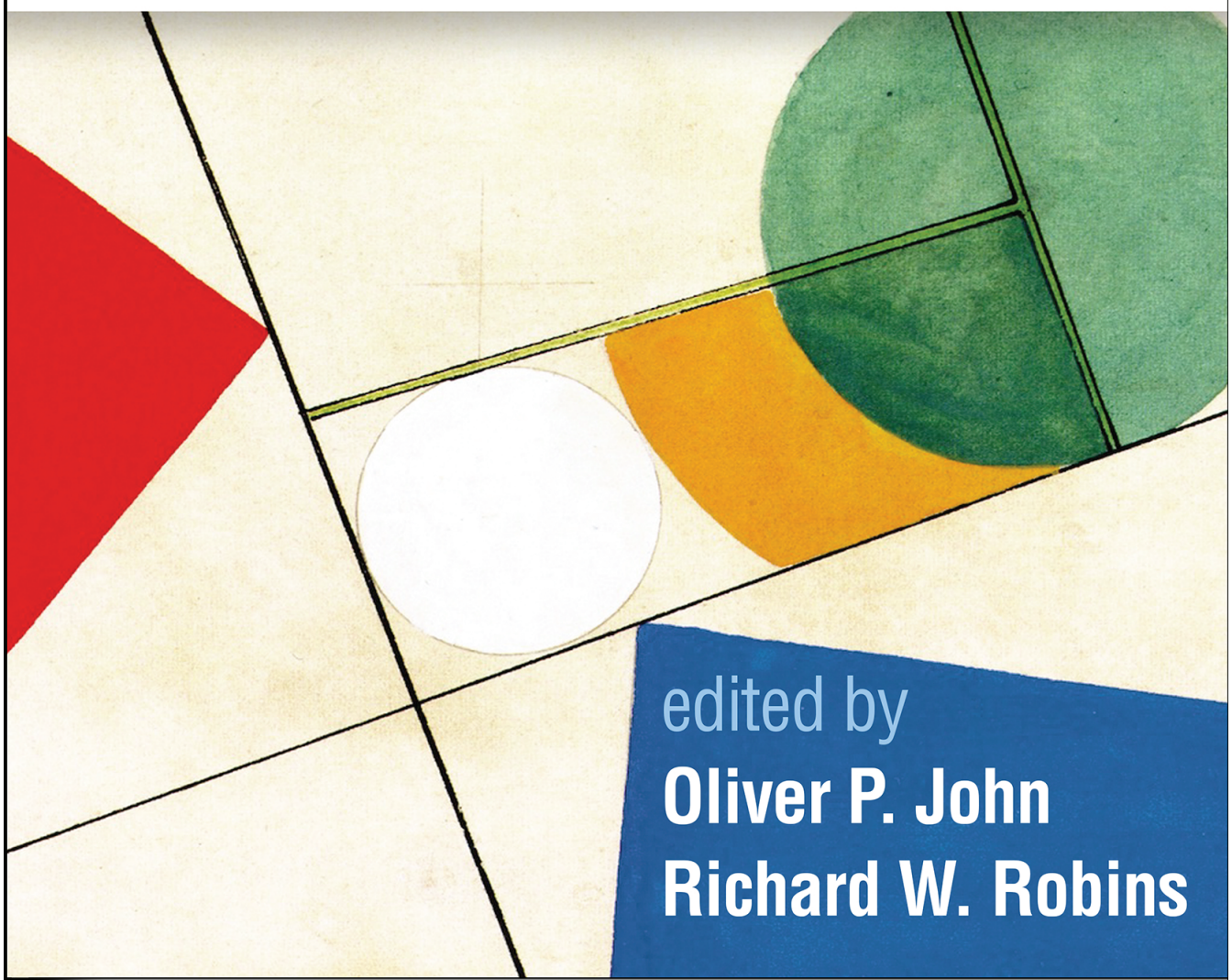


F O U R T H E D I T I O N

Handbook of **PERSONALITY**

Theory and Research



edited by

Oliver P. John

Richard W. Robins



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Handbook of **PERSONALITY**

Theory and Research

FOURTH EDITION

Edited by

Oliver P. John

Richard W. Robins



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Preface

This fourth edition of the *Handbook of Personality* follows three decades after the 1990 inaugural volume and just over one decade after the third edition. It chronicles the substantial advances in recent personality research. Indeed, the field of personality psychology, as a unified discipline distinct from clinical and social psychology, has consolidated and expanded greatly, and the fourth edition of the *Handbook* is testimony to its increasing growth and maturation.

To accommodate changes in the field over the past decade, we have expanded and restructured the *Handbook*. With more topics to cover, we have increased the number of chapters from 32 in the third edition to 42 in the fourth edition. More than half of these chapters are entirely new, and the remaining chapters have been thoroughly updated and revised.

The organization of the *Handbook* has also been updated and now consists of eight sections. Part I provides a broad overview and introduction to the field; each of its five chapters summarizes a theoretical perspective that is foundational to the field.

The major body of the *Handbook* consists of five sections that represent the main content areas of personality theory and research, with greatly expanded coverage compared to the previous edition. Part II addresses *biological foundations* and covers temperament, personality in animals, neurobiology, and behavioral and molecular genetics. Part III focuses on the *development* of personality, with chapters on the overall life course, four specific periods in the life course (childhood, adolescence, young adulthood, and adulthood to old age), and parenting influences. Part IV covers *cognitive and motivational processes* and includes chapters on attention and memory processes, implicit motives, the cognitive–affective processing system, and creativity. Part V covers *affective processes* and reviews research on emotion, the approach system, self-conscious and social emotions, emotion regulation, and stress and coping. Part VI reviews research on *self- and social processes* and includes chapters on self-concept and self-perception, identity, self-regulation, narcissism, attachment, person–situation interactions, and culture.

Personality research connects with other fields and has important *implications and practical applications*. These connections are explored in Part VII, which includes

chapters linking personality to religion, to subjective well-being, to psychopathology, to personality disorders, and to health.

The final section is entirely new for the fourth edition. In addition to the well-established research topics and traditions covered in the preceding sections, we wanted to give voice to new researchers and cutting-edge topics. Thus, Part VIII includes shorter and more focused chapters on several *emerging issues and new directions*: interventions designed to change personality, ecological sampling methods that help us understand personality in everyday life, the interaction of personality and environments, the degree to which people have self-insight, and the link between personality and economics.

Planning the fourth edition of the *Handbook* and overseeing its publication provided many opportunities for us to reflect on the past and present state of the field. Handbooks generally serve to provide an up-to-date summary and evaluation of current knowledge in a scientific discipline; thus, each edition of the *Handbook of Personality* provides a snapshot (or time capsule) of our discipline at a particular point in time. However, when published with some regularity, handbooks also serve to chronicle the history and development of a field. When we look back to the original 1990 edition, it becomes clear that the pace of change has been rapid and remarkable.

The field has made significant advances in the three decades since the 1990 edition. Several important conferences organized by the next generation of personality psychologists, including a meeting at the University of Michigan and several annual meetings at the Nags Head conference center in the late 1980s and the early 1990s, helped to change the climate in the field from adversarial competition to open-minded discussion and collaboration. These positive developments eventually led to the founding of the Association for Research in Personality (ARP) in 2001. This society provides a single organizational home for all researchers interested in personality and organizes a biannual conference that offers much-needed opportunities for interaction and exchange of ideas and findings.

The *Handbook of Personality* reflects these historical and generational changes as well. The 1990 edition featured the influence and continued presence of the “pioneer generation” that discovered and divided the terrain of personality into various subfields. This generation included Albert Bandura, Jack Block, Raymond Cattell, Seymour Epstein, Hans Eysenck, Lewis Goldberg, Richard Lazarus, John Loehlin, David Magnusson, Walter Mischel, and Bernard Weiner. While their enduring contributions continue to give shape to the field, only two of the 28 chapter authors from the first edition remain in the fourth edition today (Dean Simonton and Oliver John). The change of interest and focus in the literature is apparent also in the content: The five content areas that form the major body of the current edition did not exist in the 1990 edition, and topics that seem indispensable from today’s perspective had not been articulated then, such as the evolutionary basis of personality, self- and emotion regulation, and well-being and happiness. Moreover, we are relieved to see that our then male-dominated field has slowly become more diverse. Specifically, in the 1990 edition, women were senior authors of only *two* of the chapters, whereas in the fourth edition that number has increased to 14 (or one-third) of the chapters.

The inevitable march of time is also apparent in the editorship of the *Handbook*. At the time of the first edition, the now senior editor was an assistant professor, and the junior editor had just started graduate school. The founding editor of the *Handbook*, Lawrence Pervin, passed away in 2016. We are grateful to him for having launched the *Handbook*, and are proud to carry on the tradition of providing a reference volume by, and for, the next generations of personality researchers. We also want to thank all of the

contributing authors for their many important contributions to our field and for their dedication and patience in seeing this fourth edition come to fruition.

Finally, we thank the team at The Guilford Press who have shepherded the *Handbook* for three decades and made sure it always had a stable home. We are grateful for their many contributions to make this fourth edition a reality. We particularly thank Editor-in-Chief Seymour Weingarten, who knew the world was ready for the next edition before we were quite ready to tackle that challenge and provided input and support all along the way, as well as Carolyn Graham, Katherine Lieber, and Jeannie Tang for their thoughtful and patient work.

OLIVER P. JOHN, PhD
RICHARD W. ROBINS, PhD

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PART I

THEORETICAL PERSPECTIVES AND CONCEPTUAL UNITS

CHAPTER 1

The Evolution of Human Personality

David M. G. Lewis

David M. Buss

Personality psychology aspires to be the broadest, most integrative, branch of the psychological sciences. Its content is not restricted to particular subsets of psychological phenomena, such as information processing, social interaction, or deviations from normality. Personality psychologists historically have attempted to synthesize and integrate these diverse phenomena into a larger unifying theory that includes the whole person in the myriad modes of functioning (McAdams, 1997; Pervin, 1990). Moreover, personality theorists have attempted to conceptualize the place of whole persons within the broader matrix of groups and society. Our central argument in this chapter is that these theoretical goals cannot be attained without an explicit consideration of the causal processes that gave rise to the mechanisms of mind that define human nature.

Although there has been much debate about the definition of personality, two major themes have pervaded nearly all efforts at grand personality theorizing: human nature and individual differences (Buss, 1984). Human nature deals with the common characteristics of humans, the shared motives, goals, and psychological mechanisms that are either universal or nearly universal. Proposed species-typical motives range from the sexual and aggressive instincts postulated by Freud (1905/1953) to the motives

to get along and get ahead postulated by Hogan (1983). A proper conceptualization of human nature, however, is much larger than the forces that impel people out of bed in the morning and motivate them in their daily quests. Human nature also includes the species-typical ways in which humans make decisions (e.g., selection of mates and habitats), the ways humans respond to environmental stimuli (e.g., fears of snakes and heights are more typical than fears of cars or electrical outlets), and even the ways people influence and manipulate the world around them. No other branch of psychology except personality psychology aspires to this broad conceptualization of human nature. Personality psychology is also the central branch of psychology for which individual differences play a prominent role. Indeed, one key function of personality theory is to identify the most important ways in which individuals differ from among the infinite dimensions of possible difference (e.g., see Goldberg, 1981; Norman, 1963; Wiggins, 1979).

These two themes—human nature and individual differences—ideally should not occupy separate and isolated branches of the field of personality psychology (Buss, 1984). Initial “grand theories” of personality, such as those advanced by Freud (1905/1953) and others, incorporated propositions about ways in which human nature and individual

differences are systematically linked. Over the past few decades, however, the field of personality psychology has retreated somewhat from this grand goal. Most empirical research on personality psychology deals with individual differences, not with human nature, let alone with the links between human nature and individual differences (e.g., McCrae & John, 1992). By focusing almost exclusively on individual differences, modern personality psychology has implicitly ceded the study of human nature to other branches of psychology, such as social psychology, which typically concentrates on shared characteristics of human psychology and neglects the individual. This restricted focus on individual differences has led some to identify this as a defining feature of modern personality psychology: “that branch of psychology which is concerned with providing a systematic account of the ways in which individuals differ from one another” (Wiggins, 1979, p. 395). Grand theories of human nature that once characterized the field of personality psychology are now regarded primarily as relics of historical interest.

One of our central arguments in this chapter is that the grand goals of personality psychology should be reclaimed. An analogy might help to clarify this argument. Suppose that invisible Martian scientists were assigned the task of studying the large metallic vehicles that earthlings use for transportation. One group of scientists was assigned the task of figuring out “car nature,” the basic design that is common to all cars. They might conclude that all cars have tires, a steering mechanism, a method of braking, and an engine that provides propulsion. The second group of scientists, in contrast, was assigned the task of determining the major ways in which cars differ from one another. They might conclude that some have large tires, others small tires; some have rack-and-pinion steering, others do not; some have anti-lock brakes, others do not; some have a six-cylinder engine, while others make do with four cylinders.

The second group of scientists is faced with the task of determining which individual differences are the really important ones, and separating these from the trivial ones. Cars differ in the color of the engine

wires, for example, but are these differences really important (Tooby & Cosmides, 1990a, 1990b)? The Martian scientists who study car differences conclude that they cannot really accomplish their task—identifying in a nonarbitrary fashion the most important individual differences—without talking to the first group of scientists, who are responsible for developing a theory of “car nature.” From a collaboration between these two groups, they arrive at a nonarbitrary criterion for determining which car differences are really important: those differences that affect the functioning of the car. Using this criterion, they decide that “differences in the colors of the engine wires” is really a trivial dimension of individual differences, since these differences have no impact on the functioning of the car’s engine. But they include differences in the number of engine cylinders, tire size, and breaking mechanism, because these differences have a profound effect on the car’s functioning. The key point is that it would be illogical to have two entirely separate “car theorists,” one dealing with car nature and one dealing with car differences. The two are inextricably bound, and their integration is essential for a nonarbitrary theory for both car nature and car differences.

People are not cars, and the analogy breaks down at a certain point. But the central point of the analogy may be expressed as a syllogism: (1) If humans have a human nature, and (2) if the components of that nature were “designed” to perform certain functions, then (3) a nonarbitrary means for identifying the most important individual differences involves discovering those differences that influence those functions. In order to establish the veracity of the first two premises, we must examine the causal processes that “designed” humans and ask whether this process has produced a human nature with an identifiable set of functions.

Selection as a Designer of *Functional* Organisms

Scientists over the past two centuries have proposed a delimited set of theories about the causal process responsible for the design of humans and other life forms. One theory

is that of “divine creation,” the idea that a deity created humans in all of their glorious nature. Another theory is that extraterrestrial organisms planted the seeds of life on earth, and that these seeds were transformed by some evolutionary process over millions of years into humans. Neither divine creation nor seeding theory have many proponents among modern scientists. Indeed, only one theory of origins, albeit with modifications and extensions, has held sway among scientists over the past century and a half—the theory of evolution by selection.

Although it is widely misunderstood, the theory of evolution by selection is remarkably simple. First, individuals differ in a variety of ways. Second, some of these variants are heritable—passed down from parents to children. Third, some of these variants influence survival and reproduction recurrently over generations. Fourth, those variants that contribute to greater reproduction (relative to extant competing variants), directly or indirectly, are passed down to succeeding generations in greater numbers than other variants that lead to comparatively lower reproduction. Fifth, over many generations, variants associated with greater reproduction continue to increase in relatively frequency in the population, thereby displacing other, less successful variants and eventually spreading to most or all members of the species. This selective process, occurring over vast expanses of time and space, is responsible for the “design” of all organisms.

Selection, of course, is not the only causal process that produces change over time. Genetic drift, sudden catastrophes, such as a meteorite hitting the earth, and other processes certainly produce change and must be included in any comprehensive evolutionary account. Selection, however, is generally regarded as the most important causal process, since it is the *only known causal process* that can produce *complex functional design, at some basic level of analysis*. A meteorite may have caused the extinction of dinosaurs, and perhaps even opened up new niches for the explosive evolution of mammals, but such catastrophic events cannot create the complex functional design that characterized dinosaurs or any other organisms. Whereas unpredictable catastrophes are important in understanding the

evolution of life on earth, no known causal process other than selection can produce the complex functional design that characterizes all organisms (see Buss, Haselton, Shackelford, Bleske, & Wakefield, 1998, for a more detailed discussion of these issues).

For this reason alone, any psychological theory, including any theory of personality, must fit within a broader evolutionary framework. To put it differently, all psychological theories are implicitly or explicitly evolutionary (Symons, 1987). Although many psychologists fail to specify their assumptions about the evolution of human nature (keeping those assumptions implicit), not one has ever proposed a psychological theory that has presumed some other causal process to be responsible for creating human nature.

Despite this, most personality psychologists have entirely ignored evolutionary processes in their domains of study. Motive approaches to personality, which would seem to have obvious evolutionary relevance, historically have ignored evolution. Researchers who study the “self” have created mini-theories such as self-verification theory, self-enhancement theory, and social identity theory in a theoretical vacuum, uninformed by the causal processes that created the psychological mechanisms involved or the functions of those mechanisms. Psychologists who study traits and trait taxonomies typically have the goal of identifying the statistical structure of individual differences, without an interest in how and why evolution might have shaped that particular structure of personality. Description, of course, is often an important first step. As evolutionary biologist George Williams (1966, p. 20) noted, “Many sciences develop for a time as exercises in description and empirical generalization. Only later do they acquire reasoned connections within themselves and with other branches of knowledge. Many things were scientifically known about human anatomy and the motions of the planets before they were scientifically explained.”

We suggest that the time is ripe for the scientific maturation of personality psychology. We present in the remainder of this chapter a powerful set of conceptual tools that an evolutionary framework can offer

to personality psychology to help transform it into a more theoretically mature and explanatory science.

Selection: The “Designing” Evolutionary Process

In each generation, the process of selection acts as a sieve (Dawkins, 1996). Variants that interfere with successful solutions to adaptive problems are filtered out. Variants that are tributary to the successful solution to an adaptive problem pass through the selective sieve. Iterated over thousands of generations, this filtering process tends to produce morphological, physiological, and psychological characteristics that interact with the physical, social, or internal environment in ways that promoted the reproduction of the individuals who possess the characteristics or the reproduction of the individual's genetic relatives (Dawkins, 1982; Hamilton, 1964; Tooby & Cosmides, 1990a, 1990b; Williams, 1966). These characteristics are called *adaptations*. Adaptations that are psychological in nature are the subclass of adaptations that make up the human mind: evolved psychological mechanisms.

An adaptation exists in the form that it does because it helped to solve a specific problem relevant to survival or reproduction that recurred through evolutionary history. Solutions to adaptive problems can be direct, such as a fear of dangerous snakes that solves a survival problem or a desire to mate with fertile members of one's species that helps to solve a reproductive problem. They can be indirect, as in a desire to ascend a social hierarchy, which many years later might give an individual better access to more desirable mates. Or they can be even more indirect, such as when a person helps a brother or sister, which eventually helps that sibling to reproduce. Our callus-producing adaptations are mechanisms that evolved to solve the problem of potential tissue damage caused by repeated friction (input) by producing additional cell layers (output) that protect underlying tissues in response to this friction. The callus example also illustrates the point that the adaptation is the underlying *mechanism* responsible for producing calluses. Highly callused hands do not characterize universal human nature; rather, the

mechanisms responsible for producing calluses are the adaptation shared by all typically developing members of our species. We elaborate on the important concept of the *mechanism* later in this chapter.

In order for a mechanism to qualify as an adaptation, it must develop reliably among species members in all “normal” environments. Environmental events during ontogeny always have the potential for disrupting the development of a mechanism in a particular individual; thus, the genes “for” the mechanism do not invariantly result in its intact form. To qualify as an adaptation, the mechanism must reliably emerge in reasonably intact form at the appropriate time during an organism's life, however, and be characteristic of most or all members of a species (with some exceptions; e.g., characteristics that are sex-linked or exist in only a subset of members of a species due to frequent-dependent selection—topics we take up later in this chapter).

Neither adaptations nor their products need be present at birth. Many develop long after birth. Bipedal locomotion is a reliably developing characteristic of humans, but most humans do not begin to walk until a year after birth. The breasts of women reliably develop and the testicles of males reliably descend, but neither process begins until pubertal development.

The hallmarks of adaptation are features that define *special design*—complexity, economy, efficiency, reliability, precision, and functionality (Williams, 1966). These qualities are conceptual criteria subject to empirical testing and potential falsification for a particular hypothesis about an adaptation. Because, in principle, there are an infinite number of alternative hypotheses to account for a particular constellation of findings, the evaluation of a specific hypothesis about an adaptation is a probability statement about the likelihood that the complex, reliable, and functional features of special design could not have arisen as an incidental byproduct of another characteristic or by chance alone (Tooby & Cosmides, 1992). As more and more functional features of special design are predicted and subsequently documented for a hypothesized adaptation, each pointing to the successful solution to a specific adaptive problem, the alternative

hypotheses of chance and incidental byproduct become increasingly improbable.

Although adaptations are generally considered to be the primary products of selection, they are not the only products (see Tooby & Cosmides, 1992; Buss et al., 1998). Selection also produces *byproducts of adaptations* and a residue of *noise*. Byproducts are characteristics that do not solve adaptive problems and tend not to have functional design. They are carried along with characteristics that do have functional design, because they happen to be coupled with those adaptations.

Consider the light bulb. A light bulb is designed to produce light. The design features of a light bulb—the conducting filament, the vacuum surrounding the filament, and the glass encasement—are all tributary to the production of light and part of its functional design. Light bulbs, however, also produce heat. Heat is a byproduct of light production. It is carried along not because the bulb was designed to produce heat, but rather because heat tends to be a reliable incidental consequence of light production.

A naturally occurring example of a byproduct of adaptation would be the human belly button. There is no evidence that the belly button per se helped human ancestors to survive or reproduce. A belly button is not good for catching food, detecting predators, avoiding snakes, locating good habitats, or choosing mates. It does not seem to be involved directly or indirectly in the solution to an adaptive problem. Rather, the belly button is a byproduct of something that is an adaptation: the umbilical cord that supplied nutrition to the growing fetus.

Nonselective Evolutionary Processes

Everything is a product of *evolution*, but that does not mean that everything is a product of *selection*. Selection is one of multiple evolutionary processes, but it is often regarded with special privilege—and for good reason: It is the only known causal process capable of producing complex functional design in organisms, including humans. Selection is therefore an indispensable tool for understanding the *design* of the human mind. For this reason, a large focus of this chapter is on selection-based conceptual tools. Nonethe-

less, we do not want the reader to conflate “selection” with “evolution,” which consists of both selective and nonselective processes. Here, we briefly outline the respective products of these different evolutionary processes, which we describe in greater detail later in the chapter.

So far, we have focused on that special class of mutations (i.e., genetic variants) that are advantageous, and therefore favored by selection, as well as phenomena that inevitably co-occur with these adaptations: byproducts. The evolutionary process of *selective neutrality* yields *noise*: mutations that neither contribute to, nor detract from, the functional design of the organism. In self-reproducing systems, these neutral effects can be carried along and passed down to succeeding generations, as long as they do not impair the functioning of the mechanisms that are adaptations. There is a third and final class of mutations: those mutations that are deleterious and therefore selected against. Despite their detrimental effects, these mutations cannot be entirely eliminated from the population, because selection cannot work fast enough to do so.

In summary, evolutionary processes produce four products—adaptations, byproducts of adaptations, neutral noise, and deleterious mutations that have yet to be selected out. In principle, we can analyze the component parts of a species and conduct empirical studies to determine which of these parts are adaptations, which are byproducts, which represent neutral noise, and which are best characterized as the result of mutation–selection balance. Evolutionary scientists differ in their estimates of the relative sizes of these four categories of products. Some argue that even uniquely human qualities, such as language, are merely incidental byproducts of large brains (e.g., Gould, 1991). Others argue that qualities such as language show evidence of special design that render it highly improbable that it is anything other than a well-designed adaptation for communication and conspecific manipulation (Pinker, 1994). It is equally incumbent on both sides of this argument to formulate hypotheses in a precise, testable, and potentially falsifiable manner, so that the different positions can be adjudicated empirically.

Evolutionary Consequences for Human Nature

One important consequence of a careful consideration of the products of evolutionary processes is that the core of human nature largely consists of adaptations. We address in this section the core of human nature from this adaptationist perspective. First, we argue that all species, including humans, have a nature that can be described and explained. Second, we provide a definition of evolved psychological mechanisms—the core units that comprise human nature. Third, we explore two illustrations of evolved psychological mechanisms. And fourth, we suggest some ways in which evolutionary thinking can provide a nonarbitrary foundation for a personality theory that specifies the core of human nature.

Humans Have a Human Nature

All species have a nature. It is part of lion's nature to walk on four legs, display a large furry mane, hunt other animals for food, and live on the savannah. It is part of a butterfly's nature to enter a flightless pupae state, wrap itself in a cocoon, and emerge to soar, fluttering gracefully in search of food and mates. It is part of a porcupine's nature to defend itself with quills, a skunk's nature to defend itself with a spray of acrid liquid smell, a stag's nature to defend itself with antlers, and a turtle's nature to defend itself with a shell. All species have a nature, but that nature is different for each species. Each species has faced at least somewhat unique selection pressures during its evolutionary history and has therefore evolved at least some unique adaptive solutions.

Humans also have a nature—qualities that define us as a species—and all psychological theories imply the existence of a human nature. For Freud (1905/1953), human nature consisted of raging sexual and aggressive impulses. For William James (1890/1962), human nature consisted of dozens or hundreds of instincts. Even the most ardently environmentalist theories, such as Skinner's theory of radical behaviorism, assume that humans have a nature—in this case, consisting of a few highly general learning mechanisms (Symons, 1987). All psychological

theories require as their core a specification of, or fundamental premises about, human nature.

Since evolution by selection is the only known causal process that is capable of producing the fundamental components of that human nature, all psychological theories are implicitly or explicitly evolutionary (Symons, 1987). Although many psychologists fail to specify their assumptions about the evolution of human nature (hence keeping those assumptions implicit), not one has ever proposed a psychological theory that has presumed some other causal process to be responsible for creating human nature.

If humans have a nature and if selection is the causal process that produced that nature, then the next question is: What insights into human nature can be provided by examining our evolutionary origins? Can examining the *process* of selection tell us anything about the *products* of that process in the human case? Can evolutionary theory provide *heuristic value*, guiding personality researchers to important domains that have been neglected, unexamined, or downplayed? Can it yield specific psychological hypotheses that are capable of being empirically tested, and hence confirmed or falsified?

Whereas the broader field of evolutionary biology is concerned with the evolutionary analysis of grandly integrated parts of an organism, evolutionary psychology focuses more narrowly on those parts that are psychological—the analysis of the human mind as a collection of evolved mechanisms, the contexts that activate those mechanisms, and the behavior generated by those mechanisms. And so we explore in the next section the subclass of adaptations that make up the human mind—evolved psychological mechanisms.

The Nature of Evolved Psychological Mechanisms

By definition, every adaptation *exists in the form that it does because it helped solve a specific problem of survival or reproduction recurrently over evolutionary history*. The fact that each evolved psychological mechanism was shaped by a specific survival- or reproduction-related problem means that

the form of the mechanism, its set of *design features*, is like a key made to fit a particular lock (Tooby & Cosmides, 1992). Just as the shape of the key must be coordinated to fit the internal features of the lock, the shape of the design features of a psychological mechanism must be coordinated with the features required to solve an adaptive problem of survival or reproduction. Consequently, each adaptation—whether physiological, morphological, or psychological—is designed (1) to be activated by input signaling that the adaptive problem it evolved to solve is being faced, and (2) to produce output that helped solve that problem in ancestral environments. For example, our callus-producing adaptations are mechanisms that evolved to solve the problem of potential tissue damage caused by repeated friction (input) by producing additional cell layers (output) that protect underlying tissues in response to this friction. Here, we elaborate on these properties of adaptations as they apply to psychological adaptations, or *evolved psychological mechanisms* (see Buss, 1991, 1995a, 1995b, 2008; Tooby & Cosmides, 1992):

- *The input of an evolved psychological mechanism tells an organism the particular adaptive problem it is facing.* The input of seeing a slithering snake tells you that you are confronting a particular survival problem, namely, physical damage and perhaps death if bitten. The differing smells of potentially edible objects—rancid and rotting versus sweet and fragrant—tell you that you are facing an adaptive survival problem of food selection. The input, in short, lets the organism know the adaptive problem with which it is dealing. This occurs almost invariably out of consciousness. Humans do not smell a pizza baking in the oven and think, “Aha, I am facing an adaptive problem of food selection!” Instead, the smell unconsciously triggers food selection mechanisms, and no consciousness or awareness of the adaptive problem is necessary.

Additionally, the fact that adaptations are *not* activated and do not produce their output in the absence of cues linked to the relevant adaptive problem is a key point. Witnessing one’s romantic partner interacting intimately with a member of the opposite sex does not activate snake avoidance, food

selection, or callus-producing adaptations. It activates a different adaptation instead: the evolved psychological mechanisms that produce the constellation of cognitive, affective, and behavioral outputs that we call sexual jealousy.

Imagine that you go to a party with your romantic partner and briefly leave the room to get a drink. When you come back, you see your romantic partner seated very close to another member of the opposite sex (i.e., a mating rival) in a secluded corner of the room. The two are laughing and smiling at each other, and then pause to look deeply into each other’s eyes. You did not notice this before, but you now see that the other person’s hand is on your partner’s thigh, and your partner is touching the other person as well.

Although the cues present in this situation do not indicate with certainty the adaptive problem of losing your mate, several of these cues are statistically predictive of the threat of your mate being unfaithful or otherwise defecting (Shackelford & Buss, 1997). These are cues to potential infidelity, which would have been costly for both ancestral men and women. Consequently, selection would have favored the evolution of anti-infidelity adaptations in both sexes, including psychological adaptations designed to detect these cues to infidelity (input).

- *The output of an evolved psychological mechanism can be physiological activity, information to other psychological mechanisms, or manifest behavior—all directed toward the solution of a specific adaptive problem.* Just as the cues to a partner’s potential infidelity signal the presence of an adaptive problem, the output of the sexual jealousy mechanism is geared toward solving that problem. The *outputs* of sexual jealousy mechanisms are a coordinated suite of cognitions, emotions, and behaviors. This can include gathering further information about the potential threat (Goetz, Shackelford, Romero, Kaighobadi, & Miner, 2008; Schützwohl, 2006, 2008); experiencing negative emotions in response to one’s mate’s interactions with potential mate poachers (Buss, 1989a, 1989b, 2000); and controlling behaviors or aggressive responses (Daly, Wilson, & Weghorst, 1982) to fend off these

same-sex rivals or combat other threats to a valued romantic relationship (Buss, 2000; Buss, Larsen, Westen, & Semmelroth, 1992; Daly et al., 1982; Symons, 1979).

Stating that the output of a psychological mechanism leads to solutions to specific adaptive problems does not imply that the solutions will always be optimal or invariably successful. A rival may not be deterred by your threats. Your partner may have a fling with your rival despite your display of jealousy. The main point is *not* that the output of a psychological mechanism *always* leads to a successful solution, but rather that the output of the mechanism *on average* tended to solve the adaptive problem in the environment in which it evolved better than outputs from alternative designs present in the population during those periods.

Moreover, evolved psychological mechanisms such as sexual jealousy adaptations, “are hypothesized to lie dormant until they are activated by cues signaling that [the] adaptive problem is being confronted” (Buss & Shackelford, 1997, p. 348); that is, we should not expect *manifest* sexual jealousy unless the adaptations responsible for producing these outputs—the universal *mechanisms*—are activated by input signaling the adaptive problem. This central property of psychological mechanisms—that their output is dependent on environmental input—has the potential to unify propositions of human nature with individual differences, and is a point we take up later in the chapter.

Describing the Human Mind: Important Properties of Evolved Psychological Mechanisms

We examine in this section several important implications for understanding the human mind based on the properties of evolved psychological mechanisms.

- *Evolved psychological mechanisms provide nonarbitrary criteria for “carving the mind at its joints.”* A central premise of evolutionary psychology is that the main nonarbitrary way to identify, describe, and understand psychological mechanisms is to articulate their functions—the specific adaptive problems they were designed by selection to solve.

Consider the human body. In principle, the mechanisms of the body could be described in an infinite number of ways. Why do anatomists identify as separate mechanisms the liver, the heart, the hand, the nose, and the eyes? What makes these divisions nonarbitrary compared with alternative ways of dividing the human body? The answer is function. The liver is recognized as a mechanism that performs functions different from those performed by the heart or hand. The eyes and the nose, although they are close to each other on the face, perform different functions and operate according to different input (electromagnetic waves in the visual spectrum vs. odors). If an anatomist tried to lump the eyes and the nose into one category, it would be seen as ludicrous. Understanding the component parts of the body requires the identification of function.

- *Function provides the only sensible nonarbitrary way to understand these component parts.* For the same reason, a powerful nonarbitrary analysis of the human mind is one that rests on function. If two components of the mind perform different functions, then they can be regarded as separate mechanisms (although they may interact with other mechanisms in interesting ways).

- *Evolved psychological mechanisms tend to be problem-specific.* Imagine giving directions to someone to get from New York City to a specific street address in San Francisco, California. If you gave some general directions such as “head west,” the person might end up as far south as Texas or as far north as Alaska. The general direction would not reliably get the person to the right state.

Now let’s suppose that the person did get to the right state. The “go west” direction now would be entirely useless, since west of California is ocean. The general direction would not provide any guidance to get to the right city within California, let alone the right street address. To get to the right state, city, street, and location on that street, you need to give more specific instructions. Furthermore, although there are many ways to get to a particular street address, some paths will be far more efficient and time saving than others.

The search for a specific street address across country is a good analogy for what is

needed to reach a specific adaptive solution. Adaptive problems, like street addresses, are specific—don't get bitten by that snake, select a habitat with running water and places to hide, avoid eating food that is poisonous, select a mate who is fertile, and so on. There is no such thing as a "general adaptive problem" (Symons, 1992). All problems are specific.

Because adaptive problems are specific, their solutions tend to be specific as well. Just as general instructions fail to get you to the correct location, general solutions fail to get you to the right adaptive solution. Consider two adaptive problems—selecting the right foods to eat (a survival problem) and selecting the right mates with whom to have children (a reproductive problem). What counts as a "successful solution" is quite different for these two adaptive problems. Successful food selection involves identifying objects that have calories, particular vitamins and minerals, and do not contain toxic substances. Successful mate selection involves, among other things, identifying a partner who is fertile, a reliable provider, and a good parent.

What might be a general solution to these selection problems, and how effective would it be at solving them? One general solution would be "select the first thing that comes along." This would be disastrous, since it might lead to eating poisonous plants or mating with an infertile person; or alternatively, eating the person and trying to mate with the poisonous plant! If anyone ever had developed such a general solution to these adaptive problems in human evolutionary history, he or she failed to become one of our ancestors.

In order to solve these selection problems in a reasonable way, one needs more specific guidance about the qualities of foods and qualities of mates that are important. Fruit that exhibits cues to being fresh and ripe, for example, will signal better nutrients than fruit that looks rotten. People who exhibit cues to youth and health will be more fertile, on average, than people who exhibit cues to older age and poorer health. We need *specific selection criteria*—qualities that are part of our selection mechanisms—in order to solve these selection problems successfully.

The specificity of mechanisms is further illustrated by errors in selection. If you make

an error in food selection, then you have an array of mechanisms that are tailored to correcting that error. When you place a piece of bad food in your mouth, it may taste terrible—an output of evolved disgust mechanisms that motivates you to spit it out. You may gag on it if it makes its way past your taste buds. And if it makes its way all the way down to your stomach, you may vomit—another feature of evolved disgust mechanisms designed to get rid of toxic or detrimental ingested substances. But if you make an error in mate selection, you do not spit, gag, or throw up (at least not usually!). Rather, that adaptive problem is solved by distinct psychological and behavioral outputs (e.g., by leaving, selecting someone else, or simply telling the person that you don't want to see him or her anymore).

In summary, problem specificity of adaptive mechanisms is favored over generality, because (1) general solutions fail to guide the organism to the correct adaptive solutions; (2) general solutions, even if they can sometimes work, lead to too many errors and thus are excessively costly to the organism; and (3) what constitutes a "successful solution" fundamentally differs from problem to problem (criteria for successful food selection differ from criteria for successful mate selection).

- *Humans possess many evolved psychological mechanisms.* Humans, like most organisms, face a large number of adaptive problems. The problems of survival alone number in the dozens or hundreds—problems of thermal regulation (getting too cold or too hot), avoiding predators and parasites, ingesting life-sustaining foods, and so on. Then there are problems of mating, such as selecting, attracting, and keeping good mates and getting rid of bad mates. There are also problems of parenting such as breastfeeding, weaning, socializing, deciding on the varying needs of different children, and so on. Then there are the problems of investing in kin, such as brothers, sisters, nephews, and nieces; dealing with social conflicts; defending yourself against aggressive groups; grappling with the social hierarchy, and dozens more.

- *Because specific problems require specific solutions, numerous specific problems will require numerous specific solutions.*

The mind, according to this analysis, almost surely contains hundreds or possibly thousands of specific mechanisms. Since a large number of different adaptive problems cannot be solved with just a few mechanisms, the human mind must contain a large number of evolved psychological mechanisms.

- *The specificity, complexity, and numerousness of evolved psychological mechanisms gives humans behavioral flexibility.* The definition of a *psychological mechanism*, including the key components of input, decision rules, and output, highlights why adaptations are not rigid “instincts” that show up invariably in behavior. Recall the example of callus-producing mechanisms that have evolved to protect the structures beneath the skin. You can design your environment so that you don’t experience repeated friction. In this case, your callus-producing mechanisms will not be activated. The activation of the mechanisms is dependent on contextual input coming from the environment. In the same way, all psychological mechanisms require input for their activation.

The analogy of a carpenter’s toolbox provides a useful illustration of how the numerousness of evolved psychological mechanisms, each designed to solve a specific problem, afford the mind with *greater* flexibility. The carpenter gains flexibility not by having one “highly general tool” that can be used to cut, poke, saw, screw, twist, wrench, plane, balance, and hammer. Instead, the carpenter gains flexibility by having a large number of highly specific tools in the toolbox. These highly specific tools can then be used in many combinations that would not be possible with one highly “flexible” tool. In a similar fashion, the human mind gains its flexibility from having a large number of problem-specific psychological mechanisms.

This leads to a conclusion that is contrary to our intuitions. Most people’s intuitions are that having a lot of innate mechanisms causes behavior to be rigid and inflexible. But just the opposite is the case. The more mechanisms we have, the greater the range of behaviors we can perform, and hence the greater the flexibility of behavior.

In summary, an evolutionary perspective provides some broad specifications of human nature. First, it suggests a nonarbi-

trary foundation for describing the contents of human nature—contents described by the evolved psychological mechanisms of humans. Second, it suggests that human nature is likely to be extremely complex, consisting of a large number of evolved psychological mechanisms rather than one or a few simple drives, motives, or goals. Third, because evolved psychological mechanisms tend to be problem-specific and hence activated only in particular contexts, it suggests that human nature will express itself in variable and context-dependent ways rather than as invariant impulses, as implied by some personality theories. Fourth, it suggests that human behavioral flexibility comes not from having highly general psychological mechanisms but rather from having a large number of specific psychological mechanisms that are activated and concatenated in varying complex sequences, depending on the adaptive problem being confronted. These implications render the study of human nature a difficult and daunting task, but also one that is tractable.

Progress can be made sequentially and cumulatively by uncovering each evolved psychological mechanism along with the adaptive problem it was designed to solve. Ultimately, of course, the field will have to discover how the mechanisms are connected with each other, how they are sequentially activated depending on circumstances, how the activation of one can preempt or supersede the activation of another, and so on (Buss, 2008).

The Evolution of Motives, Goals, and Strivings

This evolutionary analysis has profound implications for personality theories of human nature. It provides an incisive heuristic that guides theorists to the sorts of motives, goals, and strivings that commonly characterize humans. At the most general level, it suggests that at some fundamental level of description, the only directional tendencies that can have evolved are those that historically contributed to the survival and reproduction of human ancestors. For a variety of reasons outlined by Symons (1992) and Tooby and Cosmides (1990a, 1990b), what might seem like the most obvious candidate for a human motive—the goal of maximizing inclusive fitness—cannot have evolved.

Because what constitutes fitness differs for different species, sexes, times, and contexts, evolution by selection cannot produce a domain-general motive of fitness maximization. It is not just that people never list “maximization of gene replication” as a personal project when asked to list what they are striving toward in their lives (Little, 1989). It is that no such goal can evolve even in principle, consciously or unconsciously. Stated differently, the *products* of the evolutionary process—the specific adaptations and byproducts that characterize humans—should not be confused with the evolutionary *process* that fashioned them. Differential gene replication caused by differences in design features is the process by which adaptations get created. But the adaptations themselves do not—cannot—include a desire to maximize gene replication.

Status Striving

What can evolve are *specific* motives, goals, and strivings, the attainment of which recurrently led to reproductive success over human evolutionary history. Consider one candidate for a universal human motive—*striving for status* (Buss, 1995a, 1995b; Hogan, 1983; Maslow, 1970). Why would status striving be a species-typical motive in humans? A variety of sources of evidence can be drawn on to address this question. First, among closely related species that form status hierarchies, such as chimpanzees, those who are high in status tend to outreproduce those who are lower in status. They do so because they gain preferential access to both desirable mates and resources needed for survival, such as choice food. Dominant chimpanzee males, for example, tend to monopolize the matings with females during estrus, whereas the copulations of less dominant males, when they occur, take place outside of the peak period of fecundity (de Waal, 1982).

Second, the cross-cultural and historical evidence suggests that high-status males such as kings, emperors, and despots routinely use their status to gain increased sexual access to females (Betzig, 1986). Kings and despots routinely stocked their harems with young, attractive, nubile women and had sex with them frequently. The Moroccan emperor Moulay Ismail the Bloodthirsty,

for example, acknowledged having sired 888 children (actually, the number is probably double this, since only male children were acknowledged). His harem had 500 women. But when a woman reached the age of 30, she was banished from the emperor’s harem, sent to a lower-level leader’s harem, and replaced by a younger woman. Roman, Babylonian, Egyptian, Incan, Indian, and Chinese emperors acted in a similar manner, using their status to enjoin their trustees to scour the land for as many young, pretty women as could be found (Betzig, 1992).

Third, cross-cultural evidence suggests that the children of higher-status individuals tend to receive better health care, and hence survive longer and are more healthy than the children of lower-status individuals. Among the Ache Indians, a hunter-gatherer group in Paraguay, tribal members take great pains to remove splinters and thorns from the feet of the children of high-status males (Hill & Hurtado, 1996). Choice food, choice territory, and choice mates all flow with greater abundance to those high in status among hunters and gatherers around the world (e.g., Chagnon, 1983; Hart & Pilling, 1960; Hill & Hurtado, 1996).

If the attainment of high status recurrently led to increased reproductive success over human evolutionary history, then selection would have fashioned evolved psychological mechanisms that produce, as output, what we observe as a species-typical motive of status striving. This analysis, however, does not stop there, because specific and testable hypotheses about status striving can be generated. One key hypothesis pertains to a sex difference in the strength of the status-striving motive. Men and women differ in a fundamental fact of their reproductive biology: Women bear the burdens (and pleasures) of heavy obligatory parental investment, since a minimum of 9 months of pregnancy, with all the metabolic costs that entails, are required to produce a single child. Men, on the other hand, can produce a child from a single low-cost act of sexual intercourse. This fundamental sex difference has led to profound sex differences in sexual strategies (Buss, 1994; Symons, 1979; Williams, 1975). The key difference relevant to status striving is this: The reproductive payoff to men of gaining sexual access to multiple partners historically has been far greater

than the reproductive payoff for women. Since status leads to increased sexual access to partners, men are predicted to be higher in status striving than women.

This evolutionary reasoning produces a specific and testable prediction: Men in every culture around the world should have a greater desire for status, on average, than women. Among the many possible empirical tests that could be conducted are these: (1) Men should be more willing to take greater risks than women in order to achieve high status; (2) in the allocation of their effort across various adaptive problems, men should allocate more time and effort to status striving than women; (3) men who lose status should engage in more desperate measures than women who lose status in order to staunch the loss; (4) the psychological pain that men experience after a loss of status should be greater than the psychological pain women experience after a comparable experience. These are easily testable predictions, but to our knowledge, none of these predictions has been examined empirically in a systematic fashion across cultures.

There are several key implications from this evolutionary analysis of status striving. First, evolutionary psychology provides a powerful heuristic that guides theorists and researchers toward motives and goals likely to be the products of species-typical, evolved psychological mechanisms that form the building blocks of human nature. Second, the evolutionary predictions derived are testable and hence potentially falsifiable, contradicting a common but mistaken idea that evolutionary hypotheses are not testable. Third, this evolutionary analysis suggests that the *outputs* of the building blocks of human nature can systematically differ for men and women, because the sexes have faced recurrently different adaptive problems over the long expanse of human evolutionary history.

Mating Motivation

A second motive that is a prime candidate for being the output of a species-typical evolved psychological mechanism is mating motivation. At first blush, this may seem so obvious as to hardly warrant much comment—but first blushes can be misleading. Despite the obvious importance of sex and sexuality

in the everyday lives of people (Buss, 1994), few personality theories explicitly consider sex. Freud (1905/1953), of course, was a major exception. Indeed, sexual motivation was the primary driving force in psychoanalytic theory, providing the raw energy that fueled nearly all other forms of human activity, from sports to cultural innovation. Since Freud's theory, however, personality theories have minimized sexual and mating motivations. Evolutionary personality psychology appears to be the only metatheoretical framework that predicts sexual motivation will be a fundamental component of human nature (Buss, 1991). Even personality frameworks that restrict their focus to individual differences typically exclude individual differences in sexuality, despite their prevalence and importance in the everyday lives of persons (Schmitt & Buss, 2000).

Evolutionary analysis provides a compelling rationale for the importance of sexuality. Evolution by selection occurs through differential reproduction caused by differences in design (Symons, 1992). Reproductive differences, in other words, are the engine of the evolutionary process. Therefore, anything that resides in close proximity to reproduction and affects the probability of reproduction is likely to be a special target of the selective process. Perhaps nothing lies closer to the reproductive engine than sexuality and mating.

Consider what it would have taken human ancestors to succeed in reproduction. The first task is mate attraction, successfully enticing a member of the opposite sex to become one's mate. This task is more difficult than it might seem, for it includes at a minimum selecting the "right" mates on whom to deploy one's attraction tactics (e.g., those that are reproductively valuable rather than sterile), as well as embodying the desires of the targeted member of the opposite sex sufficiently to succeed in attraction (Buss, 1994). Embodying or fulfilling the desires of the targeted other might include a prolonged effort at attaining a modicum of social status, establishing a favorable reputation among one's peers, and displaying physical cues of desirability.

Successful attraction is not enough. In order to produce viable offspring, the ancestral human would also have had to be motivated to engage in sex with the targeted

person. Although this may appear to flow naturally and effortlessly for some, it actually entails a complex set of properly sequenced and contingent behaviors in order to culminate in successful merging of the male sperm and female egg. Mating motivation also entails the intricate tasks of besting intrasexual competitors in successful attraction tactics (Buss, 1988a; Schmitt & Buss, 1996), perhaps derogation of intrasexual competitors to make them seem less desirable (Buss & Dedden, 1990), and successful mate retention (Buss, 1988b; Buss & Shackelford, 1997). Mating motivation is a multifaceted venture, entailing a host of subtasks, any of which can result in a failure. As descendants of ancestors who succeeded in all of these mating tasks, modern humans have inherited the underlying psychological mechanisms responsible for producing mating motivations and behavioral strategies that led to their success. Personality theories that fail to include mating motivation, broadly conceived, must be viewed as woefully inadequate, if they are attempting to describe human nature.

Like status striving, however, evolutionary analysis provides a powerful rationale for predicting sex differences in the nature of mating motivation. Due to the asymmetries in obligatory parental investment, for example, men are predicted to have a greater desire than women for a larger number of sex partners, and a large body of empirical evidence supports this prediction (Buss & Schmitt, 1993; Kenrick, Sadalla, Groth, & Trost, 1990). Furthermore, a large body of cross-cultural evidence supports the specific predictions that men will be more motivated to seek young and physically attractive mates, whereas women will be more motivated to seek mates who offer a willingness and ability to accrue and commit resources (Buss, 1989a; Kenrick & Keefe, 1992). Personality theories that include mating motivation, in short, must also include specific premises about the ways in which mating motivation is known to differ between the sexes, corresponding to sex differences in the adaptive problems faced over human evolutionary history.

Universal Emotions

Another core feature of human nature proposed by evolutionary psychology involves

universal mechanisms of emotion (Buss, 1989b; Nesse, 1990; Tooby & Cosmides, 1990b). A large body of cross-cultural evidence already suggests that certain forms of emotional expression are universal (Ekman, 1973). Evolutionary analysis suggests that certain emotions will be universal, designed to solve specific adaptive problems. One candidate for such a universal emotion is jealousy, which we illustrated earlier. Like status striving and sexual motivation, evolutionary analysis provides a powerful basis for predicting sex differences. These are not sex differences in the presence of intensity of jealousy, since both sexes have faced the adaptive problem of mate retention. And indeed, the empirical evidence suggests that the sexes do not differ in measures such as the frequency and intensity of jealousy experienced (Buunk & Hupka, 1987).

An evolutionary analysis, however, suggests that the sexes might differ in the events that activate jealousy. Specifically, since fertilization occurs internally within women and not within men, over evolutionary history men have faced the adaptive problem of "paternity uncertainty." Since a partner's sexual intercourse with another man would have been the primary threat to paternity certainty, and hence to successful reproduction, men's jealousy mechanisms are hypothesized to be specially keyed to the inputs of cue to sexual infidelity by a partner. Ancestral women, in contrast, faced a different adaptive problem: the loss of a mate's time, energy, effort, attention, investment, and commitment, all of which could get rechanneled to a rival woman and her children. Since a man's emotional involvement with another woman is a leading cue to such redirection of commitments, women's jealousy mechanisms are predicted to be keyed to the inputs of cues to emotional involvement more than to cues to sexual infidelity per se, although the two signals are clearly correlated in nature.

Much empirical evidence supports these predicted sex differences (Buss & Haselton, 2005). In forced-choice dilemmas, men more than women report that they would be experience greater distress at a partner's sexual infidelity, whereas women more than men report that they would experience greater distress as a result of a partner's emotional infidelity (Buss et al., 1992). These results

have been replicated by different researchers (Wiederman & Allgeier, 1993) across methods that include psychophysiological recordings (Buss et al., 1992), and across Western and non-Western cultures (Buunk, Angleitner, Oubaid, & Buss, 1996). The sex differences have also been found by using cognitive methods such as attention to and recall of cues to sexual versus emotional infidelity; measures of physiological distress to imagining a partner committing a sexual versus emotional infidelity; and functional magnetic resonance imaging (fMRI) technology, which has documented different patterns of brain activation in response to sexual versus emotional infidelity (for summaries of this evidence, see Buss, 2008; Buss & Haselton, 2005). All of these empirical findings suggest that jealousy is a universal and universally sex-differentiated emotional mechanism that is a good candidate for inclusion in a personality theory of human nature.

Jealousy is clearly not the only candidate. Others include fear, rage, envy, disgust, sadness, and others. As Ekman (1994) notes, the empirical evidence suggest that these emotional mechanisms are universal across human cultures, have been adaptive phylogenetically, produce their manifest output in common eliciting contexts despite individual differences and cultural differences, are likely to be present in closely related primate species, and can be activated quickly, prior to awareness, mobilizing action designed to respond to specific adaptive challenges. There is no reason why theories of personality should fail to include these emotions as candidates for the core of human nature.

Parental Motivation

From an evolutionary perspective, offspring are vehicles for parents. They are a means by which their parent's genes get transported to succeeding generations. Given the supreme importance of offspring as genetic vehicles, it is reasonable to expect that selection will favor mechanisms in parents to ensure the survival and reproductive success of their children. Aside from the problems of mating, perhaps no other adaptive problems are as paramount as making sure that one's offspring survive and thrive. Indeed, without the success of offspring, all the effort that

an organism invested in mating would be reproductively meaningless. Evolution, in short, should produce a rich repertoire of parental mechanisms specially adapted to caring for offspring.

Despite the paramount importance of parental care from an evolutionary perspective, it has been a relatively neglected topic within the field of human personality psychology. When the evolutionary psychologists Martin Daly and Margo Wilson prepared a chapter on the topic for the 1987 *Nebraska Symposium on Motivation*, they scanned the 34 previous volumes in the series in search of either psychological research or theories on parental motivation. Not a single one of the 34 volumes contained even a paragraph on parental motivation (Daly & Wilson, 1995). And despite the widespread everyday knowledge that mothers tend to love their children, the very phenomenon of powerful parental love appears to have baffled psychologists at a theoretical level. One prominent psychologist who has written books on the topic of love noted that "the needs that lead many of us to feel unconditional love for our children also seem to be remarkably persistent, for reasons that are not at present altogether clear" (Sternberg, 1986, p. 133). From an evolutionary perspective, however, the reasons for deep parental love do seem clear, or at least understandable. It is reasonable to expect that selection has designed precisely such psychological mechanisms—parental mechanisms of motivation designed to ensure the survival and reproductive success of the invaluable vehicles that transport an individual's genes into the next generation.

The evolution of parenting motivation has produced in humans mechanisms that are far from unconditional. Empirical evidence suggests that parents invest more in children when they are higher in phenotypic quality, have a high probability of genetic relatedness to parents, and have the ability to convert such aid into reproduction (see Buss, 2000, for a summary of the empirical evidence). Mothers, by virtue of internal fertilization, are 100% sure that the offspring they bear are genetically their own. Fathers can never be sure. This leads to the prediction that maternal love, on average, will tend to be stronger than paternal love. Although there is circumstantial evidence to support

this prediction, such as the higher rates of child abandonment by men compared with women, this hypothesis remains to be tested rigorously in studies of parental feeling and behavior. The incidence of physical abuse of children, to take another example, is roughly 40 times higher in stepfamilies compared with genetically intact families, supporting the prediction that genetic relatedness affects feelings of parental love (Daly & Wilson, 1988). Moreover, the evolutionary theory of parent–offspring conflict suggests that children will generally desire a higher level of parental investment than parents are willing to give, since parents are motivated to distribute their investments across offspring (Trivers, 1974).

Parental motivation, as a core feature of human nature, appears to be absent from most or all personality theories, although Freud clearly signaled the importance of relationships with parents in the development of personality. Evolutionary psychology provides a heuristic for the inclusion of this neglected component of human nature (see Atherton & Schofield, Chapter 16, this volume).

Other Motivational Candidates for Human Nature

Status striving, mating motivation, jealousy, emotions, and parental motivation are merely a few of the most obvious candidates for a comprehensive theory of human nature. Others include the desire to form friendships or dyadic reciprocal alliances (Bleske & Buss, 2001), the desire to help and invest in kin (Burnstein, Crandall, & Kitayama, 1994), and the motivation to form and join larger coalitions (Tooby & Cosmides, 1988). An evolutionary perspective leads us to anticipate the evolution of many complex psychological mechanisms underlying each of these forms of social relationships. One clear implication is that evolutionary psychology provides a nonarbitrary theoretical foundation for postulating fundamental human motivations, such as “sex and aggression” or “love and power” or “getting along and getting ahead.” At the same time, it suggests that the postulation of only one or a few such motivational tendencies will grossly underestimate the complexity of human nature.

The Evolution of Individual Differences

According to this analysis, individual differences cannot be divorced from, or considered apart from, the foundations of human nature. Personality theories of individual differences, according to this reasoning, must have as a foundation a specification of human nature. We describe in this section an evolutionary framework of individual differences (see Buss & Greiling, 1999; Keller & Miller, 2006; MacDonald, 1995, 1998; Nettle, 2006; Penke, Denissen, & Miller, 2007).

This framework includes individual differences that emerge from both heritable and nonheritable sources. Evidence from behavioral genetic studies of personality strongly suggests that both are important. Personality characteristics commonly show evidence of moderate heritability, typically ranging from 30 to 50% (Bouchard & McGue, 1990; Loehlin, Horn, & Willerman, 1990; Plomin, DeFries, & McClearn, 1990). All heritable individual differences, of course, ultimately originate from mutations—a point we take up later. Simultaneously, these studies provide the strongest evidence of environmental sources of variance, ranging from 50 to 70%. A conceptual taxonomy of sources of individual differences based on environmental and heritable sources is presented in Table 1.1.

Differential Input into Universal Mechanisms

An understanding of species-typical psychological mechanisms can be used as a power-

TABLE 1.1. Sources of Individual Differences in Personality

Environmental sources of individual differences

1. Early experiential calibration
2. Enduring situational evocation
3. Strategic specialization
4. Adaptive self-assessment of strengths and weaknesses

Heritable sources of individual differences

1. Balancing selection 1: Temporal or spatial variation in selection pressures
2. Balancing selection 2: Negative frequency-dependent selection
3. Mutation–selection balance

ful heuristic for generating and testing novel hypotheses about individual differences. Because psychological mechanisms are activated by cues ancestrally linked to the particular problem they were designed to solve, they will be activated only in particular contexts—to which only *some* humans are exposed. Crucially, this suggests that human nature will express itself not as invariant impulses, as implied by some personality theories, but rather in variable and context-dependent ways. Here, we outline several distinct ways in which evolved psychological mechanisms can be activated differentially across individuals as a function of different environmental inputs, thereby resulting in individual differences in personality.

Early Experiential Calibration

Humans have some adaptations that are designed to produce stable individual differences due to exposure to events during critical periods of development. Individuals who share common underlying psychological mechanisms can experience different environmental events early in their development that serve as inputs into those mechanisms and thereby channel those individuals into alternative, developmentally stable strategies characterized by distinct psychological and behavioral outputs.

Belsky, Steinberg, and Draper (1991), for example, propose that early exposure to stressful environments, such as resource scarcity, parental unpredictability, or father absence serve as key inputs into evolved psychological mechanisms that produce, as output, developmentally stable differences in mating strategy. According to Belsky and colleagues, the presence of a father in the home during the first 5–7 years of life is a reliable cue that, in the individual's local environment, adult pair-bonds are enduring and levels of paternal investment are high. In such an environment, the benefits of pursuing a committed, long-term mating strategy are greater, on average, than a mating strategy characterized by uncommitted sexual relations and frequent partner switching. Accordingly, selection would have shaped psychological mechanisms to take this environmental cue of father presence as input, and to functionally calibrate individuals'

mating strategy according to this cue. Individuals who are exposed to the cue of father presence exhibit a suite of psychological and behavioral features consistent with this theory: delayed sexual maturation, later onset of sexual activity, a search for long-term securely attached adult relationships, perceptions of others as reliable and trustworthy, expectations that relationships will be enduring, and heavy investment in a small number of children. Conversely, individuals who are exposed to the cue of father absence exhibit earlier sexual maturation, earlier sexual initiation, and frequent partner switching; perceive others as untrustworthy and relationships as transitory; and opportunistically attain and extract resources from uncommitted sexual liaisons.

Although Belsky and colleagues (1991) did not explicitly advance these ideas using the concept of evolved psychological mechanisms, *all theories of environmental influence* ultimately rest on a foundation of evolved psychological mechanisms, whether they are acknowledged as such or not (Tooby & Cosmides, 1990a).¹ In the case of Belsky and colleagues, the implicit psychological mechanisms are specifically designed to take as input information about the presence and reliability of paternal investment, and process that input to produce, as output, distinct mating strategies.

Crucially, the individual differences that result from early experiential calibration are *functionally calibrated to local environmental cues*. This suggests that these environment-contingent strategies resulted from a long and recurrent evolutionary history in which different individuals confronted radically different rearing environments. Environmental variation over human evolutionary history presumably selected for developmentally flexible mechanisms that take as input cues from the rearing environment that are predictive of the adult environment the individual is likely to encounter.

Although some variants of this hypothesis have received mixed empirical support at best (e.g., effects of childhood father absence on adult female mating strategies), other versions appear more empirically plausible (e.g., effects of childhood stress on accelerated female puberty and perhaps on romantic attachment security; Del Giudice, 2009;

Ellis, 2004; Ellis, Schlomer, Tilley, & Butler, 2012; Mendle et al., 2009; Neberich, Penke, Lehnart, & Asendorpf, 2010; Penke, 2009). Whatever the eventual empirical outcomes, this example illustrates how selection can favor species-typical adaptations that shunt individuals toward different adult strategies, depending on exposure to critical cues present in developmental environments.

Other human adaptations respond to immediately encountered environmental information rather than being “locked in” by early environmental events. The physiological mechanism that results in calluses, for example, responds to immediately experienced friction to the skin. Individuals differ recurrently in the degree to which they pursue activities that result in frequent repeated friction to the skin. Stable individual differences in calluses, in this example, are properly understood as functionally patterned *differences in output* stemming from *enduring environmental differences* in the inputs to the callus-producing mechanism. These enduring individual differences, like those set by early experiential calibration, are the result of the *interaction between environments and evolved mechanisms*. A similar form of functionally patterned individual differences can occur with psychological variables.

Enduring Situational Evocation

Many human adaptations respond to immediately encountered environmental contingencies rather than being “set in plaster” by early environmental events. The physiological mechanism that results in calluses, for example, responds to immediately experienced friction to the skin. Individuals differ recurrently in the degree to which they pursue activities that result in frequent repeated friction to the skin. The stable individual differences in calluses, in this example, are properly understood as adaptively patterned differences stemming from enduring environmental differences in the evocation of the callus-producing mechanism. These enduring individual differences, like those set by early experiential calibration, are the result of a specific form of interaction between environments and evolved mechanisms.

A similar form of adaptively patterned individual differences can occur with psycho-

logical factors. If individuals stably occupy different environments, evolved psychological mechanisms can produce what seem to be stable individual differences (Buss & Greiling, 1999). Let us consider a married man named Matthew. Assume that Matthew’s wife is friendly, likes to dress in revealing clothing, and enjoys flirting with other men. These circumstances can elicit frequent “mate poaching” attempts from other men over the course of the relationship. These events are hypothesized inputs into jealousy-producing mechanisms that produce as output suspicions, emotional upset, and mate-guarding behavior. By contrast, Matthew’s colleague, Michael, possesses the same psychological adaptation of jealousy—the same sexual jealousy *mechanism*—but is not exposed to any of these cues in his romantic relationship and consequently does not exhibit these cognitive, affective, or behavioral facets of jealousy. In this example, observers might be misled into concluding that Matthew has the “stable trait” of jealousy, and that Michael does not. In fact, however, Matthew’s recurrent displays of jealousy—and the apparent personality differences between Matthew and Michael—are in fact attributable to Matthew’s recurrent exposure to jealousy-activating inputs (Buss & Greiling, 1999). In short, stable occupancy of different environments can produce stable individual differences that appear trait-like, even though they are properly explained by a species-typical mechanism that is sensitive to environmental inputs.

Individual differences in jealousy, in this example, are enduring over time and adaptively patterned. They rest on a foundation of evolved psychological mechanisms shared by all but differentially activated in some. Were the enduring environment to change—for example, if the man got divorced and remarried a woman of equal or lower mate value—then the enduring pattern of psychological and behavioral jealousy would presumably change (Tooby & Cosmides, 1990a).

In summary, enduring adaptive individual differences results from evocations produced by the enduring situations inhabited. These relatively enduring situations may include one’s overall desirability as a mate on the mating market age, and the ratio of men to

women in the local population (Pedersen, 1991). Future research could profitably explore these and other features of enduring environments as sources of relatively stable individual differences.

Strategic Specialization

From an evolutionary perspective, competition is keenest among those pursuing the same strategy. As one niche becomes more and more crowded with competitors, one's success can suffer compared with those seeking alternative niches (Maynard Smith, 1982; Wilson, 1994). Selection can favor mechanisms that cause some individuals to seek niches where the competition is less intense, and hence where the average payoff may be higher.

Mating provides some clear examples. If most women pursue the man with the highest status or greatest resources, then some women would achieve more success by courting males outside of the arenas in which competition is keenest. In a mating system in which both polygyny and monogamy are possible, for example, a woman might be better off securing all of the resources of a lower-status monogamous man rather than having to settle for a fraction of the resources of a high-status polygynous man.

The ability to exploit a niche will depend on the resources and personal characteristics an individual brings to the situation, whether environmental or heritable in origin (Buss, 1989a; Gangestad & Simpson, 2000). One variable that is *not* heritable is birth order. It is possible that firstborns and secondborns have faced, on average, recurrently different adaptive problems over human evolutionary history. Sulloway (1996), for example, argues that firstborns occupy a niche characterized by strong identification with parents and other existing authority figures. Second borns, in contrast, have less to gain by authority identification and more to gain by overthrowing the existing order. According to Sulloway, birth order influences niche specialization. Second borns develop a different personality marked by greater rebelliousness, lower levels of conscientiousness, and higher levels of openness to new experiences. Birth-order differences show up strongly among scientists, where second

borns tend to be strong advocates of scientific revolutions; firstborns tend to strenuously resist such revolutions (Sulloway, 1996).

Whether or not the details of Sulloway's arguments turn out to be correct, the example illustrates strategic niche specialization. Individual differences are adaptively patterned, but they are *not* based on heritable individual differences. Rather, birth order, a nonheritable individual difference, provides input (presumably through interactions with family members) into a species-typical mechanism that canalizes strategic niche specialization.

All of these individual differences are examples of environmentally contingent individual differences. In *early experiential calibration*, the developmental environment activates stable individual differences in adulthood. In *enduring situational evocation*, the stable occupancy of different environments activates and maintains stable individual differences in personality. And in *strategic specialization*, the existence or lack of existence of environmental or social niches to exploit activates and maintains stable individual differences. We now turn to those individual differences that have at least a partial basis in heritable individual differences.

Adaptive Self-Assessment of Heritable Qualities

Any feature of the environment that influences the successful attainment of fitness-relevant outcomes may serve as an input into evolved psychological mechanisms (Tooby & Cosmides, 1990a, p. 59). These different forms of environmental input can range from immediate situational inputs to stable differences in an individual's phenotype (Penke, 2011). This may even include features of an individual's own body. To the extent that fitness-relevant outcomes were ancestrally linked to an individual's own physical features, selection should have favored the evolution of psychological mechanisms that (1) take as input aspects of the individual's own physical phenotype and (2) produce output functionally calibrated to those features. Evolved mechanisms, in this view, are not only attuned to recurrent features of the external world but can also be attuned to the evaluation of self. Evolved

psychological mechanisms that regulate their output according to cues from the individual's phenotype are called *condition-dependent* psychological adaptations.

Recent evolutionarily informed research on extraversion, as well as aggression and anger, provides empirical support for the existence of such condition-dependent adaptations. High levels of extraversion can lead to increased mating opportunities both by engaging potential mates and by leading to the formation of friendships and valuable social alliances (Nettle, 2005, 2006; Denissen & Penke, 2008). Because more attractive individuals are more likely to reap mating benefits from the social interactions that extraverted behaviors create, we should expect selection to have favored extraversion-regulating mechanisms that are sensitive to individuals' own physical attractiveness. Indeed, research shows that physical attractiveness predicts extraversion among both men and women (Lukaszewski & Roney, 2011). However, because mates and high social status are contested resources, extraverted behavior can also expose individuals to competition and conflict. Evidence ranging from sex differences in upper body strength to greater fighting success and higher status among stronger men in modern-day hunter-horticulturalist societies suggests that, ancestrally, conflict over these resources ancestrally was more prevalent among men than among women (Lukaszewski & Roney, 2011). Consistent with this, physical strength predicts extraversion among men but not women.

A similar line of reasoning and set of observations has been made with anger, another dimension on which individuals exhibit stable individual differences. Because a mesomorphic man can more successfully pursue an aggressive strategy of resource acquisition than can an ectomorphic man (Sell, Tooby, & Cosmides, 2009; Price, Dunn, Hopkins, & Kang, 2012), selection should have shaped the mechanisms responsible for producing aggression to be sensitive to (i.e., take as input) the individual's own body type as a cue to the ability to successfully achieve goals via an aggressive strategy (modified from Tooby & Cosmides, 1990a, p. 58). Research on anger (Sell et al., 2009) has empirically substantiated this idea. In-

dividual differences in anger thresholds are predictable a priori on the basis of one's ability to inflict costs on others; stronger men tend to anger more easily and more readily (Sell et al., 2009).

The Heritability of Personality Differences. An important consideration to take from a condition-dependent model of personality is that many of the characteristics constituting an individual's morphological phenotype, including physical attractiveness and strength, are highly heritable (Gao et al., 2006; Rowe, Clapp, & Wallis, 1987; Silventoinen, Magnusson, Tynelius, Kaprio, & Rasmussen, 2008; Thornhill & Gangestad, 1994). This is important, because the notion of species-typical personality mechanisms seems, on the surface, to be inconsistent with the heritability of personality traits (Penke et al., 2007). Indeed, the heritability observed in personality traits is not the typical pattern expected of species-typical adaptations.

A number of scholars have interpreted the heritability of *manifest personality* as evidence for variation in the genes coding for the *mechanisms* responsible for producing personality (Nettle, 2006; Penke et al., 2007). Some evidence is consistent with this view. There are several known genetic polymorphisms associated with individual differences in personality. For example, neuroticism is associated with the short allele of the dopamine D4 (*DRD4*) exon III polymorphism (Tochigi et al., 2006); the number of cytosine-adenine-guanine (CAG) repeats at the androgen receptor (AR) gene in men (Westberg et al., 2009); the serotonin transporter promoter 5-HTTLPR short allele (Sen, Burmeister, & Ghosh, 2004); and the gamma-aminobutyric acid [GABA(A)] Alpha 6 receptor Pro385Ser Pro allele (Sen et al., 2004). The number of CAG repeats at the AR locus is also associated with individuals' extraversion (Lukaszewski & Roney, 2011; Westberg et al., 2009) and sexual jealousy levels (Lewis, Al-Shawaf, Janiak, & Akunebu, 2018).

However, models of personality based on genetic polymorphisms leave the lion's share of interindividual variation in personality unexplained (e.g., see Westberg et al., 2009). Furthermore, it is unclear whether these genetic polymorphisms are associated with (1)

differences in the psychological *mechanisms* responsible for personality, or (2) differences in characteristics that serve as *input* into personality mechanisms and thereby influence their output. For example, the number of nucleotide repeats at the AR locus is associated with individual differences in attractiveness and strength, which predict individual differences in extraversion above and beyond genetic polymorphism (Lukaszewski & Roney, 2011).

This relationship between extraversion, physical formidability, and attractiveness offers a clear empirical illustration of how species-typical evolved psychological mechanisms could produce heritable personality outcomes. If the costs and benefits of extraversion vary as a function of individuals' heritable attributes such as physical attractiveness and strength, and extraversion-producing mechanisms regulate their outputs based on these attributes, then we should expect extraversion to show up as heritable in behavior genetics studies—but only because it is dependent on physical attractiveness and strength, which are themselves heritable (see Tooby & Cosmides, 1990a, for their seminal discussion of this concept, which they termed “reactive heritability”).

In this case, heritable individual differences in physical formidability and attractiveness provide input into evolved psychological mechanisms that thereby produce individual differences in extraversion levels as output. In this example, the extraversion is not directly heritable, but rather is “reactively heritable” in the sense that it is a secondary consequence of heritable physical features that provide input into species-typical mechanisms.

More generally, if the psychological mechanisms that produce personality take as input cues ancestrally linked to the probabilistic costs and benefits of alternative personality trait levels, and those costs and benefits vary as a function of individuals' heritable attributes (e.g., strength and physical attractiveness), then we should expect personality to show heritability in behavioral genetics studies *as the output of species-typical psychological mechanisms*.

Although species-typical psychological mechanisms can, in this way, produce individual differences that are consistent with personality's well-known and established

stability and heritability, there are other evolutionary models for the heritability of personality. These include other selective models (e.g., balancing selection rather than directional selection), as well as nonselective evolutionary models.

Balancing Selection

In general, the process of directional selection tends to use up heritable variation. Heritable variants that are more successful tend to replace those that are less successful, resulting in species-typical adaptations that show little or no heritable variation in the presence or absence of basic functional components (Williams, 1966).

In balancing selection, genetic variation (originally introduced by mutation) is not weeded out by selection, but rather is maintained by selection. Balancing selection occurs when different environmental conditions favor different levels of a trait dimension; heritable variation can be maintained. There are several forms of balancing selection, but the two most relevant forms for personality appear to be *environmental heterogeneity of selection pressures over time and space* and *frequency-dependent selection* (Penke et al., 2007).

Environmental Heterogeneity of Selection Pressures over Time and Space

If environments vary, then selection can favor not just a single optimal value for a trait, but rather different optima in the different environmental conditions. Consider as an example variations over time or place in the scarcity or abundance of food resources. Under conditions of food scarcity, selection might favor boldness and risk taking that impel an individual to venture out into unknown territory to find food. Under such circumstances, timidity and risk aversion may lead to starvation and death. By contrast, under conditions of food abundance, bold and risky exploratory behavior could needlessly expose an individual to predators; aggressive, unfamiliar humans; and other biotic and abiotic ecological threats. Under these conditions, selection would favor greater levels of timidity. If some environments favor boldness and others favor cautiousness, as in this example, then this

variation over time and space can maintain both boldness and cautiousness. In short, environmental heterogeneity can set up conditions in which heritable individual differences are maintained in the population. This is a form of balancing selection.

Nettle (2006), building on MacDonald (1995, 1998, 2005), offered a specific set of hypotheses about the adaptive value of being high or low on each of the Big Five. For example, Nettle characterizes high levels of extraversion as a strategy that fosters success in mating, forming social allies, and exploring the environment but also entails costs in the form of greater exposure to dangers from the physical environment. When environments are relatively safe, an extraverted strategy may pay off, since the risks incurred from the physical environment are minimal. In environments that are hazardous, however, an extraverted strategy may suffer in fitness currencies, and instead a more introverted strategy may be favored. The argument is that temporal variation in the strategy favored by environmental pressures can maintain genetic variation on the personality dimension of extraversion–introversion.

Nettle argues that each end of the Big Five carries benefits as well as costs. Neuroticism may give an individual the benefit of being extra vigilant about dangers, but it carries the cost of increased stress, anxiety, and depression. High agreeableness can lead to excellent social alliances and valued partnerships, but also to vulnerability to being cheated or otherwise exploited.

The critical agenda for those pursuing this line of theorizing is to identify the specific costs and benefits of variation in each of the key traits across different environments. Nettle's (2006) hypotheses provide a start, but alternatives could be suggested. For extraversion, for example, although one benefit may be mating success, if the extraverted strategy leads an individual to have sex with individuals who are already mated, a key cost may be social or physical retaliation from their mates (Buss, 2000). As Penke and his colleagues (2007, p. 566) aptly conclude, "Even if balancing selection proves to be a good general account of heritable personality traits, much more research would be needed to identify each personality trait's relevant fitness costs and benefits across different environments."

Empirical and simulation-based research has provided some evidence that is at least consistent with this form of balancing selection. One potential empirical example comes from a study that assessed the personalities of people living in mainland Italy and on a number of small islands off the coast of Italy (Camperio Ciani, Veronese, Capiluppi, & Sartori, 2007). People from families that were long-time inhabitants of the islands (at least 20 generations) scored lower on both extraversion and openness to experience compared to those from the mainland. Islanders who descended from families that were multigeneration inhabitants of the islands were also lower on extraversion and openness compared to those who were recent immigrants to the islands. Although these findings are somewhat circumstantial, they are consistent with the notion that different environments can select for different personality trait levels, and that environmental heterogeneity can maintain heritable personality variation.

Molecular genetics studies provide further evidence for the idea that balancing selection can maintain heritability in human personality. Chen, Burton, Greenberger, and Dmitrieva (1999) hypothesized that the 7-repeat (7R) allele of the *DRD4* gene, which is associated with novelty seeking (Munafò, Yalcin, Willis-Owen, & Flint, 2008), is favored by selection when people migrate to new environments or inhabit resource-rich environments. Chen et al. (1999), provided empirical support for this hypothesis by studying the migration patterns of 2,320 individuals from 39 groups and demonstrating that migratory populations had a far higher proportion of long-allele *DRD4* genes than did sedentary populations. These findings could potentially be explained by selective migration of individuals carrying those genes rather than selective favoring of those genes in the new environments. However, independent research has subsequently provided evidence that the 7R allele of the *DRD4* gene is more advantageous among nomadic than among settled populations (Eisenberg, Campbell, Gray, & Sorenson, 2008). Importantly, this suggests that environmental heterogeneity can select for different optimum personality trait levels in different environments. This leads to the maintenance of heritable personality variation on that trait.

Recent simulation-based work also shows how heterogeneity in the social environment can maintain personality differences. Del Giudice (2012) showed that sex ratios of populations will show substantial natural fluctuation over time. Since different sex ratios greatly alter the cost and benefits of different reproductive strategies in humans (Schmitt, 2004), fluctuation in sex ratios can exert balancing selection pressure on reproductive strategy-related personality dimensions such as sociosexuality (Schmitt, 2004), as well as extraversion and neuroticism (Alvergne, Jokela, & Lummaa, 2010).

Heritable Frequency-Dependent Adaptive Strategies

Strictly speaking, *frequency-dependent selection* is not a second “type” of balancing selection; rather, it is a particular case of balancing selection due to environmental heterogeneity. For conceptual clarity, we nonetheless find it useful to give it its own treatment.

Frequency-dependent selection occurs when multiple strategies exist in a population, and the fitness of each strategy decreases as that strategy’s frequency increases relative to other strategies in the population. Biological sex is the most obvious example of frequency-dependent selection. As the ratio of males-to-females in a population increases, the average fitness of males decreases, and vice versa; that is, the familiar example of an approximately equal ratio of women to men is a *result of frequency-dependent selection*.

Alternative adaptive strategies can also be maintained *within sex* by frequency-dependent selection. Among the bluegill sunfish, for example, three different male mating strategies are observed: a “parental” strategy that defends the nest, a “sneak” strategy that matures to only a small body size, and a “mimic” strategy that resembles the female form (Gross, 1982). The sneakers gain sexual access to the female eggs by avoiding detection due to their small size, while the mimics gain access by resembling females, thus avoiding aggression from the parental males. As the parasitizing strategists increase in frequency, however, their success decreases—their existence depends

on the parentals, who become rarer as the parasites become more common, rendering the parasite strategies more difficult to pursue. Thus, heritable alternative strategies within sex are maintained by the process of frequency-dependent selection. Theoretically, these heritable individual differences can persist in the population indefinitely through frequency-dependent selection, unlike the process of directional selection, which tends to drive out heritable variation.

Psychopathy as a Frequency-Dependent Strategy. Frequency-dependent selection has also been hypothesized to explain the personality constellation that characterizes psychopathy (see Mealey, 1995). *Psychopathy* (sometimes called *sociopathy* or *antisocial personality disorder*) represents a cluster of traits marked by egotism, unreliable behavior, impulsivity, an absence of enduring relationships, superficial social charm, and low levels of social emotions such as guilt, love, and empathy (Cleckley, 1982; American Psychiatric Association, 1994).

Psychopaths pursue a social strategy characterized by exploiting the reciprocity mechanisms of others. After feigning cooperation, psychopaths typically defect.

According to the theory, a psychopathic strategy can be maintained by frequency-dependent selection. As the number of cheaters increases, and hence the average cost to the cooperative hosts increases, mechanisms would presumably evolve to detect cheating and to inflict costs on those pursuing a cheating strategy. As the prevalence of psychopaths increases, therefore, the average payoff of the psychopath’s strategy decreases. However, because over 95% of both men and women do *not* exhibit psychopathy, the “cheating” strategy of psychopathy has a large pool of resources to exploit: the majority strategy of cooperation. As long as the frequency of psychopaths is not too high, psychopathy can be maintained amid a population composed primarily of cooperators (Mealey, 1995).

There is some indirect evidence that is consistent with Mealey’s hypothesis. First, behavioral genetics studies suggest that psychopathy may be moderately heritable, at least as indicated by the Minnesota Multiphasic Personality Inventory (MMPI)

Psychopathic Deviate scale (Willerman, Loehlin, & Horn, 1992). Second, some psychopaths appear to pursue an exploitative short-term sexual strategy, which could be the primary route through which genetic variants associated with psychopathy increase or are maintained in the population (Rowe, 1995). Psychopathic men tend to be more sexually precocious, to have sex with a larger number of women, to have more children out of wedlock, and are more likely to separate from their wives (Rowe, 1995). This short-term, opportunistic, exploitative sexual strategy would be expected to rise in populations marked by high mobility, in which the reputational costs associated with such a strategy would be least likely to be incurred (Wilson, 1995).

There are several challenges to this theory, such as whether psychopathy represents a type or a continuum (Baldwin, 1995; Eysenck, 1995), whether its frequency is sufficiently large to be maintained by frequency-dependent selection, and whether it represents a recently evolved cluster in modern populations or an ancient evolved strategy (Wilson, 1995; but see Mealey's (1995) response to these challenges). Despite these complications, Mealey's theory of psychopathy nicely illustrates the possibility that heritable alternative strategies can be maintained by frequency-dependent selection.

Nonselective Models: Selective Neutrality and Mutation-Selection Balance

A prevalent misconception, perhaps due to the term *evolution* being used interchangeably with *selection*, which is just one of multiple evolutionary processes, is that evolution only produces functional adaptations. In reality, evolution consists of both selective and nonselective processes. Here, we discuss several nonselective evolutionary models in the context of personality psychology.

Outside of the special case of balancing selection, selection generally reduces genetic variation by purging less successful genetic variants from a population. However, this is an iterative process across generations that is inexorably accompanied by an influx of mutations that introduce new genetic variation. Mutations can occur on any of the approxi-

mately 20,000 genes that characterize the human genome or in any of the regulatory parts of the genome. Recent molecular genetics evidence suggests that approximately 70 new mutations are introduced per individual per generation (Keightley, 2012). This is how genetic variation is *introduced* into a population.

Although heritable variants that have greater replicative success continue to increase in relative frequency in the population, displacing less successful genetic variants, there are constraints on selection's ability to winnow out these less successful genetic variants. The constraints include *selective neutrality* and *mutation-selection balance*.

Selective Neutrality

Some mutations neither disrupt nor improve the functioning of an organism's brain or other organs. Because these mutations have no impact on an organism's reproductive success, selective processes will neither increase nor decrease their relative frequency in the population. Such mutations are *selectively neutral*.

Early evolutionarily informed work on personality identified selective neutrality as one possible explanation for the heritability of personality differences (Tooby & Cosmides, 1990a). However, selective neutrality carries a highly implausible assumption: that different personality trait levels are unlinked to reproductive fitness. This is clearly at odds with known predictive relationships between personality and life outcomes (Nettle, 2006; Ozer & Benet-Martinez, 2006; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007). Many personality traits, including those captured by the five-factor model, are systematically linked with components that contribute to fitness (Buss & Greiling, 1999; Nettle, 2006; Ozer & Benet-Martinez, 2006; Roberts et al., 2007). Conscientiousness, for example, is linked with literal survival in the form of longevity (Deary, Weiss, & Batty, 2010). Extraversion is linked with sexual access to number of sex partners (Nettle, 2005; Schmitt, 2004). The key point is that many personality traits have been linked to components tributary to reproductive success, as well as to over-

all lifetime reproductive success (Alvergne et al., 2010; Hutteman, Bleidorn, Penke, & Denissen, 2013; Jokela, Alvergne, Pollet, & Lummaa, 2011; Jokela, Hintsala, Hintsanen, & Keltikangas-Järvinen, 2010; Jokela & Keltikangas-Järvinen, 2009). Selective neutrality is therefore unlikely to be an important explanation for many or most heritable individual differences in personality.

Mutation–Selection Balance

The models we have presented thus far are based on two different classes of mutations. The first class refers to those mutations that are advantageous and therefore favored by selection, whether in the form of directional selection for universal psychological adaptations or by balancing selection. The second class refers to those mutations that do not have an impact on reproductive success—selectively neutral mutations. There is a third and final class of mutations: those mutations that are deleterious and therefore selected against. Despite their detrimental effects, these mutations cannot be entirely eliminated from the population, because selection cannot work fast enough to do so.

Research suggests that each human is born with approximately two new deleterious mutations (Keightley, 2012). However, few of these mutations are so harmful that they are selected out immediately. Although selection eventually weeds out harmful mutations (see Fu et al., 2012), those that are only mildly harmful can take many generations for selection to purge. Consequently, these heritable mutations can accumulate across generations despite their deleterious effects. Conservative estimates suggest that the average human carries at least 500 brain-disruptive mutations (Fay, Wyckoff, & Wu, 2001; Keller & Miller, 2006).

Nonetheless, the number of mildly harmful mutations that individuals carry—called their “mutation load”—varies tremendously across individuals (Penke et al., 2007). Recent work suggests that individual differences in mutation load might be able to explain the heritability of some individual differences, such as general intelligence (Penke et al., 2007; Deary, Penke, & Johnson, 2010), and some harmful mental disorders, such as schizophrenia and autism (Keller & Miller,

2006), although these hypotheses require further empirical verification.

Molecular Genetics Evidence Consistent with Mutation–Selection Balance. The last few years have seen an explosion of molecular genetics findings relevant to evolutionary models of personality. The most significant change was from analyzing individual or small sets of genomic markers to genome-wide approaches that use hundreds of thousands of genetic markers. More recently, there has been another shift to whole-genome sequencing of all the nucleotide letters in the DNA of studied individuals. While the existing evidence is not yet conclusive and a detailed review is beyond the scope of this chapter, we provide a short summary of the current state of the evidence here.

The last decade has greatly altered our view of the molecular genetics associated with personality variation. Meta-analyses of individual genes, such as the dopamine receptor gene *DRD4* or the serotonin transporter gene *5HTT*, have yielded negative or weak results at best (Munafo & Flint, 2011). At the same time, sufficiently powered genomewide association studies (GWAS) have shown that there are no common (i.e., frequent in the population) genetic variants that explain more than 1% of the genetic variance associated with broad personality traits such as those in the five-factor model (de Moor et al., 2012; Verweij et al., 2012). This means that there are either thousands of genetic variants, each with very small effects on personality trait levels, or many different rare mutations that account for substantial proportions of genetic variation in personality (Penke, 2011).

Recent research has also attempted to estimate how much of the additive heritability of traits can be explained by all the common genetic variants used in a GWAS in total, regardless of how much individual variants explain. Interestingly, while this approach is able to explain almost all of the genetic variance in traits such as height (Yang et al., 2010), only a very small percentage of the genetic variance in Cloninger’s (Verweij et al., 2010) and Eysenck’s (Vinkhuyzen et al., 2012) personality traits can be explained this way. Some researchers (e.g., Verweij et al., 2012) take this as evidence for personal-

ity being under mutation–selection balance, an interpretation that we discuss in the following section.

A Comprehensive Framework: Integrating Selective and Nonselective Models

We have presented five evolutionary models for the origins of variation in human personality. These models are based on both selective and nonselective processes, and each offers a potential account for heritable individual differences. A central impetus for presenting these models together in a single resource is that evolutionarily informed work to date has generally emphasized just one or a few of these models (e.g., Lewis, 2015). Such a narrow focus has enabled researchers to offer useful expansions on individual models. However, their restricted scope has led to not only the exclusion of other models but also implicit and unnecessary antagonism between models.

This is problematic for two reasons. First, the models are not necessarily mutually exclusive. Second, there is no sound reason to believe that just one model should account for all heritable variation in personality. Human personality exhibits heritable variance on manifold dimensions. Different evolutionary models may account for variance on different dimensions. Moreover, different models may account for distinct proportions of variance within each dimension. A central objective for personality researchers should therefore be to integrate these distinct evolutionary models to maximize the explanatory power of their research framework.

For researchers interested in identifying the relative explanatory contributions offered by each of the evolutionary models presented here, it is important to use evidentiary criteria capable of discriminating between these distinct models. This is key, because many criteria are consistent with multiple evolutionary models and are therefore *not* capable of discriminating between alternative evolutionary models. For example, Camperio Ciani and colleagues' (2007) finding that Italian islanders differ on major personality axes relative to Italian mainlanders is consistent with balancing selection favoring different optimal personality levels in different environments but also

with universal psychological mechanisms responding to different environmental input.

Similarly, mutation–selection balance and condition-dependent psychological adaptations lead to *identical* expected patterns of genetic variation; that is, a condition-dependent model of personality proposes that if psychological mechanisms calibrate manifest personality trait levels according to condition-linked inputs such as physical attractiveness and strength, and these attributes themselves are heritable, then patterns of heritable variation in personality may actually reflect heritable variation in these inputs, not in the psychological mechanisms themselves. Verweij and colleagues' (2012) are not unjustified in concluding that the genetic variation associated with personality differences in their data is consistent with mutation–selection balance. However, they jump to the conclusion that the genetic loci under mutation–selection balance are specifically those that code for the *mechanisms* that produce personality. A plausible alternative is that the genetic loci under mutation–selection balance are those that code for the physical features that serve as *inputs* to those personality-regulating mechanisms. These ideas illustrate that a sophisticated evolutionary approach to personality requires an integrated understanding of multiple selective as well as nonselective evolutionary processes.

Adaptations for Detecting and Acting on Personality Differences

Whether individual differences are adaptively patterned or not, other individuals constitute one of the primary environments within which humans function (Alexander, 1987) and define a major part of the human adaptive landscape (Buss, 1991). Other individuals can both *pose* and *help solve* adaptive problems. Attending to personality differences in others can be crucial for solving (or avoiding) adaptive problems. For example, assessing whether others are pursuing cooperative or defecting social strategies can result in mutually beneficial reciprocal alliances on the one hand, or disastrous consequences on the other, such as resources pilfered, reputations damaged, and pregnancies unwanted.

Over evolutionary time, those individuals who attended to and acted on individual differences in others that were adaptively consequential would have survived and reproduced more successfully than those who were oblivious to adaptively consequential differences in others. Based on this analysis, Buss (1989b, 1996) proposed that humans have evolved psychological mechanisms to detect adaptively relevant individual differences in others.

These mechanisms would have been critical in assessing individual differences for the goals of mate selection, coalition formation, and dyadic alliance building. The formation of these different relationships and the attendant adaptive problems entailed by them may require assessment specificity; that is, different individual differences in the social landscape may be relevant to some problems and irrelevant to others. Individual differences in sexual fidelity, for example, are more critical to assessing the viability of a long-term mate than a coalition partner (Shackelford & Buss, 1996). Despite some degree of domain specificity, some dimensions of individual differences, such as those captured by the five-factor model of personality, may be important because they are relevant to a host of different adaptive problems, and hence may transcend the particulars of specific relationships (MacDonald, 1995).

Because individual differences are so critical to solving adaptive problems, individuals often attempt to manipulate others' perceptions and reputations of their own and competitors' standing on relevant dimensions of differences. In mate competition, for example, men tend to impugn the surgency, agreeableness, and emotional stability of their rivals (Buss & Dedden, 1990). Thus, derogation of competitors becomes a verbal form of trait usage as manipulation, exploiting the difference-detecting mechanisms of others in the service of mate competition. Simultaneously, men will exaggerate their own positive traits in self-presentation to a woman, striving to appear to fulfill characteristics that she desires in a mate (Buss, 1988b).

Whatever the origins of individual differences, whether they are or are not adaptively patterned, they represent important vectors

in the human adaptive landscape. When the individual differences of others in one's social environment are adaptively patterned, however, it may be especially important to detect and act on them, because they are more likely to represent coherent and hence predictable suites of covarying qualities rather than randomly varying or single-dimension attributes.

Ultimately, comprehensive theories of personality and individual differences will require accounts of both the adaptive and nonadaptive differences, as well as the difference-detecting mechanisms humans have evolved to grapple with the varying terrain of the human adaptive landscape.

Conclusions

Comprehensive theories of personality should aspire to include both a specification of human nature and an account of the major ways in which individuals differ. Evolutionary psychology provides a powerful heuristic for the discovery of both. Since selection is the only known process capable, in principle, of producing complex organic mechanisms, all theories of human nature must at some level be anchored in the basic principles of evolution by selection. Theories of personality inconsistent with these principles stand little or no chance of being correct (Buss, 1991).

The core of personality theory, therefore, must be defined by the adaptive mechanisms that are characteristic of most members of our species—in other words, a species-typical human nature. The mechanisms of human nature cannot be fully understood without identifying the adaptive problems they were designed to solve. These adaptive solutions exist in the present because in the past they contributed, either directly or indirectly, to the successful reproduction of ancestral humans who carried them. Modern humans are the end products of a long and unbroken chain of ancestors who succeeded in solving the adaptive problems necessary for, or that enhanced, survival and reproduction. As the descendants of these successful ancestors, modern humans carry with them the psychological mechanisms that led to their success.

Personality theories would be incomplete without an account of the major ways in which individuals differ. Although some individual differences may be random, and hence independent of the basic functioning of human nature, the most important individual differences are those that stem from the workings and nature of the species-typical mechanisms.

Major individual differences can originate, in principle, from environmental sources of variation, genetic sources of variation, or a combination of the two. It may seem ironic to some that the environmentally based individual differences are most easily handled within this evolutionary psychological framework. Individual differences can result from early experiences during childhood, enduring environmental experiences, strategic specialization, and other forms of varying environmental input into species-typical mechanisms.

All individuals possess callus-producing mechanisms but differ in the thickness and distribution of calluses because of individual differences in experiences of friction to the skin. Similarly, all individuals may possess a psychological mechanism of jealousy but differ in the degree to which they enduringly occupy an environment filled with threats to their romantic relationship, perhaps because they are mated with someone who is habitually flirtatious or who is higher in “mate value,” and so gives off signals of defection (Tooby & Cosmides, 1990b). Stable individual differences in jealousy, in this example, arise from stable individual differences in inhabiting jealousy-evoking environments.

Balancing selection, where traits can be maintained as a consequence of differences in selective environments over time or space, is an evolutionary process that can potentially explain personality characteristics that are heritable. Negative frequency-dependent selection is a specific form of balancing selection, an evolutionary process that can create heritable individual differences that are adaptively patterned.

Not all individual differences, of course, will be adaptively patterned. Some might occur because of random environmental forces, genetic noise, genetic defects, and other factors. Some individual differences, such as those in intelligence or mental

health, may reflect differences in mutation load (Keller & Miller, 2006).

Given this early stage in the development of evolutionary personality psychology, no pretense is made that we have arrived at, or even approximated, the ultimate theory of personality. In this chapter we have merely offered some suggestions for ingredients that might be contained within a future theory of personality. Evolutionary psychology, however, does offer something lacking in all existing nonevolutionary theories of personality—a nonarbitrary anchoring for the specification of the basic psychological machinery that humans share, as well as the major ways in which humans differ.

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NOTE

1. Contrary to views that perpetuate the false dichotomies of nature–nurture or genetic–environmental, evolved psychological mechanisms are necessarily entailed by theories of environmental influence (Tooby & Cosmides, 1990a) and environmental influence is necessarily entailed by evolved psychological mechanisms; without receiving the environmental input activating it, an evolved psychological mechanism does not produce its output.

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CHAPTER 2

History, Measurement, and Conceptual Elaboration of the Big-Five Trait Taxonomy

The Paradigm Matures

Oliver P. John

Personality psychology is the science of individuality, and one task for our field is to devise a conceptual language, or taxonomy, to describe individuality and specify how one individual differs from another. Consider the following description of one individual:

Thirty-one-year-old Robert often feels restless. He has problems sitting at a desk for more than a few minutes, cannot get organized, loses his keys and wallet, and forgets about his plans for the evening. He fails to achieve up to his potential at work. During conversations, his mind wanders and he interrupts others, blurting out what he is thinking without considering the consequences. He gets into arguments. His mood swings and periodic outbursts make life difficult for those around him. Now his marriage is in trouble.

How should we summarize Robert's behavior, experience, and cognitions? What constructs should we use?

Personality psychologists in the 1980s offered many answers to these fundamental questions, and most of these answers were remarkably different from each other.

"Surely, this young man has problems with ego undercontrol, and he certainly lacks ego resilience," would be the likely analysis from Jack Block at the University of California, Berkeley; Block would use his California *Q*-sort (Block & Block, 1980) to assess Robert's personality. In contrast, Harrison Gough (also at Berkeley) would use his California Psychological Inventory (CPI; Gough, 1987) to diagnose Robert with deficits in socialization, self-control, and responsibility, as well as low capacity for status and well-being. And Ravenna Helson (also at Berkeley) would have administered Robert the four scales from the Myers-Briggs Type Indicator (MBTI; Myers & McCaulley, 1985), which measures extraversion, feeling, judging, and intuition. Finally, Robert Hogan had graduated from Berkeley just a few years earlier, but he did not appreciate any of these three approaches; thus, he proceeded to develop his own, naming it the Hogan Personality Inventory (HPI; Hogan, 1986; Hogan & Hogan, 2007). In short, personality trait research was organized into schools that often did not get along that well. Table 2.1 shows some of the schools that were most popular at the time and their favorite measures.

TABLE 2.1. Personality Dimensions in Questionnaires and in Models of Personality and Interpersonal Behavior: Classified by the Big Five Domain

Major theory or test author	Extraversion I	Agreeableness II	Conscientiousness III	Neuroticism IV	Openness/Intellect V
Bales (1970)	Dominant–Initiative	Social–Emotional Orientation	Task Orientation ^a		—
Block & Block (1980)	Undercontrol		Overcontrol	Ego Resiliency ^b (R)	
EASI (A. H. Buss & Plomin, 1975)	Activity and Sociability	—	Impulsivity (R)	Emotionality	—
Cattell (1943)	Exvia (vs. Invia)	Pathemia (vs. Cortertia)	Superego Strength	Adjustment (R) (vs. Anxiety)	Independence
Clark & Watson (1999)	Positive Emotionality	Constraint (vs. Disinhibition) ^c		Negative Emotionality	—
Comrey (1970)	Extraversion and Activity	Femininity (vs. Masculinity)	Orderliness and Social Conformity	Emotional Stability (R)	Rebelliousness
Eysenck (1986)	Extraversion	Psychoticism ^c (R)		Neuroticism	—
CPI (Gough, 1987)	Sociability	Femininity	Norm-Favoring	Well-Being (R)	Achievement via Independence
Guilford (1975)	Social Activity	Paranoid Disposition (R)	Thinking Introversion	Emotional Stability(R)	—
HPI (Hogan & Hogan, 2007)	Sociability and Ambition	Interpersonal Sensitivity	Prudence (vs. Impulsivity)	Adjustment (R)	Inquisitiveness and Learning Approach

Jackson (1984)	Outgoing–Social Leadership	Self-Protective Orientation (R)	Work Orientation	Dependence (R)	Aesthetic–Intellectual
PID-5 (Krueger et al., 2011)	Detachment (R)	Antagonism (R)	Disinhibition (R)	Negative Affectivity	Psychoticism
MMPI-2 (Tellegen et al., 2003)	Histrionic	Paranoid (R)	Compulsive	Borderline	Schizotypal
MBTI (Myers & McCauley, 1985)	Extraversion (vs. Introversion)	Feeling (vs. Thinking)	Judging (vs. Perceiving)	—	Intuition (vs. Sensing)
MPQ (Tellegen & Waller, 2008)	Positive Emotionality		Constraint	Negative Emotionality	Absorption
Wiggins ^d (1979)	Dominance	Nurturance	(Conscientiousness)	(Neuroticism)	(Openness)

Note. This table has been updated and expanded from the version that appeared in the first edition of this chapter (John, 1990; see also McCrae & John, 1992). (R) indicates that the dimension was reverse-scored in the direction *opposite* to that of the Big Five label listed earlier. When two labels appear in a cell (joined by “and”), then this researcher has included two separable dimensions or scales for the corresponding Big Five domain. For example, Hogan and Hogan’s (2007) HPI includes two scales designed to measure aspects of Extraversion, namely, Sociability and Ambition. Several scale labels were also changed with the 2007 edition of the HPI: Likability is now called Interpersonal Sensitivity, and Intellectance is now Inquisitiveness (defined as imagination, curiosity, and creative potential). CPI, California Psychological Inventory; EASI (Emotionality, Activity, Sociability, and Impulsivity) Temperament Survey; EPQ, Eysenck Personality Questionnaire; GTS, General Temperament Survey; HPI, Hogan Personality Inventory; MMPI, Minnesota Multiphasic Personality Inventory; MPQ, Multidimensional Personality Questionnaire; PID-5, Personality Inventory for DSM-5.

^aThis dimension contrasts a work-directed, emotional-neutral orientation with an erratic, emotionally expressive orientation (Bales, 1970), and thus seems to combine elements of both Conscientiousness and Neuroticism.

^bEgo resiliency seems to subsume aspects of both Openness and low Neuroticism, because an ego-resilient individual is considered both intellectually resourceful and effective in controlling anxiety (Block & Block, 1980). However, Robins, John, and Caspi (1994) found that in adolescents, ego resiliency is related to all of the Big Five dimensions in the well-adjusted direction. The Ego-Control construct was related to Extraversion, Conscientiousness, and Agreeableness, with the undercontrolled pole most similar to Extraversion and overcontrolled pole most similar to Conscientiousness and Agreeableness.

^cHigh scores on the GTS Constraint scale are correlated with both Agreeableness and Conscientious (Clark & Watson, 1999; Markon et al., 2005). Conversely, the EPQ Psychoticism scale is associated with low scores on both Agreeableness and Conscientiousness (Goldberg & Rosolack, 1994; McCrae & Costa, 1985a).

^dWiggins (1979) originally focused on Dominance and Nurturance, which define the interpersonal circumplex. Trapnell and Wiggins (1990) added adjective scales for Conscientiousness, Neuroticism, and Openness (see also Wiggins, 1995).

Note that Table 2.1 includes a very large number of concepts with different names. It illustrates how researchers, as well as practitioners, in the field of personality assessment were faced with a bewildering array of personality scales from which to choose, with little guidance and no organizing theory or framework at hand. As Allport once put it, “Each assessor has [*sic*](their) own pet units and uses a pet battery of diagnostic devices” (1958, p. 258). What made matters worse was that scales with the same name might measure concepts that were quite different, and scales with different names might measure concepts that were quite similar, a situation known as the “jingle-jangle fallacy.” Although diversity and scientific pluralism can be useful, systematic accumulation of findings and communication among researchers was impossible amid this cacophony of competing concepts and scales. This is not the way to run a scientific discipline. Indeed, Kuhn (1962) would probably have described personality trait psychology in the 1980s as an immature science, stuck in the preparadigmatic phase of *competing schools*.

Many personality researchers at the time were hoping to be the one who would discover the ultimate model of personality structure that all others would then adopt, thus uniting the fragmented field into a community that speaks a common language. However, we now know that such an integration was not to be achieved instantaneously or by any one researcher, or by any one theoretical perspective. Instead, a young science is expected to mature slowly and to eventually become paradigmatic by evolving and refining a global organizing model or theory that has great integrative power (Kuhn, 1962).

What personality psychology needed was a descriptive model, or taxonomy, of its subject matter. One of the central goals of scientific taxonomies is the definition of overarching domains within which large numbers of specific instances can be understood in a simplified way. Thus, in personality psychology, a taxonomy would permit researchers to study specified domains of related personality characteristics rather than examining separately the thousands of particular attributes that make human beings individual and unique. Moreover, a

generally accepted taxonomy would facilitate the accumulation and communication of empirical findings by offering a standard vocabulary, or nomenclature.

After decades of research, and long debates about the right number of factors and the best labels for these factors, the field has now achieved an initial consensus on a general taxonomy of personality traits: the “Big Five” personality dimensions. These dimensions do not represent a particular theoretical perspective but were derived initially from analyses of the natural-language terms people use to describe themselves and others. Rather than replacing all previous systems, the Big Five taxonomy serves an integrative function, because it can represent the various and diverse systems of personality description in a common framework, as shown by the five columns organizing Table 2.1.

Outline and Goals of This Chapter

The first version of this chapter (John, 1990) offered a comprehensive and detailed review of virtually every study published on the Big Five by then. This is no longer possible as we are writing this fourth edition, almost 30 years later. What has happened in the meantime? Figure 2.1 shows the publication trends from 1980 to 2019 and illustrates how fundamentally the field has changed. Specifically, we show the number of publications related to the Big Five personality traits for each 5-year interval, beginning in the early 1980s, obtained from keyword searches of the PsycINFO data base. To provide a comparison, we also show the publication trend data for the influential models Cattell and Eysenck had developed earlier. Although both were already at retirement age, they remained active and their influence continued throughout the 1990s. In fact, both Cattell (1990) and Eysenck (1990) contributed chapters on personality traits for the first edition of this handbook.

How did the publication trends develop after the 1990 handbook was published? We had expected that publications on the Big Five would show a substantial increase since the early 1990s, with Cattell’s and Eysenck’s influence decreasing. But we were surprised

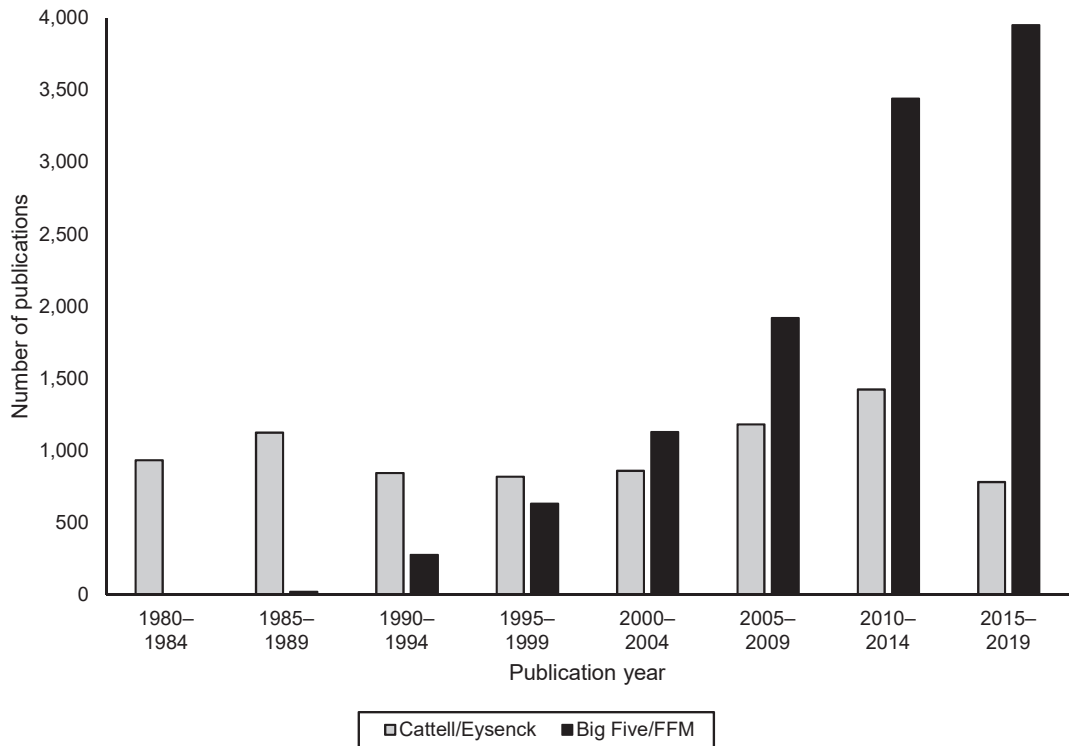


FIGURE 2.1. Number of publications related to either the Big Five personality traits or the influential models developed earlier by Cattell and Eysenck, identified in keyword searches of the PsycINFO database. The numbers identified in the figure as *Cattell/Eysenck* refer to the sum of all articles that used one of the measures developed by either Eysenck or Cattell, as indicated by the term “personality” plus either “EPI,” “EPQ,” “Eysenck Personality Inventory,” “Eysenck Personality Questionnaire,” “16PF,” or “16 Personality Factors”; those identified as *Big Five/FFM* are the sum of all articles that used the term “personality” plus either “Big Five,” “Big 5,” “Five Factor Model,” “5 Factor Model,” or “FFM.”

by the data. First, the ascent of the Big Five happened much more gradually than we had expected, and Cattell’s and Eysenck’s influence held steady much longer. Science moves slowly. As Figure 2.1 shows, it took until the early 2000s for the number of Big Five publications to finally overtake the two older models. Second, whereas references to the Cattell and Eysenck models have finally begun to decline in absolute numbers, their decline has been small compared to the amazing increase in research publications on the Big Five. For 2015–2019, the number of new Big Five publications exceeded 800 per year, compared with less than 200 for the two older models combined.

How can we explain this enormous growth in the number of publications on

the Big Five? There are not enough personality psychologists to publish that many papers per year. Our publication trend analysis shows that the Big Five have left the stuffy backrooms of full-time personality researchers and have made useful contributions in a wide range of fields outside of psychology, such as comparative biology and animal husbandry (e.g., Gosling & John, 1999; Gosling, Kwan, & John, 2003), education (e.g., Abrahams et al., 2019; John & De Fruyt, 2015), economics (see Heckman, Chapter 42, this volume), geography (see Rentfrow & Gosling, Chapter 40, this volume), music (e.g., Vella & Mills, 2017), and the wide range of now common internet behaviors, likes, and preferences (e.g., Nave et al., 2018).

In the decade since the previous version of this chapter was completed (John, Naumann, & Soto, 2008), about 8,000 new publications on the Big Five have appeared. As a result, we can now cover only a minute fraction of all the relevant work in this chapter. Thus, our main goal is to provide a general overview and introduction to the field that focuses on the main issues and can serve as a useful reference resource. We therefore refer the reader to more specialized sources or reviews as needed, many of them appearing in later chapters in this very handbook.

We begin our chapter with the history of the Big Five, including the discovery of the five dimensions in the natural language, research replicating and extending the model, its convergence with research in the questionnaire tradition, and the development of various instruments to measure the Big Five. Then, we compare three of the most frequently used instruments and present some new data regarding their reliability, validity, and interrelations. Finally, we address a number of conceptual issues, including how the Big Five taxonomy is structured hierarchically, how the five dimensions develop, whether they predict important life outcomes, and whether they are descriptive or explanatory concepts.

The Lexical Approach and Discovery of the Big Five

One starting place for a shared taxonomy is the natural language of personality description, because it provides a common and finite source of attributes for a scientific research. This work, beginning with the extraction of all personality-relevant terms from the dictionary, has been guided by the lexical approach (e.g., John, Angleitner, & Ostendorf, 1988). The *lexical hypothesis* posits that most of the socially relevant and salient personality characteristics in a culture have become encoded in the natural language (Allport & Odbert, 1936). Thus, the personality vocabulary contained in the dictionaries of a natural language provides an extensive, yet finite, set of attributes that the people speaking that language have found important and useful in their daily interactions (Goldberg, 1981).

Allport and Odbert's *Psychological Study: Traits, States, Activities, and Evaluations*

Following Baumgarten's (1933) work in German, Allport and Odbert (1936) extracted from an unabridged English dictionary all the terms that could be used to "distinguish the behavior of one human being from that of another" (Allport & Odbert, 1936, p. 24) and identified almost 18,000 terms—"a semantic nightmare" (Allport, 1937, pp. 353–354) that could keep psychologists "at work for a life time" (Allport & Odbert, 1936, p. vi). Indeed, this task has preoccupied personality psychologists for more than 60 years (for details, see John et al., 1988; John, 1990).

Allport and Odbert found four kinds of person descriptors in the dictionary: (1) personality traits (e.g., *sociable*, *aggressive*, and *fearful*), defined as "generalized and personalized determining tendencies—consistent and stable modes of an individual's adjustment to his environment" (p. 26); (2) temporary states, moods, and activities, such as *afraid*, *rejoicing*, and *elated*; (3) highly evaluative judgments of personal conduct and reputation, such as *excellent*, *worthy*, *average*, and *irritating*—although these terms presuppose some traits within the individual, they do not indicate the specific attributes that gave rise to the individual's evaluation by others or by society in general; and (4) physical characteristics, capacities and talents, and other terms of doubtful relevance to personality. Norman (1967) elaborated these classifications into seven content categories: Individuals can be described by their enduring *traits* (e.g., *irascible*), by the *internal states* they typically experience (*angry*), by the *physical states* they endure (*trembling*), by the *activities* they engage in (*screaming*), by the *effects* they have on others (*frightening*), by the *roles* they play (*murderer*), and by social *evaluations* of their conduct (*unacceptable*, *bad*). Moreover, individuals differ in their anatomical and morphological characteristics (*short*), and in the personal and societal evaluations attached to these appearance characteristics (*cute*).

Allport and Odbert (1936) and Norman (1967) classified the terms culled from the dictionary into mutually exclusive categories, which gave rise to numerous classifi-

cation problems (e.g., Is *happy* a trait or a state?). Chaplin, John, and Goldberg (1988) argued that these categories overlap and have fuzzy boundaries; they proposed a prototype conception in which each category is defined in terms of its clear cases rather than its boundaries. In a series of rating studies, they showed that prototypical *states* are described as temporary, brief, and externally caused. Prototypical *traits* are stable, long-lasting, and internally caused, and need to be observed more frequently and across a wider range of situations than states before they are attributed to an individual. These findings replicated the earlier classifications and confirmed that the lay conceptions of traits and states are widely shared and understood.

Identifying the Major Dimensions of Personality Description: Cattell's Reduction Efforts

Allport and Odbert's (1936) classifications provided some initial structure for the personality lexicon. However, to be of practical value, a taxonomy must provide a systematic framework for distinguishing, ordering, and naming individual differences in people's behavior and experience (John, 1989). Aiming for such a taxonomy, Cattell (1943) used both semantic and empirical clustering procedures (for details, see John et al., 1988; John, 1990) to reduce Allport and Odbert's list of about 5,000 traits to a mere 35 variables, thus eliminating more than 99 percent of the initial terms. This drastic reduction was dictated primarily by the data-analytic limitations of his time, which made factor analyses of large, variable sets prohibitively costly and complex. Using this small set of 35 variables, Cattell conducted several oblique factor analyses (i.e., allowing for correlated factors) and concluded that he had identified 12 factors, which became part of his 16 Personality Factors (16PF) Questionnaire (Cattell, Eber, & Tatsuoka, 1970).

Reanalyses of Cattell's own correlation matrices by others have not confirmed the number and nature of the factors he proposed (e.g., Tupes & Christal, 1961/1992). Digman and Takemoto-Chock (1981) concluded that Cattell's "original model, based on the unfortunate clerical errors noted here,

cannot have been correct" (p. 168), although the second-order factors of the 16PF show some correspondence between Cattell's system and the Big Five dimensions discovered later, as shown in Table 2.1.

The "Big Five" Factors in Personality Trait Ratings

Initial Discovery of the Big Five in Cattell's Variable List

Cattell's pioneering work, and the availability of a relatively short list of variables, stimulated other researchers to examine the dimensional structure of trait ratings. Several investigators were involved in the initial discovery of the Big Five dimensions. First, Fiske (1949) constructed much simplified descriptions from 22 of Cattell's variables; the factor structures derived from self-ratings, ratings by peers, and ratings by psychological staff members were highly similar and resembled what would later become known as the Big Five. To clarify these factors, Tupes and Christal (1961/1992) reanalyzed correlation matrices from eight samples and found "five relatively strong and recurrent factors and nothing more of any consequence" (1961, p. 14). Norman (1963) further replicated this five-factor structure and labeled them in the order of emergence in the factor analysis: (I) Extraversion or Surgency (talkative, assertive, energetic); (II) Agreeableness (good-natured, cooperative, trustful); (III) Conscientiousness (orderly, responsible, dependable); (IV) Emotional Stability (calm, not neurotic, not easily upset); and (V) Culture (intellectual, polished, independent-minded).

These factors (see Table 2.2 for more recent labels, definitions, and examples) eventually became known as the "Big Five"—a name Goldberg (1981) chose not to reflect their intrinsic greatness but to emphasize that each of these factors is extremely broad—after all, 5,000 trait terms were being represented by only five underlying dimensions. However, the Big Five structure does not imply that personality differences can be reduced to only five traits. Rather, these five dimensions represent personality at the broadest level of abstraction. Just like the biological categories of mammal and

TABLE 2.2. The OCEAN of Personality: Definition and Explication of the Big Five Domains in Terms of Lower-Order Facets, Behavioral Examples, and Prediction of External Criteria

Factor initial (number)	Big Five domains				
	E (Factor 1)	A (Factor 2)	C (Factor 3)	N (Factor 4)	O (Factor 5)
Original label	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Conceptual definition	Implies an <i>energetic approach</i> toward the social and material world	Contrasts a <i>prosocial and communal orientation</i> toward others with antagonism and hostility	Describes <i>socially prescribed impulse control</i> that facilitates task- and goal-directed behavior	Contrasts <i>negative emotionality</i> with emotional stability, contentment, and frustration tolerance	Describes the breadth, depth, originality, and complexity of the person's <i>mental and experiential life</i>
Major facets	Sociability Assertiveness Energy	Compassion Respect Trust	Organization Productiveness Responsibility	Anxiety Depression Volatility	Openness Originality Open-mindedness
Behavioral examples	Approach strangers at a party and introduce myself; take the lead in organizing a project; keep quiet when I disagree with others (R)	Emphasize the good qualities of other people when I talk about them; lend things to people I know (e.g., class notes, books, milk); console a friend who is upset	Arrive early or on time for appointments; study hard in order to get the highest grade in class; double-check a term paper for typing and spelling errors; let dirty dishes stack up for more than 1 day (R)	Accept the good and the bad in my life without complaining or bragging (R); get upset when somebody is angry with me; take it easy and relax (R)	Take the time to learn something simply for the joy of learning; watch documentaries or educational TV; come up with novel set-ups for my living space; look for stimulating activities that break up my routine
Examples of external criteria predicted	<i>High pole:</i> Social status in groups and leadership positions; selection as jury foreperson; positive emotion expression; number of friends and sex partners; social and enterprising career interests <i>Low pole:</i> Poorer relationships with parents; rejection from peers	<i>High pole:</i> Better performance in work groups; religiosity <i>Low pole:</i> Risk for cardiovascular disease; juvenile delinquency; interpersonal problems; antisocial and criminal behavior	<i>High pole:</i> Higher academic grade point average; better job performance; adherence to their treatment regimens; live longer lives; conservative political views <i>Low pole:</i> Smoking, substance abuse, and poor diet and exercise habits; ADHD	<i>High pole:</i> Poorer coping and reactions to illness; experience burnout and change jobs; self-harm and suicide <i>Low pole:</i> Feel satisfied and committed to work organizations; greater relationship satisfaction; higher subjective well-being	<i>High pole:</i> Years of education completed; better performance on creativity tests; create distinctive looking work and home environments; investigative and artistic career interests; liberal political views <i>Low pole:</i> Conservative attitudes and right-wing political preferences

Note. Conceptual definitions are based on John and Srivastava (1999). Major facets (see also Table 2.3) are based on the literature review by Soto and John (2017a, 2017b). Behavioral examples are based on significant correlations between BFI scales and self-reported act frequencies in an undergraduate sample (John, Naumann, & Soto, 2008). (R) denotes that the act was correlated negatively with the Big Five domain. For more examples of predictive validity criteria and relevant references, see the text and Soto (2019, 2020a).

birds include hundreds of distinct species, each Big Five dimension summarizes a large number of distinct, more specific personality characteristics.

Testing the Big Five in a Comprehensive Set of English Trait Terms

After a period of dormancy during the 1970s and early 1980s, research on personality structure has increased dramatically since the mid-1980s. Factor structures resembling the Big Five were identified in numerous sets of variables (see John, 1990, for a review). Nonetheless, because a number of these studies were influenced by Cattell's selection of variables (Block, 1995), it was important to test the generality of the Big Five in more comprehensive variable sets. Norman (1967) compiled an exhaustive list of personality descriptive terms, and Goldberg (1990; see also 1981, 1982) used this list to clarify the composition of the Big Five factors and to test their generalizability across methodological variations and data sources. In a variety of analyses, the first five factors represented the expected Big Five and remained virtually invariant even when more than five factors were rotated. Saucier and Goldberg (1996) selected 435 highly familiar trait adjectives; a factor analysis of these adjectives closely replicated the Big Five. Another thorough search for factors beyond the Big Five showed that these five were the only consistently replicable factors (Saucier, 1997).

Assessing the Big Five with Trait Descriptive Adjectives: Simple and Circumplex Approaches

Goldberg (1990, 1992) distilled his extensive taxonomic findings into several adjective lists, including a commonly used set of 100 unipolar trait-descriptive adjectives (TDA). Goldberg (1992) conducted a series of factor-analytic studies to develop and refine the TDA, selecting only adjectives that uniquely defined each factor. These scales have high internal consistency. Another adjectival measure of the Big Five was developed by Wiggins (1995; Trapnell & Wiggins, 1990), who used trait adjectives to elaborate the two major dimensions of interpersonal behavior: dominance (or agency) and nur-

ture (or communion). As shown in Table 2.1, the first dimension resembles Extraversion in the Big Five, and the second resembles Agreeableness. Wiggins thus extended his interpersonal-circumplex scales by adding simple adjective measures for the other three Big Five factors (Trapnell & Wiggins, 1990).

The circumplex approach has also been extended to a perennial problem in lexical research on personality factors, namely, to describe more clearly those characteristics that fall in the fuzzy regions *between* the factors. Using 10 two-dimensional circumplexes, Hofstee, de Raad, and Goldberg (1992) devised the Abridged Big Five Circumplex (AB5C) approach to represent the two-dimensional space formed by each pair of factors and define eight facets in that circular representation that reflect various combinations of the two factors. The facets differ in whether they are more closely related to one or the other factor. For example, there are two facets that reflect high Agreeableness and high Conscientiousness, but they differ in which of the two factors is given more prominence. The *responsibility* facet represents agreeable Conscientiousness, whereas the *cooperation* facet represents conscientious Agreeableness (Hofstee, Kiers, de Raad, Goldberg, & Ostendorf, 1997).

Cross-Language and Cross-Cultural Studies

The results reviewed so far suggest that the Big Five structure provides a replicable representation of the major dimensions of trait description in English across different types of samples, raters, and methodological variations. Generalizability across languages and cultures is another important criterion for evaluating personality taxonomies (John, Goldberg, & Angleitner, 1984). The existence of cultural universals (Goldberg, 1981) would be consistent with an evolutionary perspective: If the tasks most central to human survival are universal, the most important individual differences, and the terms people use to label these individual differences, would be universal as well (Buss, 1996). Conversely, if cross-cultural research reveals a culturally specific dimension, variation on that dimension may be uniquely

important within that culture's particular social context. Although central from the vantage point of the lexical approach, cross-language research is difficult and expensive to conduct, and until the 1990s, it was quite rare. In the initial taxonomic studies, English was the language of choice, primarily because the researchers were American (see John et al., 1984, 1988).

Initial Studies in Dutch and German

The first two non-English taxonomy projects involved Dutch and German, both Germanic languages closely related to English. The Dutch projects, carried out by Hofstee, de Raad, and their colleagues at the University of Groningen (de Raad, Mulder, Kloosterman, & Hofstee, 1988; Hofstee et al., 1997; see de Raad, Perugini, Hrebickova, & Szarota, 1998, for a review), yielded conclusions generally consistent with those from the American English research: Only five factors were replicable across different selections of trait adjectives and across different subject samples. Those five factors were similar to the English Big Five, although the fifth Dutch factor emphasizes elements of Unconventionality and Rebelliousness rather than Intellect and Imagination, as found in English.

The German taxonomy project (Angleitner, Ostendorf, & John, 1990) began with a comprehensive "psycholexical" study of the German personality vocabulary. The study was explicitly based on the prototype conception and improved on earlier studies in several respects. In particular, 10 independent judges classified all the terms obtained from the dictionary as traits, states, social evaluations, and so forth, thus providing a continuous measure of the prototypicality of each term for each category and also a check on the reliability and validity of the judgments. The resulting German personality lexicon is more convenient to use than the unwieldy Allport and Odbert lists, because prototypicality values are available for each term in 13 different content categories. Thus, it is easy to select subsets of prototypical traits, states, social evaluations, and so forth, from the total pool for further studies. Angleitner and colleagues' (1990) research has served as a blueprint for subsequent taxonomic efforts in other languages.

To test the structure underlying the German trait terms, Ostendorf (1990) selected the most prototypical trait adjectives from the German taxonomy, and his factor analyses of about 450 traits yielded the clearest replication of the Big Five so far. In addition to the prototypical traits representing the distillation of the German trait lexicon, Ostendorf also included German translations of several English personality instruments—a combined emic–etic design that allows researchers to establish empirically the similarity of indigenous (emic) factors to the factors translated from other languages and cultures (etic). Ostendorf found evidence for substantial cross-language convergence.

However, this combined emic–etic strategy is difficult to implement and, unfortunately, has not been used consistently in research. Thus, researchers often reach conclusions about factor similarity by "eyeballing" the item content of the factors in the indigenous language and comparing it to the typical factor definitions in English. That leaves much leeway to the investigators in finding (or not finding) a factor that another investigator might not have found. For example, a Hebrew factor defined primarily by traits such as sophisticated, sharp, knowledgeable, articulate, and impressive would lead some researchers to conclude they found a clear Intellect factor, whereas Almagor, Tellegen, and Waller (1995) interpreted it as Positive Valence.

Problems with Translations and Underestimating Cross-Language Congruence. Another methodological difficulty in cross-language research involves translations. Researchers working within their indigenous language have to translate their concepts into English to communicate their findings in scientific journals, and much too often considerable slippage occurs in the translation process. For example, because "temperamental" was listed as a definer of Extraversion in German, one might hypothesize an important cultural difference here until one realizes that the German trait was probably *temperamentvoll*, which has nothing to do with bad temper but means "full of life and energy," as in *vivacious* or *passionate*. Similarly, the Italian trait term *frizzante* (translated as *sparkling*) was not found to be related to intellect, as one might expect, but

to Extraversion and probably means something close to *bubbly*.

An initial study of German–English bilinguals, which provided support for cross-language generalizability (John et al., 1984), directly addressed the issue of translation equivalence. The unique advantage of the bilingual design is that sample differences can be controlled, and translation checks can be made at the level of individual items, because the same subject provides descriptions in both languages (see also Benet-Martinez & John, 1998). Using a careful back-translation procedure, John and colleagues (1984) found acceptable levels of translation equivalence between English and German trait adjectives, with a mean correlation of .52 across a 2-week interval between administrations. However, a few translations proved to be inadequate, with item–translation correlations approaching zero. These findings, obtained for closely related languages, suggest that mistranslations of single trait adjectives are even more likely to occur in monolingual investigations of personality structure and lead to severe underestimations of cross-language generality.

Rules for Including Trait Descriptors in Taxonomic Studies. In addition to translation problems, some of the differences among factor structures in different languages are due to the different inclusion rules adopted by the taxonomy teams. The selection criterion used by the Dutch researchers favored terms related to temperament; excluded terms related to intellect, talents, and capacities; and included a number of extremely negative evaluative terms, such as *perverse*, *sadistic*, and *criminal*. The German team explicitly included intellect and talent descriptors but omitted attitudes and evaluative terms, which were included in separate categories. In contrast, the American English taxonomy included attitudinal terms such as *liberal*, *progressive*, and *provincial*, along with a number of intellect terms. Given the diverse range of traits related to the fifth factor, it is less surprising that the German and English factors shared the intellect components, whereas the Dutch factor included some imagination-related traits (e.g., *inventive*, *original*, *imaginative*) but otherwise emphasized unconventionality and was thus interpreted initially as a “Rebelliousness” factor.

One Italian trait taxonomy (Caprara & Perugini, 1994) found a similar fifth factor interpreted as Unconventionality: Not surprisingly, these Italian researchers had followed the Dutch selection procedures rather than the German procedures, which likely would have represented more Intellect terms in the initial item pool. A second (and independent) team of Italian taxonomers (Di Blas & Forzi, 1998) failed to find the same factors as the first (see also de Raad, Di Blas, & Perugini, 1998). Given that both teams started with the *same lexical material* (Italian personality descriptors), their lack of convergence serves to illustrate the inherent difficulties in standardizing taxonomic procedures and factor-analytic decisions across cultures and languages. How can we expect the Big Five to generalize across languages when two studies of the same language fail to show factor generalizability?

Thus, apparent failures to replicate the Big Five structure can be hard to interpret. For example, Szirmak and de Raad (1994) examined Hungarian personality descriptors and found strong support for the first four but failed to obtain a factor resembling the fifth of the Big Five. Instead, when they forced a five-factor solution, the Agreeableness factor split into two factors. Should this finding be counted as a failure to replicate the Big Five, suggesting that Hungarians do not differ systematically on traits related to imagination, creativity, and intellect? Probably not: When six factors were rotated, an Intellect/Openness factor did emerge in the Hungarian data. Again, we suspect that this finding may be due to differences in the way the initial item pool was selected. In their review of this literature, Saucier, Hampson, and Goldberg (2000) conclude that “given these and other differences among studies, is it any wonder that investigators might disagree about the evidential basis for a particular structural representation?” (p. 23).

Evidence in Non-Germanic Languages. Lexical research has now been extended to an growing range of non-Germanic languages, such as Chinese (Yang & Bond, 1990), Czech (Hrebickova & Ostendorf, 1995), Greek (Saucier, Georgiades, Tsouasis, & Goldberg, 2005), Hebrew (Almagor et al., 1995), Tagalog in the Philippines (Church, Reyes, Katigbak, & Grimm, 1997), and so

on. This literature has grown far beyond the scope of this chapter, and we thus refer the reader to several in-depths reviews (e.g., Ashton et al., 2004; de Raad & Perugini, 2002; Saucier et al., 2000). Most generally, our reading of this literature is that factors similar to the Big Five were found in many other languages but sometimes more than five factors needed to be rotated and sometimes two indigenous factors corresponded to one of the Big Five. The Big Five have been well-replicated in Germanic languages, but the evidence for non-Western languages and cultures tends to be more complex. Overall, the evidence is least compelling for the fifth factor, which appears in various guises, ranging from pure Intellect (in German) to Unconventionality and Rebelliousness (in Dutch and Italian). Moreover, when we only consider which factors are the *most* replicable, then structures with fewer factors (e.g., two or three) can be even more robust than the more differentiated Big Five (e.g., Saucier, Georgiades, Tsouasis, & Goldberg, 2005).

Finally, a number of researchers have suggested more than five factors. For example, the seven-factor solutions in Spanish and English (see Benet-Martinez & Waller, 1997) suggested additional separate positive and negative self-evaluation factors (but see Simms, 2006). The more recent six-factor solutions, obtained in reanalyses of data from several different languages (Ashton et al., 2004; Ashton & Lee, 2020; but see Crowe, Lynam, & Miller, 2018), failed to replicate the seven-factor solution and instead suggested that an additional honesty–humility factor may be important. Three general conclusions seem to hold. First, note that these factors are indeed “additional”; that is, they provide evidence for the generalizability of the Big Five *plus* one or two further factors. Second, when more factors than the Big Five have been identified, the analysis may have broken one of the broad Big Five domains into two parts; for example, Crowe, Lynam, and Miller (2018) and Soto (2020b) have argued that measures of honesty–humility tend to be positively correlated with Agreeableness, rather than representing a truly independent sixth dimension. Third, the additional factors, such as positive and negative self-evaluation, rarely replicate across multiple studies conducted by independent

investigators. Thus, we agree with de Raad, Perugini, and colleagues (1998), who concluded that the findings show “the general contours of the Big Five model as the best working hypothesis of an omnipresent trait structure” (p. 214). While this cautious conclusion falls short of an unequivocal endorsement of the universality of the Big Five, it nonetheless offers a disconfirmation of the strong linguistic relativism hypothesis that many of personality researchers (including ourselves) had expected to hold true before the lexical data became available: There are no data to suggest that each culture and language has its own unique set of personality dimensions; at least at the level of broad trait dimensions, most cultures are more alike than we had expected.

The Big Five in Personality Questionnaires

While researchers in the lexical tradition were accumulating evidence for the Big Five, the need for an integrative framework became more pressing among researchers who studied personality with questionnaire scales. Joint factor analyses of questionnaires developed by different investigators had shown that two broad dimensions: Extraversion and Neuroticism appear in one form or another in most personality inventories. Beyond these “Big Two” (Wiggins, 1968), however, the various questionnaire-based models had shown few signs of convergence. For example, Eysenck (1991) observed that “where we have literally hundreds of inventories incorporating thousands of traits, largely overlapping but also containing specific variance, each empirical finding is strictly speaking only relevant to a specific trait. . . . This is not the way to build a unified scientific discipline” (p. 786).

Costa and McCrae’s Research

The situation began to change in the early 1980s, when Costa and McCrae were developing the NEO Personality Inventory (eventually published in 1985), labeled N-E-O because it was designed to measure the three dimensions of Neuroticism, Extraversion, and Openness to Experience. Costa and McCrae (1976) had begun their work with cluster analyses of the 16PF (Cattell et al., 1970)

which, as we described earlier, originated in Cattell's early lexical work. Their analyses again yielded the ubiquitous Extraversion and Neuroticism dimensions, but also convinced McCrae and Costa (e.g., 1985b) of the importance of Openness, which originated from several of Cattell's primary factors (e.g., imaginative, experimenting).

In 1983, Costa and McCrae realized that their NEO system closely resembled three of the Big Five factors, but did not encompass traits in the Agreeableness and Conscientiousness domains. They therefore extended their model with preliminary scales measuring Agreeableness and Conscientiousness. In several studies, McCrae and Costa (1985a, 1985c, 1987) demonstrated that their five questionnaire scales converged with adjective-based measures of the Big Five, although their conception of Openness was considerably broader than the Intellect or Imagination factor emerging from the lexical analyses (Saucier & Goldberg, 1996). A series of influential papers in the late 1980s and early 1990s showed that these five factors could also be recovered in various other personality questionnaires, as well as in self-ratings on the California Adult Q-Set (see Costa & McCrae, 1992; McCrae & Costa, 2003).

The Revised NEO Personality Inventory

The initial NEO Personality Inventory (Costa & McCrae, 1985) included scales to measure six conceptually derived facets each for Neuroticism, Extraversion, and Openness but did not include facet scales for the newly added Agreeableness and Conscientiousness. In 1992, Costa and McCrae published the 240-item NEO Personality Inventory—Revised (NEO-PI-R; Costa & McCrae, 1992), which permits differentiated measurement of each Big Five dimension in terms of six more specific facets per factor (Costa & McCrae, 1995). Table 2.3 lists some of their facets defining each of the factors. In contrast to most of the lexical studies, which relied on college student samples, the NEO-PI-R was developed in samples of middle-aged and older adults, using both factor-analytic and multimethod validation procedures of test construction. The scales have shown substantial internal consistency, temporal stability, and con-

vergent and discriminant validity against spouse and peer ratings (Costa & McCrae, 1992; McCrae & Costa, 2003).

For many research applications, the NEO-PI-R is rather lengthy. To provide a shorter measure, Costa and McCrae (1992) developed the 60-item NEO-FFI, an abbreviated version based on an item factor analysis of the 1985 version of the NEO-PI (Costa & McCrae, 1985). The 12-item scales of the Five-Factor Inventory (FFI) consist of items that loaded highly on one of the five factors. The item content of the scales was adjusted somewhat to include reasonable content coverage of the facets; however, these scales represent the core elements of each Big Five factor as defined on the NEO-PI and therefore do not represent equally each of the six facets defining each factor. For example, the Agreeableness scale includes five items from the Altruism facet, three from Compliance, two from Trust, one from Tender-Mindedness, one from Straightforwardness, and none from Modesty. The reliabilities (Costa & McCrae, 1992) are adequate, with a mean of .78, and the NEO-FFI scales are substantially correlated with the NEO PI-R scales.

Defining the Big Five across Studies: A Prototype Approach

So far, we have reviewed both Goldberg's (1990) lexically based research and Costa and McCrae's (1992) questionnaire-based research on the Big Five. Despite this extensive research, the Big Five structure was initially not widely welcomed in the field and, in fact, was explicitly rejected by some senior researchers in the field (e.g., Block, 1995; Eysenck, 1992, 1997; McAdams, 1992; Pervin, 1994). One problem, it seems, was the perception that there is no *single* Big Five, in the same way that there was just one 16PF, namely, Cattell's, because he owned it. In contrast, the Big Five emerged in multiple labs and studies and is therefore not owned by any one person in the field, which makes it possible to ask questions such as "*Which* Big Five?" or "*Whose* Big Five?" (John, 1989). For example, the first factor has been labeled as surgency, confident self-expression, assertiveness, social extraversion, and power (see John, 1990, Table 3.1), and the second fac-

TABLE 2.3. The BFI-2 Facets Aligned with Previous Hierarchical Models

BFI-2 facets (Soto & John, 2017a)	NEO-PI-R facets (Costa & McCrae, 1992)	AB5C facets (Hofstee et al., 1992)	Lexical subcomponents (Saucier & Ostendorf, 1999)	Big Five aspects (DeYoung et al., 2007)	BFI-2 item example
<i>Extraversion</i>					
Sociability	Gregariousness	Gregariousness	Sociability	Enthusiasm	Is outgoing, sociable.
Assertiveness	Assertiveness	Assertiveness	Assertiveness	Assertiveness	Is dominant, acts as a leader.
Energy Level	Positive Emotions/Activity	—	Activity–Adventurousness	Enthusiasm	Is full of energy.
<i>Agreeableness</i>					
Compassion	Altruism	Understanding	Warmth–Affection	Compassion	Is compassionate, has a soft heart.
Respectfulness	Compliance	Cooperation	Gentleness	Politeness	Is respectful, treats others with respect.
Trust	Trust	Pleasantness	—	—	Assumes the best about people.
<i>Conscientiousness</i>					
Organization	Order	Orderliness	Orderliness	Orderliness	Keeps things neat and tidy.
Productiveness	Self-Discipline	Efficiency	Industriousness	Industriousness	Is persistent, works until the task is finished.
Responsibility	Dutifulness	Dutifulness	Reliability	—	Is reliable, can always be counted on.
<i>Negative Emotionality</i>					
Anxiety	Anxiety	Toughness (R)	Emotionality	Withdrawal	Worries a lot.
Depression	Depression	Happiness (R)	Insecurity	Withdrawal	Tends to feel depressed, blue.
Emotional Volatility	Angry Hostility	Stability (R)	Irritability	Volatility	Is temperamental, gets emotional easily.
<i>Open-Mindedness</i>					
Intellectual Curiosity	Ideas	Intellect	Intellect	Intellect	Is complex, a deep thinker.
Aesthetic Sensitivity	Aesthetics	Reflection	—	Openness	Is fascinated by art, music, or literature.
Creative Imagination	Fantasy	Ingenuity	Imagination–Creativity	—	Is original, comes up with new ideas.

tor as social adaptability, likability, friendly compliance, agreeableness, and love. Of course, some variation across studies is to be expected with dimensions as broad and inclusive as the Big Five, because researchers differ in the variables they include, thus representing different parts of the factor's total range of meaning. Moreover, researchers differ in their preferences for factor labels even when the factor content is quite similar. The fact that the labels differ does not necessarily mean that the factors are different, too. Thus, there may be more commonality than meets the eye.

John (1990) proposed a prototype approach to identify these commonalities across studies. Natural categories such as the Big Five typically have fuzzy and partially overlapping definitions (Rosch, 1978), but they can still be extremely useful when defined in terms of prototypical exemplars. Similarly, the Big Five may be defined with prototypical traits that occur consistently across studies. One way to integrate the various interpretations of the factors is to conceptually map the five dimensions into a common language. To abstract the common elements in these findings, John (1989, 1990) used human judges, and the 300 terms included in the Adjective Check List (ACL; Gough & Heilbrun, 1983) served as the standard language.

Conceptually Derived Prototype Descriptions of the Big Five and their Validation in Observer Data

A set of 10 judges first developed a detailed understanding of the Big Five by reviewing the factor solutions and interpretations of all major Big Five articles published by 1988. The judges then independently sorted each of the 300 items in the ACL into one of the Big-Five domains or into a sixth "other" category, with substantial interjudge agreement. In all, 112 of the 300 ACL terms were assigned to one of the Big Five, with 90% or better agreement. These terms form a relatively narrow, or "core," definition of the five factors, because they include only those traits that appeared consistently across studies. As with any rationally constructed measure, the validity of these categorizations was

tested empirically in a factor analysis of the 112 terms. Whereas most Big Five research has been based on college students' self- and peer ratings, this study used observer data obtained from psychologists. John (1990) used a sample of 140 men and 140 women who had participated in groups of 10–15 in one of the assessment weekends the Institute of Personality and Social Research (IPSR, formerly the Institute for Personality Assessment Research [IPAR]) at Berkeley. As each subject had been described on the ACL by 10 staff members, a factor analysis could be performed on more reliable, aggregated observer judgments. The varimax rotation factor loadings, shown in Table 2.4, provide a compelling confirmation of the initial prototypes. All but one item loaded on its hypothesized factor in the expected direction, and most of the loadings were substantial.

Note that the items defining each of the factors cover a broad range of content. For example, Factor I includes traits such as *active, adventurous, assertive, dominant, energetic, enthusiastic, outgoing, sociable, and show-off*. In light of this substantial bandwidth, the heterogeneity of the previous factor labels is understood more easily: Different investigators have focused on different components, or facets, of the total range of meaning subsumed by each factor. In this study, the Extraversion factor includes at least three major distinguishable components: sociability (outgoing, sociable, talkative, noisy), assertiveness (assertive, forceful, outspoken, bossy), and energy level (active, energetic, enthusiastic, and spunky). Note that these three components are similar to several of the facets Costa and McCrae (1992) included in their definition of the Extraversion domain—gregariousness, assertiveness, and positive emotions/activity (see Table 2.3)—and these three have also been identified in a lexical study that empirically identified facets across two languages (Saucier & Ostendorf, 1999), as shown in Table 2.3. The traits that define the Conscientiousness factor in Table 2.4 seem to capture three major themes, namely Organization or Orderliness (thorough, precise, and painstaking vs. disorderly), Productivity (efficient, planful, and deliberate vs. frivolous), and Responsibility (responsible, reliable, and dependable vs. irresponsible). More gener-

TABLE 2.4. Big Five Prototypes: Most Central Trait Adjectives Selected Consensually by Expert Judges and Their Factor Loadings in Personality Ratings by 10 Psychologists Serving as Observers

Extraversion		Agreeableness		Conscientiousness		Neuroticism		Openness	
Low	High	Low	High	Low	High	Low	High	Low	High
-.83 Quiet	.85 Talkative	-.52 Fault-finding	.87 Sympathetic	-.58 Careless	.80 Organized	-.39 Stable	.73 Tense	-.74 Common-place	.76 Wide interests
-.80 Reserved	.83 Assertive	-.48 Cold	.85 Kind	-.53 Disorderly	.80 Thorough	-.35 Calm	.72 Anxious	-.73 Narrow interests	.76 Imaginative
-.75 Shy	.82 Active	-.45 Unfriendly	.85 Appreciative	-.50 Frivolous	.78 Planful	-.21 Contented	.72 Nervous	-.67 Simple	.72 Intelligent
-.71 Silent	.82 Energetic	-.45 Quarrelsome	.84 Affectionate	-.49 Irresponsible	.78 Efficient		.71 Moody	-.55 Shallow	.73 Original
-.67 Withdrawn	.82 Outgoing	-.45 Hardhearted	.84 Soft-hearted	-.40 Slipshod	.73 Responsible		.71 Worrying	-.47 Unintelligent	.68 Insightful
-.66 Retiring	.80 Outspoken	-.45 Hardhearted	.82 Warm	-.39 Unpendable	.72 Reliable		.68 Touchy		.64 Curious
	.79 Dominant	-.38 Unkind	.81 Generous	-.37 Forgetful	.70 Dependable		.64 Fearful		.59 Sophisticated
	.73 Forceful	-.33 Cruel	.78 Trusting		.68 Conscientious		.63 High-strung		.59 Artistic
	.73 Enthusiastic	-.31 Stern	.77 Helpful		.66 Precise		.60 Temperamental		.59 Clever
	.68 Show-off	-.28 Thankless	.77 Forgiving		.66 Practical		.59 Unstable		.58 Inventive
	.68 Sociable	-.24 Stingy	.74 Pleasant		.65 Deliberate		.58 Self-punishing		.56 Sharp-witted
	.64 Spunky		.73 Good-natured		.46 Painstaking		.54 Despondent		.55 Ingenious
	.64 Adventurous		.73 Friendly		.26 Cautious		.51 Emotional		.45 Witty
	.62 Noisy		.72 Cooperative						.45 Resourceful
	.58 Bossy		.67 Gentle						.37 Wise
			.66 Unselfish						
			.56 Praising						
			.51 Sensitive						

Note. Based on John (1990). These items were assigned to one Big Five domain by at least 90% of the judges and thus capture the most prototypical (or central) content of each Big Five domain. The factor loadings, shown here only for the expected factor, were obtained in a sample of 140 males and 140 females, each of whom had been described by 10 psychologists serving as observers during an assessment weekend at the Institute of Personality and Social Research at the University of California at Berkeley (see also John, 1989).

ally, the adjectival definitions of the Big Five in Table 2.4 seem to capture the prototypical traits found in other studies and the facets shown in Table 2.3.

The Prototypical Definition of Factor V: Culture, Intellect, or Openness?

The findings in Table 2.4 also address questions about the definition of the fifth factor. None of the items referring to aspects of “high” culture (e.g., civilized, polished, dignified, foresighted, logical) loaded substantially on Factor V (see John, 1990), and many loaded more highly on Factor III (Conscientiousness), thus discrediting an interpretation of Factor V as culture. Apparently, the initial interpretation of Tupes and Christal’s (1961/1992) fifth factor as Culture was a historical accident (Peabody & Goldberg, 1989). The items that did load substantially on the fifth factor (see Table 2.4) include both the “open” characteristics (e.g., artistic, curious, original, wide interests) highlighted by McCrae and Costa (1985a, 1985b) and the “intellectual” characteristics (intelligent, insightful, sophisticated) emphasized by Digman and Inouye (1986), Peabody and Goldberg (1989), and Goldberg (1990).

These findings are also consistent with Goldberg’s (1990) result that Factor V is defined as Originality, Wisdom, Objectivity, Knowledge, Reflection, and Art, thus involving facets of Openness related to ideas, fantasy, and aesthetics (Costa & McCrae, 1992), or, as labeled in Table 2.3, intellectual curiosity, creative imagination, and aesthetic sensitivity, respectively. Similarly, Goldberg’s (1990) analyses of the 133 synonym clusters showed Intellectuality (intellectual, contemplative, meditative, philosophical, and introspective) and Creativity (creative, imaginative, inventive, ingenious, innovative) with the highest positive loadings, and Conventionality (traditional, conventional, unprogressive) loaded negatively in all four samples. These and other lexical findings (see John & Srivastava, 1999) are inconsistent with both the Culture and a narrow Intellect interpretation and instead favor the broader Openness interpretation proposed by McCrae (1996); the inclusion of unconventionality and nonconformity (which de-

scribe both creative and artistic individuals) also makes an important link to the definition of this lexical factor in Dutch and Italian (de Raad, di Blas, et al., 1998). Moving away from a narrow Intellect interpretation, Saucier (1994a) has suggested the label “Imagination,” which is somewhat closer to Openness and emphasizes the emerging consensus that fantasy, ideas, and aesthetics, rather than intelligence, are most central to this factor. In this chapter, we therefore adopt the term Openness, elsewhere we have suggested the similar, but less technical, term *open-mindedness* (Soto & John, 2017a).

The Big Five Inventory: Measuring the Core Features of the Big Five with Short Phrases

To address the need for a short instrument measuring the prototypical components of the Big Five that are common across investigators, John, Donahue, and Kentle (1991) constructed the Big Five Inventory (BFI; see also Benet-Martinez & John, 1998; John & Srivastava, 1999; Rammstedt & John, 2005, 2007, 2017). The 44-item BFI was developed to represent the Big Five prototype definitions described earlier (see Table 2.4), which represent a canonical representation of the factors intended to capture their core elements across the particulars of previous studies, samples, or instruments. The final items were selected on the basis of factor analyses in large samples of both junior college and public university students. Thus, Hampson and Goldberg (2006, p. 766) were mistaken when they suggested that “John developed each of the five BFI scales to fall roughly between the lexical Big Five factors (Goldberg, 1992) and the five domain scores from the NEO PI-R,” nor was this outcome intended or entailed by the procedures used, as we will see below. The goal was to create a brief inventory that would allow efficient and flexible assessment of the five dimensions when there is no need for more differentiated measurement of individual facets. There is much to be said in favor of brevity: “Short scales not only save testing time, but also avoid subject boredom and fatigue. . . . There are subjects . . . from whom you won’t get any response if the test looks too long” (Burisch, 1984, p. 219).

The BFI does not use single adjectives as items, because such items are answered less consistently than when they are accompanied by definitions or elaborations (Goldberg & Kilkowski, 1985). Instead, the BFI uses short phrases based on the trait adjectives known to be prototypical markers of the Big Five (John, 1989, 1990). One or two prototypical trait adjectives served as the item core to which elaborative, clarifying, or contextual information was added. For example, the Openness adjective *original* became the BFI item “Is original, comes up with new ideas” and the Conscientiousness adjective *persevering* served as the basis for the item “Perseveres until the task is finished.” Thus, the BFI items (see Appendix 2.1) retain the advantages of adjectival items (brevity and simplicity) while avoiding some of their pitfalls (ambiguous or multiple meanings and salient desirability). Indeed, DeYoung (2006, p. 1140) hypothesized that with their more contextualized trait content the BFI items should elicit higher interrater agreement than single-adjective items, and found that pairwise interrater agreement was indeed somewhat higher for the BFI.

Although the BFI scales include only eight to 10 items, they do not sacrifice either content coverage or good psychometric properties. In U.S. and Canadian samples, the alpha reliabilities of the BFI scales range from .75 to .90 and average above .80. Three-month test–retest reliabilities range from .80 to .90, with a mean of .85 (Rammstedt & John, 2005, 2007). In a middle-aged sample, Hampson and Goldberg (2006) found a mean test–retest stability of .74, with stability correlations of .79 for Extraversion and Openness and about .70 for Agreeableness, Conscientiousness, and Neuroticism. Validity evidence includes substantial convergent and divergent relations with other Big Five instruments, as well as with peer ratings (Rammstedt & John, 2005, 2007). DeYoung (2006) analyzed a large community dataset with BFI self-reports and BFI ratings by three peers; We therefore reanalyzed these data and found validity correlations of .67 for Extraversion, .60 for Openness, .52 for Neuroticism, .48 for Agreeableness, and .47 for Conscientiousness, averaging .55. The size of these convergent correlations is even more impressive given that the (abso-

lute) heterotrait–heteromethod discriminant correlations averaged .09, and 19 of the 20 correlations were below .20, with only one reaching $-.21$ (indicating that individuals who described themselves as high in Neuroticism were rated by their peers as slightly more disagreeable).

Measurement: Comparing Major Big Five Instruments

So far, we have discussed Goldberg’s (1992) TDA, Costa and McCrae’s (1992) NEO questionnaires, and DeYoung et al.’s (2007) BFAS, and the BFI as well as its revised version, the BFI-2 (Soto & John, 2017a). In addition, a variety of other measures are available to assess the Big Five in English. Most of them were developed for specific research applications. Digman (e.g., 1989) constructed several different adjective sets to study teacher ratings of personality in children and adolescents, and Wiggins (1995) scales were described above. Big Five scales have also been constructed using items from existing instruments. For example, John, Caspi, Robins, Moffitt, and Stouthamer-Loeber (1994) developed scales to measure the Big Five in adolescents using personality ratings on the California Child Q-Sort obtained from their mothers. Measelle, John, Ablow, Cowan, and Cowan (2005) developed scales to measure the Big Five with a puppet interview in children ages 4–7. In their behavior genetic research, Loehlin, McCrae, Costa, and John (1998) used Big Five scales constructed from the ACL (Gough & Heilbrun, 1983) and the CPI (Gough, 1987); for the latter, Soto and John (2009a) developed new domain and facet scales. As shown in Table 2.1, another broad-band personality inventory that provides scores for the Big Five is the Hogan Personality Inventory (HPI; Hogan, 1986; Hogan & Hogan, 2007). The availability of so many different instruments to measure the Big Five makes clear that there is no single instrument that represents *the* “gold standard.”

Comparing the NEO-FFI, BFI-2, and TDA

In general, the NEO questionnaires represent the best-validated Big Five measures

in the questionnaire tradition. Goldberg's (1992) 100-item TDA and its abbreviated 40-item version (Saucier, 1994b) is the most commonly used measure consisting of single adjectives. The BFI has been used in several thousand research studies, where subject time is at a premium and its short-phrase item format provides more context than Goldberg's single-adjective items but less complexity than the sentence format used by the NEO questionnaires; the BFI items are also somewhat easier to understand (Benet-Martinez & John, 1998).

How well do these different Big Five measures converge? A number of researchers have reported on the psychometric characteristics of these instruments, and a few have compared two of them with each other (e.g., Benet-Martinez & John, 1998; DeYoung, 2006; Goldberg, 1992; McCrae & Costa, 1987). Besides the John and Srivastava (1999) study, however, no published studies have compared all three. To provide such a comparison, we summarize findings from a large dataset of self-reports on all three measures. The sample consisted of 438 undergraduates at the University of California, Berkeley (see Soto & John, 2017a; Soto & John, 2008) who completed the BFI-2, the BFAS, Saucier's (1994b) 40-item version of Goldberg's (1992) TDA, as well as Costa and McCrae's (1992) NEO-PI-R, from which we scored both the 30 facets and the NEO-FFI domain scores. The data thus represent a multitrait-multimethod (MTMM) design in which the methods are the three Big Five self-report instruments (see John & Benet-Martinez, 2000).

Reliability of the Three Instruments

Overall, the coefficient alpha reliabilities, shown in Table 2.5, were impressive for these relatively short scales, and relatively similar in size across instruments; the mean of the alphas was .84 for the TDA scales, .86 for the BFI-2, and .81 for the NEO-FFI, which had the longest scales (12 items for the NEO-FFI and BFI-2, compared to eight for the TDA). Across instruments, Extraversion, Neuroticism, and Conscientiousness were measured most reliably (all clearly above .80 on all instruments), whereas Agreeableness and Openness tended to be somewhat

less reliable. The scales with the lowest reliabilities were the NEO-FFI Openness and Agreeableness scales, similar to the values reported in the NEO-PI-R manuals and also replicating two other college samples (e.g., Benet-Martinez & John, 1998). John and Srivastava (1999) noted that several NEO-FFI Openness items in their data did not correlate well with the total scale, and these less reliable items came from particular openness facets, namely from openness to action (e.g., trying new and foreign foods) and from openness to values (e.g., looking to religious authorities for decisions on moral issues, reverse-scored).

Convergent Validity across the Three Instruments

Overall, we expected the convergent validities across the three instruments to be substantial. However, we had already noted some potential differences in the way the three instruments define Extraversion and Openness. The NEO Extraversion domain had already been defined in terms of six facets before Costa and McCrae added domain scales for Agreeableness and Conscientiousness in 1985 and facet scales for these two factors in 1992. Thus, the warmth facet scale, included in the NEO-PI-R Extraversion domain, also correlates substantially with their Agreeableness domain scale (Costa & McCrae, 1992). In contrast, Goldberg (1992), John (1990), and Saucier and Ostendorf (1999, Tables 4.3 and 4.4) all found in independent analyses that trait adjectives related to warmth correlate more highly with Agreeableness than with Extraversion. Thus, John and Srivastava (1999) found that the NEO-FFI Extraversion scale showed much less convergence with either TDA or the BFI than those two instruments with each other.

The other potential difference involves the fifth factor. As described earlier, Goldberg (1992) prefers to interpret this factor as intellect or imagination (Saucier, 1992). Similarly, the BFI-2 Openness scale does not include items conceptually related to Costa and McCrae's (1992) values and actions facets, because preliminary BFI items based on prototype items related to conventionality (i.e., relevant to the NEO-PI-R values facet)

TABLE 2.5. Reliability and Convergent Validity Coefficients for Three Short Big Five Measures: Big Five Inventory, NEO Five-Factor Inventory, and Trait Descriptive Adjectives

Measures	Extraversion	Agreeableness	Conscientious- ness	Neuroticism	Openness	Mean
<u>Internal consistency</u>						
BFI-2	.87	.83	.85	.89	.85	.86
NEO-FFI	.87	.78	.85	.87	.73	.81
TDA	.87	.84	.84	.84	.82	.84
Mean	.85	.82	.85	.87	.80	.84
<u>Uncorrected convergent validity correlations (across measures)</u>						
BFI-2—TDA	.88	.80	.84	.74	.75	.80
BFI-2—NEO-FFI	.71	.74	.80	.76	.73	.75
TDA—NEO-FFI	.69	.64	.76	.61	.62	.67
Mean	.76	.73	.80	.70	.70	.74
<u>Corrected convergent validity correlations (across measures)</u>						
BFI-2—TDA	1.00	.95	.99	.85	.90	.94
BFI-2—NEO-FFI	.84	.92	.94	.86	.93	.90
TDA—NEO-FFI	.82	.79	.90	.72	.81	.81
Mean	.89	.89	.94	.81	.88	.88

Note. $N = 438$ (see Soto & John, 2017a, Study 3). BFI-2, Big Five Inventory–2 (Soto & John, 2017a); TDA, Trait Descriptive Adjective Mini-Markers (Saucier, 1994a); NEO-FFI, NEO Five-Factor Inventory (Costa & McCrae, 1992). Means are shown in **bold**.

and behavioral flexibility (relevant to the action facet) failed to cohere with the other items on the BFI Openness scale (John, Donahue, & Kentle, 1991). Thus, John and Srivastava (1999) found that the NEO-FFI Openness scale showed less convergence with either TDA or the BFI than those two instruments with each other.

The cross-instrument validity correlations, computed between pairs of instruments and shown in Table 2.5, were generally substantial in size. Across all five factors, the mean of the convergent validity correlations across instruments was .74. As shown in Table 2.5, BFI and TDA showed the strongest overall convergence (mean $r = .80$), followed closely by BFI and NEO-FFI (.75), and finally TDA and NEO-FFI (mean $r = .67$).

To determine the extent to which the validity correlations simply reflect the imperfect reliability of the scales rather than sub-

stantive differences among the instruments, we corrected for attenuation using alpha. As shown in Table 2.5, the corrected validity correlations averaged .88. However, this excellent overall result masks some important differences. Across instruments, the first three of the Big Five (Extraversion, Agreeableness, and Conscientiousness) showed mean validities of about .90, suggesting very high equivalence of the reliable variance of the three instruments. However, Neuroticism (.81) was notably lower. Focusing on the pairwise comparisons between instruments, the patterns were more differentiated. BFI and TDA (corrected mean $r = .94$) shared virtually all of their reliable variance, with the highest correlation for Extraversion; only the correlation for Neuroticism (.81) fell below .90. BFI and NEO-FFI also showed substantial mean convergence (.90). In contrast, TDA and NEO-FFI shared less

in common (mean corrected $r = .81$); only one correlation (for Conscientiousness) exceeded .90, and those for Neuroticism and Agreeableness did not even reach .80, suggesting that the conceptualization of four of the Big Five dimensions is not fully equivalent across these two instruments. On average, then, the BFI converged much better with both TDA and NEO-FFI than did TDA and NEO-FFI with each other. However, in contrast to Hampson and Goldberg's (2006) impression, the empirical findings show that the BFI does not simply occupy an intermediate position between the lexically derived TDA and the questionnaire-based NEO-FFI. Instead, the pattern of convergence correlations depends on the Big Five domain: The BFI achieved practical equivalence with the TDA for Extraversion and Conscientiousness, whereas the convergence with the NEO-FFI was greatest for Agreeableness, Conscientiousness, and Openness.

Discriminant Correlations

Overall, discriminant correlations were low, with absolute values averaging less than .25 overall. Moreover, none of the discriminant correlations reached .40 on any of the instruments. Thus, there was little support for Eysenck's (1992) contention that Agreeableness and Conscientiousness are highly correlated "primary" traits that should be combined into a broader dimension contrasting Eysenck's Psychoticism with what might be called "good character." The size of these intercorrelations should also dampen some of the enthusiasm (e.g., DeYoung, 2006; Markon, Krueger, & Watson, 2005) for higher-order factors above the Big Five (Digman, 1997). Yes, as has been noted repeatedly (e.g., John & Srivastava, 1999; Paulhus & John, 1998), the Big Five dimensions, as assessed by human self- and peer observers, are not strictly orthogonal. However, the size of these intercorrelations represents barely 10% shared variance—hardly enough, it would seem, to support the two substantively interpreted superordinate factors initially reported by Digman (1997). An alternative view has been proposed by Paulhus and John (1998), who showed that at least some of that covariance may be ex-

plained in terms of self-enhancing biases in self-reports.

Together, the findings in this section show that the Big Five are fairly independent dimensions that can be measured by several instruments with impressive convergent and discriminant validity.

Convergent and Discriminant Associations across Instruments at the Facet Level

So far, we have examined how well the broad Big Five domains are measured across three of the most commonly used and best validated instruments available to researchers. Much less is known about the facets that define each of the Big Five at a lower level of abstraction but progress is being made. In fact, Table 2.3 proposes a number of hypotheses about convergence and discrimination at the facet level, and these hypotheses can be tested empirically. Of the instruments included in Soto and John's (2017a, Study 3) data set described above, three measure lower-level constructs: the BFAS measures two aspects for each Big Five domain, the BFI-2 measures three facets for each, and the NEO-PI-R measures six facets for each. Given the rather different number of constructs included in each, correspondences cannot be perfect. Still, we can ask whether we find evidence for the patterns of convergences across instruments predicted in Table 2.3. Moreover, we wondered whether the facets that belong to the same domain (i.e., they are all positively correlated with each other because they relate to the superordinate Big Five factor) are nonetheless sufficiently distinct to show discriminant relations to each other.

To examine these issues from the perspective of the newest measure, namely the BFI-2, we computed the correlations of each BFI-2 facet scale with the two BFAS aspects and the six NEO-PI-R facets in the same domain. Overall, convergence was quite strong. Moreover, each BFI-2 facet showed a distinctive profile of associations across the 8 BFAS and NEO PI-R scales. To illustrate the findings, Figure 2.2 presents the results as a profile of 8 convergent and discriminant correlations for Conscientiousness and Agreeableness.

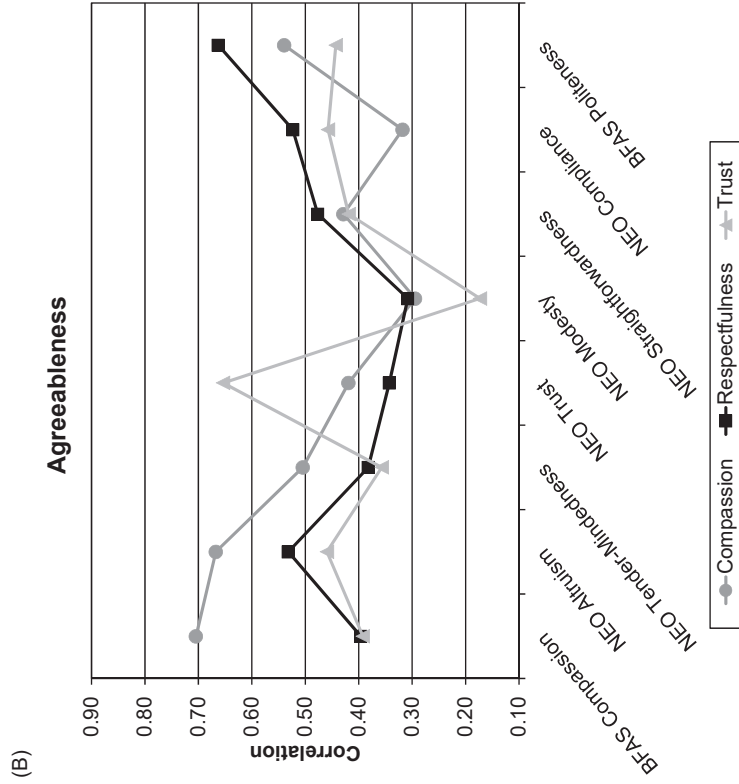
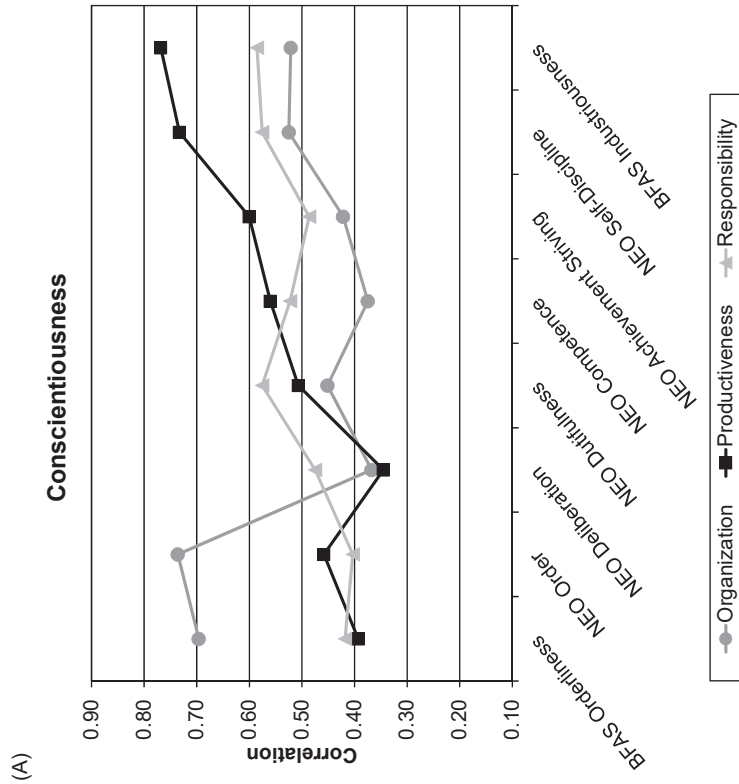


FIGURE 2.2. Correlations of the three BFI-2 facet scales (i.e., the three lines within the graph) with the two BFAS aspect scales and the six NEO facet scales on the x-axis, for the Conscientiousness domain (Panel A) and the Agreeableness domain (Panel B). BFAS, Big Five Aspect Scales; NEO, NEO Personality Inventory-Revised. Adapted from Soto and John (2017a, Study 3, N = 438).

The results for the Conscientiousness domain are shown in the Panel (A) of Figure 2.2. Consider the BFI-2 Organization facet first: As expected on the left-hand side of the figure, that BFI-2 scale had its highest correlations with Orderliness on the BFAS ($r = .70$) and with Order on the NEO-PI-R ($r = .74$); in contrast, the correlations with Deliberation, Dutifulness, Competence, and Achievement Striving on the NEO-PI-R on the right-hand side were all much lower (all around .40). BFI-2 Productiveness showed a very different profile: relatively low correlations with BFAS Orderliness and NEO-PI-R Order (around .40) on the left but much more substantial expected convergent correlations with Industriousness ($r = .77$) and Self-Discipline ($r = .73$) on the right. BFI-2 Responsibility, finally, showed its peak in the middle of the profile and correlated most strongly with Dutifulness ($r = .58$) and Deliberation ($r = .47$).

Panel (B) of Figure 2.2 shows the same overall pattern of high convergent and lower discriminant correlations for Agreeableness. Specifically, BFI-2 Compassion was substantially associated with BFAS Compassion ($r = .70$) and NEO-PI-R Altruism ($r = .67$) but not with Trust, Modesty, and Straightforwardness. In contrast, BFI-2 Trust was uniquely associated with Trust on the NEO-PI-R ($r = .65$). And BFI-2 Respectfulness was distinctively associated with BFAS Politeness ($r = .66$) and NEO-PI-R Compliance ($r = .52$).

Similar patterns of convergent and discriminant correlations were obtained for the BFI-2 facets from the other three Big Five dimensions as well. Taken together, these results support the theoretical conceptualization and measurement of the BFI-2 facets as well as the validity of the lower-level scales included in the BFAS and the NEO-PI-R, making us optimistic that the field can eventually reach consensus about the lower-level constructs that define each of the broad Big Five domains.

An alternative approach to examining the convergent and discriminant interrelations between the lower-level constructs is provided by the AB5C approach (Hofstee et al., 1992) described earlier. Because it presents the locations of the facets in a two-dimensional circumplex space, relations across the fuzzy boundaries of the Big

Five domains can be made apparent. Here we reanalyzed the data from Soto and John (2017a, Study 3) to show the 22 lower-level scales from all three instruments that belong either to the Extraversion or the Agreeableness domains; together these two domains define what has long been known as the interpersonal circle (e.g., Wiggins, 1979).

The 11 Extraversion and 11 Agreeableness facet scales from the three Big Five instruments (BFI-2, NEO-PI-R, and BFAS) were jointly factored using principal components analysis and VARIMAX rotation. Figure 2.3 shows the loadings on the two orthogonal factors for the 22 facet scales in the resulting two-dimensional space. Clearly, one factor represents Agreeableness (with BFI-2 Compassion and NEO Tender-mindedness at its center) and the other Extraversion (with BFI-2 Sociability and NEO Activity at its center). However, the two factors do not show a tight simple structure but form the expected half-circle, ranging all the way from NEO Modesty in the upper-left quadrant (i.e., loading positively on Agreeableness but negatively on Extraversion) to the three Assertiveness scales in the lower-right quadrant (i.e., loading positively on Extraversion but negatively on Agreeableness). And the boundary between the two clouds of loadings is decidedly fuzzy, populated by two NEO Extraversion facet scales, namely Warmth and Positive Emotions, which loaded positively and about equally on both Extraversion and Agreeableness.

Figure 2.3 also highlights how the locations of the six NEO Extraversion facets range from Assertiveness to Warmth and thus cover a wide (and heterogeneous) swath of Agreeableness content. Across instruments, Agreeableness facets such as trust and altruism have positive loadings on Extraversion, whereas modesty and compliance have negative loadings. The BFAS scales, in particular, behave as conceptualized; for example, Compassion and Politeness both load positively on their Agreeableness factor but on opposite sides of its center, with Compassion loading positively on Extraversion and Politeness loading negatively, thus maximizing their distance even though they both clearly belong to the Agreeableness domain. The same type of pattern holds for the two BFAS Extraversion scales, Assertiveness

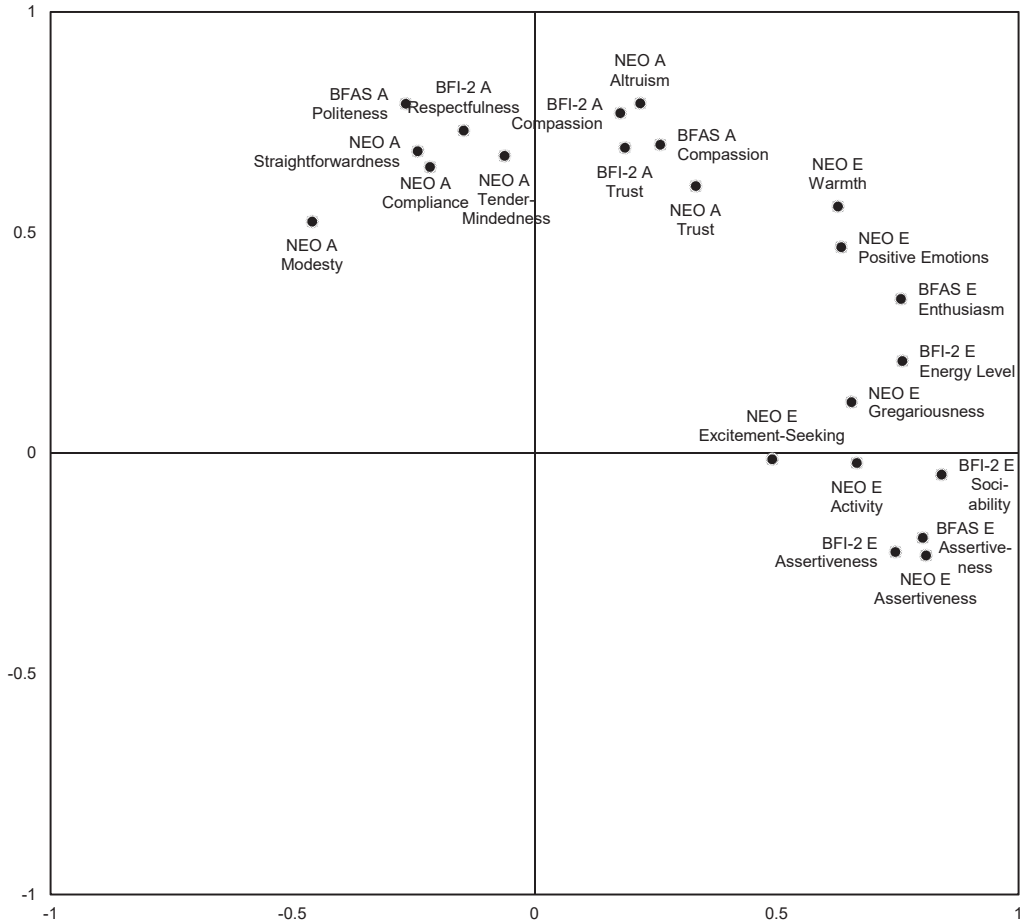


FIGURE 2.3. The interpersonal circumplex formed by the Big Five domains of Extraversion and Agreeableness. The Extraversion and Agreeableness facet scales from three Big Five instruments (BFI-2, NEO-PI-R, and BFAS) were jointly factored, and the graph shows the loadings of the 22 facet scales in the resulting two-dimensional space. BFI-2, Big Five Inventory–2; NEO, NEO PI-R; BFAS, Big Five Aspect Scales; E, Extraversion; A, Agreeableness.

(low on Extraversion) and Enthusiasm (high on Extraversion).

Finally, some of the convergent and discriminant relations apparent in Figure 2.2 can be discerned in Figure 2.3 as well; for example, BFI-2 Trust and NEO Trust appear close together in the two-dimensional space, as do BFI-2 and BFAS Compassion. However, the substantial discrimination between Compassion and Trust, while so apparent in Figure 2.2, is obscured here, partly because all these scales share their substantial loading on the Agreeableness factor where they belong. More generally, even though two-

dimensional plots of factor loadings, like that in Figure 2.3, have long been used in trait taxonomic and especially circumplex work, they seem to offer less specific information than the more focused facet profiles in Figure 2.2. Their strength is their ability to show the presence or absence of clear discriminations between factors, like the fuzzy boundaries between the interpersonal factors and the conceptual drift of the NEO Extraversion facets into the Agreeableness domain. That strength, however, is offset by their limited ability to show discrimination among the facets within each factor. Thus,

both kinds of representations, the unidimensional facet profiles in Figure 2.2 and the two-dimensional circumplex representations in Figure 2.3, have their place in helping us understand the structure of the Big Five at the lower level of the hierarchy.

Big Five Measurement: Conclusions and Limitations

One of the limitations of the findings presented here is that we did not examine external (or predictive) validity. Future researchers need to study the comparative validity of all three instruments using peer ratings and other external criteria. One of the advantages of the BFI-2 is its efficiency, taking only about 5 to 10 minutes of administration time, compared with about 15 minutes for the NEO-FFI and the 100-item TDA. Moreover, the BFI-2 items are shorter and easier to understand than the NEO-FFI items (Benet-Martinez & John, 1998; Soto & John, 2017a; Soto et al., 2008). The 100 (or 40) adjectives on the TDA are even shorter; however, single-trait adjectives can be ambiguous in their meanings.

When should researchers use each of these instruments? When participant time is not at a premium, participants are well educated and test-savvy, and the research question calls for the differentiated assessment of more than three facets for the Big Five, then the full 240-item NEO-PI-R is most useful. Otherwise, the 60-item BFI-2 or the 30-item BFI-2S would seem to offer a measure of the core attributes of the Big Five and the three most important facets that are at least as efficient and easily understood as the 60-item NEO-FFI and the 100-item TDA. At this point, we can recommend the use of even shorter instruments, with as few as 10–15 items (e.g., Gosling, Rentfrow, & Swann, 2003; Rammstedt & John, 2007; Soto & John, 2017b, 2019), *only* if a researcher encounters truly exceptional circumstances, such as the need to measure the Big Five as part of a national phone survey. From our perspective, the gains in time achieved by moving from a measure such as the BFI-2S (i.e., less than 5 minutes of subject time) to an even shorter measure can rarely compensate for the potential losses in reliability and validity one has to risk with such minimalist measurement.

Factor Names, Numbers, or Initials: Which Shall We Use?

Problems with the English Factor Labels

Now that we have considered both the history of the Big Five and its measurement, it is time to revisit the names or labels assigned to the factors (see Table 2.2). Although the constructs that will eventually replace the current Big Five may be different from what we know now, labels are important, because they imply particular interpretations and therefore influence the directions that theorizing might take. Norman's (1963) factor labels have been frequently used, but Norman offered little theoretical rationale for their selection. Norman's labels differ vastly in their breadth or inclusiveness (Hampson, Goldberg, & John, 1987); in particular, Conscientiousness and Culture are much too narrow to capture the enormous breadth of these two dimensions. Moreover, researchers have abandoned Culture as a label for Factor V, in favor of Intellect or Imagination (Saucier & Goldberg, 1996) or Openness to Experience (McCrae & Costa, 1985b). Neither label is truly satisfactory, however, because Intellect is too narrow and Openness, while broad enough, is somewhat vague.

Agreeableness is another problematic label. For one thing, it refers to the behavioral tendency to *agree* with others, thus incorrectly implying submissiveness, which is more closely related to the introverted pole of Factor I. Agreeableness is also too detached, too neutral a label for a factor supposed to capture intensely affective characteristics, such as love, compassion, and sympathy. Freud viewed love and work as central; following this lead, we could call Factor II simply *Love* (Peabody & Goldberg, 1989). However, *Work* is too narrow a label for Factor III. Even Conscientiousness is too narrow, because it omits a central component that Peabody and Goldberg (1989) called "favorable impulse control."

We could say more about the many shortcomings of the traditional labels, but better labels are hard to come by. The unsurpassed advantage of the traditional labels is that they are commonly known and used, thus preventing Babel from taking over the literature on the Big Five.

Preliminary Definitions

Because the traditional labels are so easily misunderstood, we provide short definitions of the five dimensions in Table 2.2 (cf. Costa & McCrae, 1992; John, 1990; Tellegen, 1985). Briefly, Extraversion implies an *energetic approach* toward the social and material world and includes traits such as sociability, activity, assertiveness, and positive emotionality. Agreeableness contrasts a *pro-social and communal orientation* toward others with antagonism and includes traits such as altruism, tender-mindedness, trust, and modesty. Conscientiousness describes *socially prescribed impulse control* that facilitates task- and goal-directed behavior, such as thinking before acting, delaying gratification, following norms and rules, and planning, organizing, and prioritizing tasks. Neuroticism contrasts emotional stability and even-temperedness with *negative emotionality*, such as feeling anxious, nervous, sad, and tense. Finally, Openness to Experience (vs. closed-mindedness) describes the breadth, depth, originality, and complexity of an individual's *mental and experiential life*.

The numbering convention from I to V, favored by Saucier and Goldberg (1996) and Hofstee et al. (1997), is useful because it reflects the relative size of the factors in lexical studies. Factor I and II, which primarily summarize traits of interpersonal nature, tend to account for the largest percentage of variance in personality ratings, followed by Factor III, whereas the last two factors are by far the smallest in lexical studies (de Raad, Perugini, et al., 1998). However, the Roman numerals are hard to remember, and the order of the factors is not invariant across studies. Thus, we favor the mnemonic convention suggested by the initials given in Table 2.2. They evoke multiple associations that represent more fully than a single word the broad range of meaning captured by each of the factors: *E* stands for Extraversion, Energy, or Enthusiasm; *A* stands for Agreeableness, Altruism, or Affection; *C* is for Conscientiousness, Control, or Constraint; *N* is for Neuroticism, Negative Affectivity, or Nervousness; and *O* for Openness, Originality, or Open-Mindedness. The reader intrigued by anagrams may have no-

ticed that these letters form the OCEAN of personality dimensions.

A Proposal for New Factor Names for Applied Contexts

Unfortunately, initials like *C*, *E*, and *O* (George, Helson, & John, 2011) may serve as efficient labels for personality researchers but they are not easily accessible for nonexpert audiences, such as educators, economists, or public policy makers. It is time for personality psychologists to reach out to these kinds of audiences and to share with them what we have learned about these important socio-emotional characteristics (e.g., John & De Fruyt, 2015; see also Abrahams et al., 2019).

In Table 2.6, we summarize a recent proposal for new factor and facet names (Primi, John, Santos, & De Fruyt, in press). This proposal evolved over the past seven years in a collaboration that began at the Organization for Economic Collaboration and Development (OECD; see John & De Fruyt, 2015), which initiated a project on the assessment of socio-emotional competencies in public school students. The OECD argued that characteristics like compassion, responsibility, and assertiveness (i.e., the facet level in the hierarchical Big Five model) are learned and practiced during development, and the school environment can play a role in this developmental process. Thus, educators, economists, and policy makers have shown a great interest in the Big Five and the constructs at the more specific facet level (see Heckman, Jagelka, & Kautz, Chapter 42, this volume).

Further work continued at the Instituto Ayrton Senna in Sao Paulo, Brazil, focused on developing an inventory that could assess the concepts defined by Soto and John's (2017a) literature review in public school settings in Brazil. As shown in Table 2.6, the proposed label for Conscientiousness emphasizes self-management skills in completing tasks and assignments; because the Productiveness facet (Soto & John, 2017a) is such an important attribute in school contexts, Primi et al. (in press) divided it into three more specific facets, namely Determination, Focus, and Perseverance. The *E* domain appears as Engaging with Others.

TABLE 2.6. Developing Social–Emotional Skills for the School Context: Domains and Facets Assessed in the SENNA Questionnaire for Youth (Primi et al., in press)

Big Five	Facets	Specific skills
C: Conscientious Self-Management	Determination	Setting goals and high standards, motivating themselves, working hard, and applying themselves fully to the task, work, or project at hand
	Organization	Organizing and preparing details needed for executing plans to reach longer-term goals
	Focus	Focusing attention and concentrating exclusively on the current task, and avoiding distractions
	Persistence	Overcoming obstacles in order to reach important goals
	Responsibility	Making choices (e.g., managing time) conducive to meeting expectations and commitments in work, social, or moral realms
E: Engaging with Others	Social initiative	Approaching and connecting with others, both friends and strangers, initiating, maintaining, and enjoying social contact and connections
	Assertiveness	Being able to speak up, voicing personal opinions, needs, and feelings, and exerting social influence
	Enthusiasm	Showing passion and zest for life; approaching daily tasks with energy, excitement, and a positive attitude
A: Amity (vs. Enmity)	Compassion	Using empathy and perspective taking skills to understand the needs and feelings of others, acting on that understanding with kindness and consideration of others
	Respect	Treating others with tact, politeness, and respect and controlling aggressive or selfish impulses
	Trust	Being able to recognize others that are well-intentioned and forgiving those that have done wrong
N: Negative Emotion Regulation	Stress modulation	Being effective in responding to stress and modulating anxiety in high-pressure situations
	Self-confidence	Thinking positive thoughts about oneself, feel content with self and current life, and maintaining optimistic expectations
	Frustration tolerance	Using effective strategies for regulating temper, anger, and irritation; maintaining tranquillity and equanimity in the face of frustrations
O: Open-Mindedness	Intellectual curiosity	Mustering interest in ideas and cultivating a passion for learning, understanding, and intellectual exploration
	Creative imagination	Generating novel ways to think about or do things through experimenting, tinkering, learning from failure, insight, and vision
	Artistic interest	Valuing, appreciating, and enjoying art, design, and beauty, which may be experienced or expressed in writing, visual and performing arts, music, and other forms of self-actualization

The A domain emphasizes Amity as the opposite of Enmity, in the sense of tending and befriending others, rather than seeing them as the enemy. N now stands for Negative-Emotion Regulation, emphasizing the positive view that students can learn to better manage the negative emotions they inevitably encounter in their lives, with facets such as stress modulation to counter anxiety, tolerance of frustration, and self-confidence to manage sadness and self-doubt. Finally, Open-mindedness is already familiar from the work on the BFI-2 described above.

Finally, the measurement model adopted by Primi et al. (in press) is two-fold, assessing both the self-perceived skills (i.e., self-efficacy) of the students and their general view of their typical behavior and experience (i.e., identity); those two levels of assessment were found to be substantially correlated. So far, the reception of the more intuitive and consumer-friendly labels and definitions in Table 2.6 has been very positive among teachers, students, and school officials in Brazil. We are curious to see how widely these labels will be adopted.

Convergence between the Big Five and Other Structural Models

McCrae and Costa's (1985a, 1985b, 1985c, 1987) findings, like the cross-instrument convergence described earlier, show that the factor-analytic results from the lexical tradition converge surprisingly well with those from the questionnaire tradition. This convergence eventually led to a dramatic change in the acceptance of the five factors in the field. With regard to their empirical status, the findings accumulated since the mid-1980s show that the five factors replicate across different types of subjects, raters, and data sources in both dictionary-based and questionnaire-based studies. Indeed, even more skeptical reviewers were led to conclude that "agreement among these descriptive studies with respect to *what* are the appropriate dimensions is impressive" (Revelle, 1987, p. 437; see also McAdams, 1992). The finding that it does not matter whether Conscientiousness is measured with trait adjectives, short phrases, or questionnaire items suggests that the Big Five dimensions

have the same conceptual status as other personality constructs. For example, Loehlin et al. (1998) found that all five factors show substantial and about equal heritabilities, regardless of whether they are measured with questionnaires or with adjective scales derived from the lexical approach.

One of the great strengths of the Big Five taxonomy is that it can capture, at a broad level of abstraction, the commonalities among most of the existing systems of personality traits, thus providing an integrative descriptive model for research. Table 2.1 summarizes the personality dimensions proposed by a broad range of personality theorists and researchers. These dimensions, although by no means a complete tabulation, emphasize the diversity of current conceptions of personality. However, they also point to some important convergences. First, almost every one of the theorists includes a dimension akin to Extraversion. Although the labels and exact definitions vary, nobody seems to doubt the fundamental importance of this dimension. The second almost universally accepted personality dimension is Emotional Stability, as contrasted with Neuroticism, Negative Emotionality, and Proneness to Anxiety. Interestingly, however, not all the researchers listed in Table 2.1 include a separate measure for this dimension. This is particularly true of the interpersonal approaches, such as those of Wiggins (1979) and Bales (1970), as well as the questionnaires primarily aimed at the assessment of basically healthy, well-functioning adults, such as Gough's (1987) CPI, the MBTI (Myers & McCaulley, 1985), and even Jackson's (1984) PRF. In contrast, all of the temperament-based models include Neuroticism. There is less agreement on the third dimension, which appears in various guises, such as Control, Constraint, Super-Ego Strength, and Work Orientation as contrasted with Impulsivity, Psychoticism, and Play Orientation. The theme underlying most of these concepts involves the control, or moderation, of impulses in a normatively and socially appropriate way (cf. Block & Block, 1980). However, Table 2.1 also points to the importance of Agreeableness and Openness, which are neglected by temperament-oriented theorists such as A. H. Buss and Plomin (1975), Eysenck (1986),

and Clark and Watson (1999; see also Clark & Watson, Chapter 6, this volume). In a comprehensive taxonomy, even at the broadest level, we need a “place” for an interpersonal dimension related to Communion, Feeling Orientation, Altruism, Nurturance, Love Styles, and Social Closeness, as contrasted with Hostility, Anger Proneness, and Narcissism. The existence of these questionnaire scales, and the cross-cultural work on the interpersonal origin and consequences of personality, stress the need for a broad domain akin to Agreeableness, Warmth, or Love.

Similar arguments apply to the fifth and last factor included in the Big Five. For one, there are the concepts of Creativity, Originality, and Cognitive Complexity, which are measured by numerous questionnaire scales (Helson, 1967, 1985; Gough, 1979). Although these concepts are cognitive, or, more appropriately, *mental* in nature, they are clearly different from IQ. Second, limited-domain scales measuring concepts such as Absorption, Fantasy Proneness, Need for Cognition, Private Self-Consciousness, Independence, and Autonomy would be difficult to subsume under Extraversion, Neuroticism, or Conscientiousness. Indeed, the fifth factor is necessary, because individual differences in intellectual and creative functioning underlie artistic interests and performances, inventions and innovation, and even humor. Individual differences in these domains of human behavior and experience cannot be neglected by personality psychologists.

Finally, the matches between the Big Five and other constructs sketched out in Table 2.1 should be considered with a healthy dose of skepticism. Some of these correspondences are indeed based on solid research findings, but others are conceptually derived and await empirical confirmation. These matches reflect broad similarities, ignoring some important, implicative, and useful differences among the concepts proposed by different investigators. Nonetheless, at this stage in the field, we are more impressed by the newly apparent similarities than by the continuing differences among the various models. Indeed, the Big Five are useful primarily because of their integrative and heuristic value, a value that becomes apparent in Table 2.1. The availability of a taxonomy,

even one that is as broad and incomplete as the Big Five, permits the comparison and potential integration of dimensions that, by their names alone, would seem entirely disparate.

Critical Issues and Theoretical Perspectives

Like any scientific model, the Big Five taxonomy has limitations. Critics have argued that the Big Five does not provide a complete theory of personality (e.g., Block, 1995; Eysenck, 1997; McAdams, 1992; Pervin, 1994), and we agree. In contrast to McCrae and Costa's (1996) five-factor theory, the Big Five taxonomy was never intended as a personality theory; it was developed to account for the structural relations among personality traits (Goldberg, 1993). Thus, like most structural models, it provides an account of personality that is primarily descriptive rather than explanatory, emphasizes regularities in behavior and experience rather than inferred dynamic and developmental processes, and focuses on variables rather than on individuals or types of individuals (cf. John & Robins, 1993, 1998). Nonetheless, the Big Five taxonomy of trait terms provides a conceptual foundation that helps in examination of these theoretical issues. In this section, we begin with the hierarchical structure defined by the Big Five, then review how the Big Five predict important life outcomes, how they develop, how they combine into personality types, and how different researchers view their conceptual status.

Hierarchy, Levels of Abstraction, and the Big Five

A frequent objection to the Big Five is that five dimensions cannot possibly capture all of the variation in human personality (e.g., Block, 1995; McAdams, 1992; Mershon & Gorsuch, 1988), and that they are much too broad. However, the objection that five dimensions are too few overlooks the fact that personality can be conceptualized at different levels of abstraction or breadth. Indeed, many trait domains are hierarchically structured (Hampson, John, & Goldberg, 1986).

The advantage of categories as broad as the Big Five is their enormous bandwidth.

The disadvantage, of course, is their low fidelity. In any hierarchical representation, one always loses information as one moves up the hierarchical levels. For example, categorizing something as a “Guppy” is more informative than categorizing it as a “fish,” which in turn is more informative than categorizing it as an “animal.” Or, in psychometric terms, one necessarily loses item information as one aggregates items into scales, and one loses scale information as one aggregates scales into factors (John, Hampson, & Goldberg, 1991).

The Big Five dimensions represent a rather broad level in the hierarchy of personality descriptors. In that sense, they are to personality what the categories “plant” and “animal” are to the world of biological objects—extremely useful for some initial rough distinctions but of less value for predicting specific behaviors of a particular object. The hierarchical level a researcher selects depends on the descriptive and predictive tasks to be addressed (Hampson et al., 1986). In principle, the number of specific distinctions one can make in the description of an individual is infinite, limited only by one’s objectives.

Norman, Goldberg, McCrae and Costa, and Hogan all recognized that there was a need in personality, just as in biology, “to have a system in which different levels of generality or inclusion are recognized” (Simpson, 1961, p. 12). A complete trait taxonomy must include middle-level categories, such as Assertiveness, Organization, and Creative Imagination (e.g., John, Hampson, & Goldberg, 1991). Costa and McCrae’s (1992) 30 facets represent the most widely used and empirically validated model. The 10 aspects in the BFAS (DeYoung et al., 2007) and the more recent 15 facets in the BFI-2 (Soto & John, 2017a) have attracted considerable interest in the field, as shown by their citations and adaptations into other languages and cultures. Hofstee et al.’s (1992) circumplex-based AB5C approach defines 45 facets as unique, pairwise combinations or “blends” of the Big Five factors (e.g., Poise as a blend of high Extraversion and low Neuroticism); measures of these facets have now been developed as a part of Goldberg’s collaborative and web-based International Personality Item Pool (IPIP) project. Saucier and Osten-

dorf (1999) provided a thoughtful discussion of the fundamental issues in developing empirically based facets and presented 18 facets that show some cross-language generalizability. Table 2.3 shows some promising convergences, but the number and nature of the facets proposed so far still varies tremendously, indicating that further conceptual and empirical work is needed to achieve a consensual specification of the Big Five factors at lower level of abstraction.

Person–Environment Interactions: Do the Big Five Predict Important Life Outcomes?

Given that the Big Five dimensions were derived initially from analyses of the personality lexicon, one might wonder whether they merely represent linguistic artifacts. Do the Big Five actually predict important behavioral and life outcomes in people’s lives? Initially, external validity and predictive utility did not receive much attention from researchers working in the Big Five tradition. Indeed, Eysenck (1991, p. 785) challenged the field, arguing that “little is known about the social relevance and importance of openness, agreeableness, and conscientiousness. . . . What is lacking is a series of large-scale studies which would flesh out such possibilities.” Over the past three decades, however, researchers have taken up the task of identifying the particular Big Five dimensions that predict particular life outcomes in fundamental domains such as physical and mental health, work, and relationships (see Table 2.2 for examples). This research is based on the assumption that person factors (e.g., the individual’s traits) and environmental factors (e.g., aspects of a job or a relationship partner) interact to jointly produce behavioral and experiential outcomes that accumulate over the individual’s lifespan (e.g., Caspi & Bem, 1990; Scarr & McCartney, 1983). In other words, personality traits are important because they influence the way individuals interact with particular environments. As we review below, traits influence how individuals construe and interpret the personal meaning a particular environment or situation has for them (e.g., how they interpret a potential health risk), and to which aspects of the environment they attend (e.g., a doctor’s prescribed treatment regimen). In

addition to these cognitive processes of perceiving and attending to the environment, traits also influence the way individuals select both social and nonsocial environments (e.g., college classes, jobs, places to live, relationship partners, and even music) and how they then modify those environments (e.g., their bedrooms). It is through their systematic interaction with environmental affordances and risks that traits are hypothesized to influence the behavioral, emotional, social, and material life outcomes of the individual.

Links to Health, Health Behaviors, and Longevity

Although research on personality and health has a long tradition in the field, the emergence of the Big Five taxonomy has greatly helped clarify and organize the links among personality, health behaviors, illness, and mortality across the lifespan. Multiple studies have provided converging evidence that Conscientiousness is one of the Big Five dimensions that predicts good health habits, health outcomes, and longevity (for a review, see Friedman & Hampson, Chapter 37, this volume). For example, low Conscientiousness predicts the likelihood of engaging in risky behaviors such as smoking, substance abuse, and poor diet and exercise habits (Bogg & Roberts, 2004; Hampson, Andrews, Barkley, Lichtenstein, & Lee, 2000; Trull & Sher, 1994). Moreover, highly conscientious individuals diagnosed with an illness are more likely to adhere to their treatment regimens (Kenford et al., 2002) and have been shown to live longer lives (Danner, Snowdon, & Friesen, 2001; Friedman, Hawley, & Tucker, 1994; Weiss & Costa, 2005). Other Big Five dimensions are also related to health-related risk factors. Low Agreeableness (especially hostility) predicts cardiovascular disease (Miller, Smith, Turner, Guijarro, & Hallet, 1996). High Neuroticism predicts less successful coping and poorer reactions to illness, in part because highly neurotic individuals are more likely to ruminate about their situation (David & Suls, 1999; Scheier & Carver, 1993; see also Carver & Scheier, Chapter 25, this volume). Individuals high in Extraversion, on the other hand, have available more social support and close relationships important for

coping with illness (Berkman, Glass, Brissette, & Seeman, 2000).

Links to Psychopathology, Personality Disorders, and Adjustment Problems

The availability of the Big Five taxonomy has also renewed interest in the links between personality and psychopathology, especially personality disorders (e.g., Wiggins & Pincus, 1989; Costa & Widiger, 2002); findings from this burgeoning literature have been reviewed by Krueger and Tackett (2006) and Widiger and Oltmanns (Chapter 36, this volume). From a developmental perspective, the Big Five dimensions may serve as risks or buffers for subsequent adjustment problems. In adolescents, for example, both low Agreeableness and low Conscientiousness predict delinquency and externalizing problems, whereas high Neuroticism and low Conscientiousness predict internalizing problems such as depression and anxiety (John et al., 1994; Measelle et al., 2005; Robins, John, & Caspi, 1994; Robins, John Caspi, Moffitt, & Stouthamer-Loeber, 1996). Low Conscientiousness is also the personality trait most strongly linked to attention-deficit/hyperactivity disorder (ADHD), at least when diagnosed in adulthood (Nigg et al., 2002); more specifically, low Conscientiousness predicts attentional and organizational problems that can lead to broader adjustment problems in school settings and even relationships. Ultimately, findings linking Big Five profiles to developmental or adjustment problems may help identify children at risk and design appropriate interventions, such as teaching children relevant behaviors and skills (e.g., strategies for delaying gratification).

Links to Academic and Work Outcomes

Industrial and organizational researchers have also rediscovered the importance of personality traits, and a growing body of research has linked the Big Five to academic and work achievement. Early studies showed that both Conscientiousness and Openness predict school performance measured with teacher ratings or objective tests in early adolescence (John et al., 1994; Robins et al., 1994; see also Andersen, Gensowski, Ludeke, & John, 2020; Primi, John, Santos,

& De Fruyt, in press). In college, Conscientiousness predicts higher academic grade-point averages, whereas Openness predicts the total years of education completed by middle adulthood (George, Helson, & John, 2011; Goldberg, Sweeney, Merenda, & Hughes, 1998).

Beyond primary and secondary schooling, conscientiousness has emerged also as a general predictor of job performance across a wide range of jobs (for reviews, see Barrick & Mount, 1991; Mount, Barrick, & Stewart, 1998). The other Big Five dimensions relate to more specific aspects of job performance, such as better performance or satisfaction in specific job types or positions. For example, Agreeableness and Neuroticism predict performance in jobs in which employees work in groups, Extraversion predicts success in sales and management positions, Openness predicts success in artistic jobs, and Conscientiousness predicts success in conventional jobs (Barrick, Mount, & Gupta, 2003; George et al., 2011; Larson, Rottinghaus, & Borgen, 2002). Neuroticism is an important predictor of job satisfaction. Highly neurotic individuals are more likely to experience burnout and change jobs, while more emotionally stable individuals feel satisfied and committed to their organizations (Thoresen, Kaplan, Barsky, Warren, & de Chermont, 2003). These trait-by-job interactions help researchers develop a more fine-grained understanding of how different traits are instrumental to performance and satisfaction in various job environments.

Links to Social Outcomes in Relationship and Group Contexts

The Big Five dimensions are also relevant for social behaviors and experiences, such as relationship maintenance and satisfaction, both in dyadic relationships and in groups. In terms of family relationships, adolescents high in Neuroticism, low in Conscientiousness, and low in Extraversion tend to have poorer relationships with parents (Belsky, Jaffee, Caspi, Moffitt, & Silva, 2003). Individuals low in Agreeableness and Extraversion are more likely to experience peer rejection (Newcomb, Bukowski, & Pattee, 1993). Extraversion, Conscientiousness, and low Neuroticism predict greater relation-

ship satisfaction and less conflict, abuse, or dissolution (Karney & Bradbury, 1995; Robins, Caspi, & Moffitt, 2002; Watson, Hubbard, & Wiese, 2000). Because most social groups form formal or informal status hierarchies, one important social goal is to attain status (respect, influence, and prominence) in one's social groups. Across several types of groups (Anderson, John, Keltner, & Kring, 2001; Anderson, John, & Keltner, 2012), Extraversion substantially predicted higher attainment of status and power for both sexes; in contrast, Agreeableness was never related to power, so that individuals high, low, or average did not differ in the power they attained. Consistent with these findings, extraverted individuals were more likely to be chosen as the jury foreperson (Clark, Boccaccini, Cailloulet, & Chaplin, 2007) and more likely to have a firmer "power" handshake (Chaplin, Phillips, Brown, Clanton, & Stein, 2000).

While status and leadership positions are not chosen by the individual but awarded by one's peers or coworkers, individuals do select their environments or modify many of their aspects. Individuals differ in their selection and modifications efforts and successes, and these individual differences are related to personality traits. For example, several Big Five dimensions predict how and where people spend their time. In a study monitoring students' daily lives (Mehl, Gosling, & Pennebaker, 2006; see also Mehl & Wrzus, Chapter 39, this volume), students high in Conscientiousness spent more time in the classroom or on campus; students high in Openness spent more time in coffee houses and restaurants; and students high in Extraversion engaged in more conversations and spent less time alone. In a series of studies relating independent assessments of bedrooms and offices to their inhabitants' personality traits (Gosling, Ko, Manerelli, & Morris, 2002), the Big Five dimensions predicted how individuals shape and modify their physical environments: Highly open individuals tend to create distinctive-looking work and living spaces (with a large variety of different kinds of books), whereas highly conscientious individuals tend to keep their rooms well-organized and clutter-free. High Openness also predicts the expression of a wider variety of interests and preferences (e.g., complex music genres) in online web-

sites and social networking sites (Nave et al., 2018; Rentfrow & Gosling, 2006).

This brief review of Big Five research on person–environment interactions illustrates that the nomological network emerging for each of the Big Five domains now includes an ever-broadening range of life outcome variables. These findings have been summarized in greater detail in several reviews (e.g., Graziano & Eisenberg, 1997; Hogan & Ones, 1997; McCrae, 1996; Ozer & Benet-Martinez, 2006; Watson & Clark, 1997). In interpreting these findings, however, it is important to realize that although individual differences in personality traits are relatively stable over time (e.g., Roberts & DelVecchio, 2000), they are not fixed or “set in plaster” (e.g., Srivastava, John, Gosling, & Potter, 2003). Many people have the capacity to change their patterns of behavior, thought, and feeling, for example, as a result of therapy or intervention programs (see Jackson, Beck, & Mike, Chapter 38, this volume). Thus, the links between the Big Five and the life outcomes reviewed earlier are neither fixed nor inevitable for the individual. Instead, they point to critical domains of behavior and emotion that the individual may target for personal development and change. In the health domain, for example, people can improve how conscientiously they adhere to a diet, exercise regimen, or medical treatment plan (Friedman et al., 1994), thus greatly influencing their ultimate health outcomes and longevity.

The Big Five and Personality Development

Historically, personality psychology has concerned itself with a range of developmental issues that are relevant to the Big Five—the antecedents of adult personality traits, how traits develop, the time lines for the emergence and peak expression of traits, their stability or change throughout the lifespan, and the effects of traits on other aspects of personal development. Some critics have suggested that Big Five researchers have not paid enough attention to issues of personality development in childhood and adolescence (Pervin, 1994). In the past, this criticism had some merit: Although the Big Five taxonomy has influenced research on adult development and aging (e.g., Helson, Kwan, John, & Jones, 2002; McCrae & Costa,

2003; Roberts, Walton, & Viechtbauer, 2006; see also Roberts & Nickel, Chapter 11, this volume), there has been less research on personality structure in childhood. Developmental and temperament psychologists have studied a number of important traits (e.g., sociability, fearful distress, shyness, impulsivity) but many studies examine one trait at a time, in isolation from the others, and the available research has not been integrated in a coherent taxonomic framework (but see Soto & John, 2014, for an effort to link the developing structure of youth personality to several *a priori* structural models). Until this work is done, however, research on personality development across the lifespan is likely to remain fragmented (Halverson, Kohnstamm, & Martin, 1994).

The adult personality taxonomy defined by the Big Five can offer some promising leads. In our view, the Big Five should be examined in developmental research for two reasons (John et al., 1994). Theoretically, it may be necessary to examine the developmental origins of the Big Five: Given that the Big Five emerge as basic dimensions of personality in adulthood, researchers need to explain how they develop. Practically, the Big Five has proven useful as a framework for organizing findings on adult personality in areas as diverse as behavioral genetics and industrial psychology. Thus, extension of the Big Five into childhood and adolescence would facilitate comparisons across developmental periods.

Work on these issues is well underway (see Shiner, Chapter 12, this volume; also De Fruyt & Karevold, Chapter 13, this volume), and researchers are drawing on existing models of infant and child temperament to make connections to the Big Five dimensions in adulthood (for reviews, see Caspi, Roberts, & Shiner, 2005; Halverson et al., 1994; Shiner & Caspi, 2003). Some research suggests that the Big Five may provide a good approximation of personality structure in childhood and adolescence (Digman, 1989; Graziano & Ward, 1992). Extending Digman's (1989) earlier work on Hawaiian children, Digman and Shmelyov (1996) examined both temperament dimensions and personality dimensions in a sample of Russian children. Based on analyses of teachers' ratings, they concluded that the Big Five offers a useful model for describing

the structure of temperament. Studies using free-response techniques found that the Big Five can account for a substantial portion of children's descriptions of their own and others' personalities (Donahue, 1994), as well as teachers' and parents' descriptions of children's personality (Kohnstamm, Halverson, Mervielde, & Havill, 1998). In a large Internet sample providing self-reports on the BFI, Soto et al. (2008) analyzed data from children and adolescents ages 10–20 years and found substantial changes in the coherence and differentiation of the Big Five domains, even though a variant of the adult Big Five factor structure was apparent as early as age 10 when individual differences in response acquiescence were controlled (see Appendix 2.2). In an even younger sample, Measelle et al. (2005) found that using an age-appropriate puppet interview task, children as young as ages 5–7 were able to self-report on their personality; by age 6, their self-reports were beginning to show evidence of coherence, longitudinal stability, and external validity (using ratings by adults) for Big Five domains Extraversion, Agreeableness, and Conscientiousness.

Three large-scale studies suggest that the picture may be more complicated. John et al. (1994) tested whether the adult Big Five structure would replicate in a large and ethnically diverse sample of adolescent boys. They used the California Child Q-Sort, a comprehensive item pool for the description of children and adolescents that was not derived from the adult Big Five and does not represent any particular theoretical orientation. Factor analyses identified five dimensions that corresponded closely with a priori scales representing the adult Big Five. However, two additional dimensions emerged: Irritability involved negative affect expressed in age-inappropriate behaviors, such as whining, crying, tantrums, and being overly sensitive to teasing. Activity was defined by items involving physical activity, energy, and high tempo, such as running, playing, and moving and reacting quickly. In several Dutch samples of boys and girls ages 3–16 years, van Lieshout and Haselager (1994) also found the Big Five plus two additional factors—one similar to the Activity factor observed by John et al. (1994), and a Dependency dimension defined primarily by eagerness to please and reliance on others. Soto

and John (2014) replicated the additional Activity factor in a large sample of parent ratings of child personality, suggesting that the structure of personality traits may be more differentiated in childhood than in adulthood. Specifically, the additional dimensions may originate in temperamental features of childhood personality (e.g., activity level) that become integrated into adult personality structure over the course of adolescence (John et al., 1994).

These studies illustrate how the Big Five can help stimulate research that connects and integrates findings across long-separate research traditions. They also provide some initial insights about the way personality structure may develop toward its adult form. Yet a great deal of work still lies ahead. Studies need to examine the antecedents of the Big Five and their relations to other aspects of personality functioning in childhood and adolescence. In this way, the Big Five can help connect research on adult personality with the vast field of social development.

Theoretical Perspectives on the Big Five: Description and Explanation

Over the years, researchers have articulated a number of different perspectives on the conceptual status of the Big Five dimensions. Because of their lexical origin, the factors were initially interpreted as dimensions of trait description or attribution (John et al., 1988). Subsequent research, however, has shown that the lexical factors converge with dimensions derived in other personality research traditions, that they have external or predictive validity (as reviewed earlier), and that all five of them show about equal amounts of heritability (Loehlin et al., 1998). We therefore need to ask how these differences should be conceptualized (e.g., Wiggins, 1996), and below we briefly summarize some of the major theoretical perspectives (see also John & Gosling, 2000).

Researchers in the lexical tradition tend to take an agnostic stance regarding the conceptual status of traits. For example, Saucier and Goldberg (1996) argued that their studies of personality description do not address issues of causality or the mechanisms underlying behavior. Their interest is primarily in the language of personality. This level of self-restraint may seem dissatisfactory

to psychologists who are more interested in personality itself. However, the findings from the lexical approach are informative, because the lexical hypothesis is essentially a functionalist argument about the trait concepts in the natural language. These concepts are of interest because language encodes the characteristics that are central to human life and experience for cultural, social, or biological reasons. Thus, Saucier and Goldberg argue that lexical studies define an agenda for personality psychologists, because they highlight the important and meaningful psychological phenomena (i.e., phenotypic characteristics) that personality psychologists should study and explain. Thus, issues such as the accuracy of self- and peer descriptions and the causal origin of traits (i.e., genotypes) are left as open questions that need to be answered empirically. However, there may exist important characteristics that people may not be able to observe and describe verbally; if so, the agenda specified by the lexical approach may be incomplete and would need to be supplemented by more theoretically driven approaches (Block, 1995; Tellegen, 1993).

Several theories conceptualize the Big Five as relational constructs. In interpersonal theory (Wiggins & Trapnell, 1996), the theoretical emphasis is on the individual in relationships. The Big Five are taken to describe “the relatively enduring pattern of recurrent interpersonal situations that characterize a human life” (Sullivan, 1953, pp. 110–111), thus conceptualizing the Big Five as descriptive concepts. Wiggins and Trapnell (1996) emphasize the interpersonal motives of agency and communion, and interpret all of the Big Five dimensions in terms of their interpersonal implications. Because Extraversion and Agreeableness are the most clearly interpersonal dimensions in the Big Five, they receive conceptual priority in this model.

Socioanalytic theory (Hogan, 1996; see also Roberts & Nickel, Chapter 11, this volume) focuses on the social functions of self- and other-perceptions. According to Hogan, trait concepts serve as the linguistic tools of observers (1996, p. 172) used to encode and communicate reputations. This view implies that traits are socially constructed to serve interpersonal functions. Because trait terms are fundamentally about reputation, indi-

viduals who self-report their traits engage in a symbolic-interactionist process of introspection (i.e., the individual considers how others view him or her). Hogan emphasizes that individuals may distort their self-reports with self-presentational strategies; another source of distortion are self-deceptive biases (cf. Paulhus & John, 1998) that reflect not deliberate impression management but are honestly held, though biased, beliefs about the self.

The evolutionary perspective on the Big Five holds that humans have evolved “difference-detecting mechanisms” to perceive individual differences that are relevant to survival and reproduction (D. M. Buss, 1996, p. 185; see also Botwin, Buss, & Shackelford, 1997). D. M. Buss views personality as an “adaptive landscape” in which the Big Five traits represent the most salient and important dimensions of the individual’s survival needs (see also Lewis & Buss, Chapter 1, this volume). The evolutionary perspective equally emphasizes person perception and individual differences: Because people vary systematically along certain trait dimensions, and because knowledge of others’ traits has adaptive value, humans have evolved a capacity to perceive those individual differences that are central to adaptation to the social landscape. The Big Five summarizes these centrally important individual differences.

McCrae and Costa (1996, 2008) view the Big Five as causal personality dispositions. Their five-factor theory (FFT) is a general trait theory that provides an explanatory interpretation of the empirically derived Big Five taxonomy. One central tenet of the FFT is based on the finding that all of the Big Five dimensions have a substantial genetic basis (e.g., Loehlin et al., 1998; Plomin, DeFries, Craig, & McGuffin, 2003; see also Krueger & Johnson, Chapter 9, this volume) and must therefore derive, in part, from biological structures and processes, such as specific gene loci, brain regions (e.g., the amygdala), neurotransmitters (e.g., dopamine), hormones (e.g., testosterone), and so on (e.g., Canli, 2006; see also DeYoung, Grazioplene, & Allen, Chapter 8, this volume); it is in this sense that traits are assumed to have causal status. McCrae and Costa (1996) distinguish between “basic tendencies” and “characteristic adaptations.” Personality traits are

basic tendencies that refer to the abstract underlying potentials of the individual, whereas attitudes, roles, relationships, and goals are characteristic adaptations that reflect the interactions between basic tendencies and environmental demands accumulated over time. According to McCrae and Costa, basic tendencies remain stable across the life course, whereas characteristic adaptations can undergo considerable change. From this perspective, then, a statement such as “Paul likes to go to parties because he is extraverted” is not circular, as it would be if “extraverted” were merely a description of typical behavior (Wiggins, 1997). Instead, the concept “extraverted” stands in for biological structures and processes that remain to be discovered. This view is similar to Allport’s (1937) account of traits as neuropsychic structures and Eysenck’s view of traits as biological mechanisms (Eysenck & Eysenck, 1985).

The idea that personality traits have a biological basis is also fundamental to Gosling’s (2001; Gosling, Kwan, & John, 2003) proposal that personality psychology must be broadened to include a comparative approach to study individual differences in both human and nonhuman animals (see also Weiss, Chapter 7, this volume). Although scientists are understandably reluctant to ascribe personality traits, emotions, and cognitions to animals (Kwan, Gosling, & John, 2008), evolutionary theory predicts cross-species continuities for not only physical but also behavioral traits; for example, Darwin (1872) argued that emotions exist in both human and nonhuman animals. A review of 19 studies of personality factors in 12 nonhuman species showed substantial cross-species continuity (Gosling & John, 1999). Chimpanzees and other primates, dogs, cats, donkeys, pigs, guppies, and octopuses all showed reliable individual differences in Extraversion and Neuroticism, and all but guppies and octopuses varied in Agreeableness as well, suggesting that these three Big Five factors may capture fundamental dimensions of individual differences. Further evidence suggests that elements of Openness (e.g., curiosity and playfulness) are present in at least some nonhuman animals. In contrast, only humans and our closest relatives, chimpanzees, appear to show systematic individual differences in Conscientiousness.

Given the relatively complex social-cognitive functions involved in this dimension (i.e., following norms and rules, thinking before acting, and controlling impulses), it makes sense that Conscientiousness may have appeared rather recently in our evolutionary history. The careful application of ethological and experimental methodology, and the high interobserver reliability in these studies make it unlikely that these findings merely reflect anthropomorphic projections (cf. Gosling, Kwan, et al., 2003; Kwan, Gosling, & John, 2008). Rather, these surprising cross-species commonalities suggest that personality traits reflect, at least in part, biological mechanisms that are shared by many mammalian species.

The most recent biologically based theoretical account of the Big Five is the broad cybernetic theory proposed by DeYoung’s (2015; see also DeYoung, Grazioplene, & Allen, Chapter 8, this volume). DeYoung and his colleagues view personality traits as probabilistic descriptions of relatively stable patterns of emotion, motivation, cognition, and behavior. They draw on theoretical accounts of the psychological functions that unify the personality traits in each Big Five domain (e.g., Dennisen & Penke, 2008) and have identified candidate brain systems that contribute to those psychological functions, such as the dopamine system associated with reward sensitivity for Extraversion.

In summary, researchers subscribe to diverse perspectives on the conceptual status of the Big Five, ranging from purely descriptive concepts to biologically based causal concepts. This diversity might be taken to imply that researchers cannot agree about the definition of the trait concept and that the field is in disarray. It is important to recognize, however, that these perspectives are not mutually exclusive. For example, although Saucier and Goldberg (1996) caution against drawing inferences about genotypes from lexical studies, the lexical hypothesis does not preclude the possibility that the Big Five are embodied in biological structures and processes. In our view, “What is a trait?” is fundamentally an empirical question. Research in diverse areas such as behavior and molecular genetics, personality stability and change, and accuracy and bias in self-reports and interpersonal perception will be instrumental in building and refining

a comprehensive theoretical account of the Big Five.

Conclusions and Implications

At the beginning of this chapter, we argued that a personality taxonomy should provide a systematic framework for distinguishing, ordering, and naming the behavioral, emotional, and experiential characteristics of individuals.

Ideally, that taxonomy would be built around principles that are causal and dynamic, exist at multiple levels of abstraction or hierarchy, and offer a standard nomenclature for scientists working in the field of personality. The Big Five taxonomy does not yet meet all of these high standards. It provides descriptive concepts that still need to be explicated theoretically, and a nomenclature that is still rooted in the “vernacular” English but has accumulated considerable technical knowledge and increasing precision.

The Big Five structure has the advantage that everybody can understand the words that define the factors. Moreover, the natural language is not biased in favor of any existing scientific conceptions; although the atheoretical nature of the Big Five dimensions makes them less appealing to some psychologists, it also makes them more palatable to researchers who reject dimensions cast in a theoretical mold different from their own. Whatever the inadequacies of the natural language for scientific systematics, broad dimensions inferred from folk usage are *not* a bad place to start a taxonomy. Even in the biological taxonomy of animals, “the technical system evolved from the vernacular” (Simpson, 1961, pp. 12–13).

Obviously, a system that initially derives from the natural language does not need to reify such terms indefinitely. Indeed, several of the dimensions included among the Big Five, most notably Extraversion and Neuroticism, have been the target of various physiological and mechanistic explanations (e.g., Canli et al., 2001; see also Clark, 2005; DeYoung et al., Chapter 8, this volume). In their research on emotion regulatory processes, John and Gross (2007) have begun to articulate the links between broad personality dimensions such as the Big Five, the chronic

use of particular regulatory strategies, and their emotional and social consequences. Similarly, the conceptual explication of Extraversion and Neuroticism as persistent dispositions toward thinking and behaving in ways that foster, respectively, positive and negative affective experiences (e.g., Tellegen, 1985; see also Clark & Watson, Chapter 6, this volume) promises to connect the Big Five with individual differences in affective functioning, which, in turn, may be studied in more tightly controlled laboratory settings (see English, Eldesouky, & Gross, Chapter 24, this volume). At this point, the Big Five differentiate domains of individual differences that have similar surface manifestations, just like the early animal taxonomy that was transformed by better accounts of evolutionary processes and by the advent of new tools, such as molecular genetics. Likewise, the structures and processes underlying these personality trait domains are now beginning to be explicated. Explication in explanatory and mechanistic terms will likely change the definition and assessment of the Big Five dimensions as we know them today.

Remember Robert? We met him in the beginning of this chapter. Given what we have learned about the Big Five taxonomy, what can we say about his personality structure? Next, we have reprinted the sketch from the Introduction but we’ve classified his behavior and experience in terms of two core Big Five dimensions, one in bold and the other in italics.

Thirty-one-year-old Robert often feels *restless*. He has *problems sitting at a desk* for more than a few minutes, cannot get *organized*, *loses his keys* and wallet, and *forgets about his plans* for the evening. He *fails to achieve* up to his potential at work. During conversations, his *mind wanders* and he **interrupts others**, **blurting out** what he is thinking *without considering the consequences*. He **gets into arguments**. His mood swings and **periodic outbursts** make life difficult for those around him. Now his **marriage is in trouble**.

How should we summarize Robert’s behavior, experience, and cognitions? Clearly, his lack of organization and deliberation, his failure to focus on work and to achieve (in italics) are all hallmarks of low Conscien-

tiousness (see the traits defining this domain in Table 2.4) and Robert can be described by most of them. However, he also shows several other notable behavior patterns (in bold) that belong in the interpersonal trait domain, namely low Agreeableness.

As Gould (1981) observed, even in the biological and physical sciences, “taxonomy is always a contentious issue because the world does not come to us in neat little packages” (p. 158). Since the early 1980s, when the Big Five barely registered a blip in the published personality literature (see Figure 2.1), we have come a long way in understanding the “messy packages” that are personality traits. Researchers have made enormous progress on the Big Five trait taxonomy, producing an initial consensus that we can differentiate five replicable, broad domains of personality as summarized by the broad concepts of *Extraversion*, *Agreeableness*, *Conscientiousness*, *Neuroticism*, and *Openness to Experience*. Viewed from a historical vantage point, the emergence and widespread adoption of the Big Five structure, and the fact that multiple groups of researchers worked on it jointly, brought about a major change in the way personality research is being conducted today. In fact, our field has moved from a stage of early individualistic pioneers to a more mature stage of normal scientific inquiry: Researchers interested in studying the effects of personality traits on important theoretical or applied phenomena, such as emotion, social behavior and relationships, work and achievement, or physical and mental health, now use a commonly understood framework to conceptualize their research and choose from several well-validated instruments to operationalize these personality domains. With a shared and commonly understood model at hand, literature reviews and meta-analyses can easily organize the available empirical knowledge about a phenomenon, and researchers can communicate findings efficiently. Clearly the current model is a work in progress, and the work is far from done. Still, instead of squabbling with each other about the right or best model, the availability of a consensual and stable paradigm has brought us 20 good years where we could just get to work and do our science. That’s the way it should be in the science of personality.

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APPENDIX 2.1. Big Five Inventory–2 Response Form and Instructions to Participants

Instructions: Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who *likes to spend time with others*? Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement.

1	2	3	4	5
Disagree strongly	Disagree a little	Neutral; no opinion	Agree a little	Agree strongly

I am someone who . . .

1. ____ Is outgoing, sociable.	31. ____ Is sometimes shy, introverted.
2. ____ Is compassionate, has a soft heart.	32. ____ Is helpful and unselfish with others.
3. ____ Tends to be disorganized.	33. ____ Keeps things neat and tidy.
4. ____ Is relaxed, handles stress well.	34. ____ Worries a lot.
5. ____ Has few artistic interests.	35. ____ Values art and beauty.
6. ____ Has an assertive personality.	36. ____ Finds it hard to influence people.
7. ____ Is respectful, treats others with respect.	37. ____ Is sometimes rude to others.
8. ____ Tends to be lazy.	38. ____ Is efficient, gets things done.
9. ____ Stays optimistic after experiencing a setback.	39. ____ Often feels sad.
10. ____ Is curious about many different things.	40. ____ Is complex, a deep thinker.
11. ____ Rarely feels excited or eager.	41. ____ Is full of energy.
12. ____ Tends to find fault with others.	42. ____ Is suspicious of others' intentions.
13. ____ Is dependable, steady.	43. ____ Is reliable, can always be counted on.
14. ____ Is moody, has up and down mood swings.	44. ____ Keeps their emotions under control.
15. ____ Is inventive, finds clever ways to do things.	45. ____ Has difficulty imagining things.
16. ____ Tends to be quiet.	46. ____ Is talkative.
17. ____ Feels little sympathy for others.	47. ____ Can be cold and uncaring.
18. ____ Is systematic, likes to keep things in order.	48. ____ Leaves a mess, doesn't clean up.
19. ____ Can be tense.	49. ____ Rarely feels anxious or afraid.
20. ____ Is fascinated by art, music, or literature.	50. ____ Thinks poetry and plays are boring.
21. ____ Is dominant, acts as a leader.	51. ____ Prefers to have others take charge.
22. ____ Starts arguments with others.	52. ____ Is polite, courteous to others.
23. ____ Has difficulty getting started on tasks.	53. ____ Is persistent, works until the task is finished.
24. ____ Feels secure, comfortable with self.	54. ____ Tends to feel depressed, blue.
25. ____ Avoids intellectual, philosophical discussions.	55. ____ Has little interest in abstract ideas.
26. ____ Is less active than other people.	56. ____ Shows a lot of enthusiasm.
27. ____ Has a forgiving nature.	57. ____ Assumes the best about people.
28. ____ Can be somewhat careless.	58. ____ Sometimes behaves irresponsibly.
29. ____ Is emotionally stable, not easily upset.	59. ____ Is temperamental, gets emotional easily.
30. ____ Has little creativity.	60. ____ Is original, comes up with new ideas.

Please check: Did you write a number in front of each statement?

Note. BFI-2 items copyright © 2015 Oliver P. John and Christopher J. Soto.

APPENDIX 2.2. Scoring the Big Five Inventory–2 Domain and Facet Scales

Item numbers for the BFI-2 domain and facet scales are listed below. Reverse-keyed items are denoted by “R.” Compute scale scores as the *mean* of the items. For more information about the BFI and the BFI-2, visit the Berkeley Personality Lab website (ofc.berkeley.edu/~johnlab/index.htm) or the Colby Personality Lab website (www.colby.edu/psych/personality-lab).

Domain Scales

Extraversion: 1, 6, 11R, 16R, 21, 26R, 31R, 36R, 41, 46, 51R, 56
Agreeableness: 2, 7, 12R, 17R, 22R, 27, 32, 37R, 42R, 47R, 52, 57
Conscientiousness: 3R, 8R, 13, 18, 23R, 28R, 33, 38, 43, 48R, 53, 58R
Negative Emotionality: 4R, 9R, 14, 19, 24R, 29R, 34, 39, 44R, 49R, 54, 59
Open-Mindedness: 5R, 10, 15, 20, 25R, 30R, 35, 40, 45R, 50R, 55R, 60

Facet Scales

Sociability: 1, 16R, 31R, 46
Assertiveness: 6, 21, 36R, 51R
Energy Level: 11R, 26R, 41, 56
Compassion: 2, 17R, 32, 47R
Respectfulness: 7, 22R, 37R, 52
Trust: 12R, 27, 42R, 57
Organization: 3R, 18, 33, 48R
Productiveness: 8R, 23R, 38, 53
Responsibility: 13, 28R, 43, 58R
Anxiety: 4R, 19, 34, 49R
Depression: 9R, 24R, 39, 54
Emotional Volatility: 14, 29R, 44R, 59
Intellectual Curiosity: 10, 25R, 40, 55R
Aesthetic Sensitivity: 5R, 20, 35, 50R
Creative Imagination: 15, 30R, 45R, 60

CHAPTER 3

Toward an Integrative Theory of Motivation, Personality, and Development

Carol S. Dweck

This chapter presents a theory that seeks to capture motivation, personality, and their development with the same set of principles and mechanisms. Many classic theories of personality have united motivation, personality, and development within one framework (e.g., Erikson, 1950; Freud, 1927; Jung, 1954), and in light of current trends, constructs, and findings, the time seems right for a new kind of integration.

Why is this the right time for a new integration? First, personality researchers are increasingly bringing together trait and social-cognitive theories (Ayduk & Mendoza-Denton, Chapter 19, this volume; Fleeson & Jayawickreme, 2015; Mischel & Shoda, 2008; Read et al., 2010; Roberts, 2009), once considered quite separate approaches. Next, more and more researchers are highlighting the importance of motivational processes in personality (Corr, DeYoung, & McNaughton, 2013; Deci & Ryan, 2000; Higgins, 2012; McCabe & Fleeson, 2012, 2016; Read et al., 2010; in this volume, Schultheiss & Kölnner, Chapter 18, and Sommet, Elliot, & Sheldon, Chapter 4). And finally, many more researchers are now studying the development and the developmental trajectory of personality (Rothbart, 2007; in this volume, see De

Fruyt, Chapter 13, Bleidorn & Denissen, Chapter 14, Mroczek, Graham, Turiano, & Aro-Lambo, Chapter 15, Roberts & Nickel, Chapter 11, Atherton & Schofield, Chapter 16, and Shiner, Chapter 12). Capitalizing on these exciting trends, I propose an integration of social-cognitive and trait theories within a motivational framework and with deep roots in developmental processes. As should be the case in an undertaking of this type, I present it as a preliminary proposal meant to stimulate thinking and serve as a foundation for future theory and research.

Overview of the Current Theory

The current theory begins with needs—three basic needs, present at or near birth, and four later-developing needs that are formed from combinations of the basic needs. I then suggest that as infants (and people in general) pursue need-fulfilling goals, they build mental representations based on their experiences. These representations serve to guide the selection and pursuit of future goals. The theory goes on to show how this cycle of needs, goals, and representations can form the basis for motivation and for personality.

More specifically, the basic tenets of the theory, as stated in Dweck (2017, p. 689), are as follows:

- Motivation derives from basic human needs, including psychological needs.
- These needs give rise to goals designed to meet the needs.
- As people pursue need-fulfilling goals, they develop mental representations.
- These representations (consisting of beliefs, representations of emotions, and representations of action tendencies) guide future goals.
- In doing so, they foster characteristic, recurrent patterns of acts and experiences (“traits”); indeed, traits can be seen as styles of pursuing need-fulfilling goals.
- These underlying representations and styles of goal pursuit are at the core of personality and personality development.
- Understanding these representations and styles of goal pursuit gives us leverage for promoting growth and change.

Thus, at its core, the theory proposes that we experience needs and pursue need-fulfilling goals, and as we do, we develop representations of our experiences, which come to play a major role in our motivation and in the formation of our personality.

In this theory, then, personality is deeply motivational. In addition, deeply embedded in the motivational processes are mental representations, such as the beliefs people develop about their world and about themselves in that world. In this sense, the theory has resonance with past formulations, such as those of Beck (1996), Bowlby (1969), and Epstein (1990), in which key beliefs are formed in rich, motivational contexts and then play important roles in motivation, personality, and well-being.

With the groundwork in place, let us turn to the needs that are the foundation of the theory.

Basic Needs

What Is a Need and What Is a Basic Need?

The theory begins with psychological needs, and with the assumption that psychological needs drive goals that promote psychological well-being, much as physical needs drive

goals that promote physical well-being (see, e.g., Reeve, 2005), although, of course, the two types of needs and their effects are not entirely distinct. What are the important psychological needs? A review of the modern literature on psychological needs (e.g., Deci & Ryan, 2000; Higgins, 2012; Pittman & Zeigler, 2007; Sheldon, 2011; Stevens & Fiske, 1995) yields a group of candidate needs, many of which may be grouped together under the same need (e.g., the need for affection, acceptance, and belonging may be grouped together).

However, how does one know what truly qualifies as a need and, in particular, what qualifies as a *basic* need? Adapting some of Baumeister and Leary’s (1995) helpful criteria, I define a *need* as having high universal value and, if not met, as leading to compromised well-being. However, to be defined as a *basic need* requires, in addition, the Baumeister and Leary criterion that the need not be reducible to other needs. I also add the requirement that a basic need be evident early in life, that is, at or near birth.

Applying these criteria for a basic need (having high universal value, being necessary for well-being, not being reducible to other needs, and being evident at or near birth) yielded three basic needs: the needs for acceptance, prediction, and competence. Figure 3.1 shows these basic needs, as well as the compound needs that are formed later in development by the conjunction of the basic needs.

I note first that other theories propose different basic needs or more than three basic needs. However, most of these theories were proposed for adults, and by adulthood, it is not clear which needs are basic needs and which are simply highly important needs but not ones that were there from the earliest period of life. Second, looking at adult needs, it is hard to fathom which needs are reducible to other, simpler ones. However, looking at infants and working forward, we can more readily see how their basic needs are combined to form some of the needs we see in older individuals. See Dweck (2017) for a comparison of the proposed needs to past need taxonomies, such as the closely related needs proposed by Stevens and Fiske (1995) and by Deci and Ryan (2000).

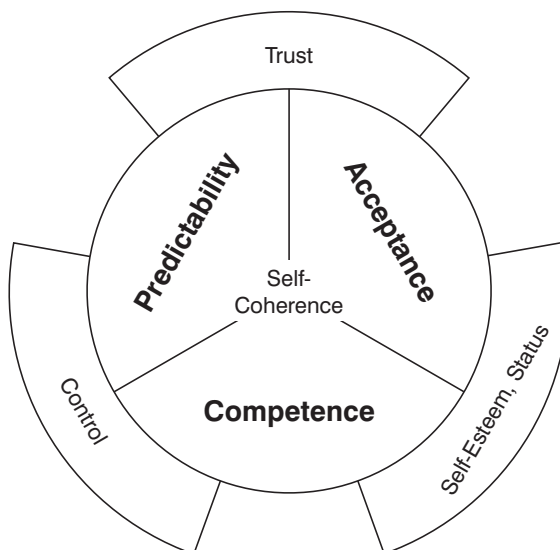


FIGURE 3.1. The seven needs, consisting of (1) three basic needs (acceptance, predictability, and competence); (2) three compound or emergent needs (trust, control, and self-esteem/status), each formed by the conjunction of two basic needs; and (3) a final emergent need, self-coherence, at the intersection of all the other needs. Reprinted, with permission from the American Psychological Association, from Dweck (2017).

Why These Three Basic Needs?

The newborn, after floating happily in a familiar environment in which all needs are automatically met, arrives in its new world knowing almost nothing about it. Steps need to be taken, and quickly. Infants need to know what their new world is like and what they can expect in it: what is in this world, what these things do, what goes with what, what follows what. This is the need for *prediction*. Next, they need to learn how to act in or on their world—how to make good things happen and how to avoid or escape from unpleasant things. This is the need for *competence*. Yet there is a long period of time in which they cannot do much of anything very well. Although, as you will see, infants are amazingly smart, they are incredibly inept when it comes to doing. This means that they must rely on others, and they need these others to accept and care for them. This is the need for *acceptance*.

For acceptance, prediction, and competence, you will see that the need (or some early form of it) is there just about from

birth and that infants come well prepared to pursue each of these needs. They have built-in attentional mechanisms, inferential and representational abilities, and emotional and behavioral capacities that orient them toward need-relevant information and that allow them to pursue need-fulfilling goals and learn from their experiences. Indeed, this tremendous preparedness confirms the importance of these needs from the very beginning of life.

It is important to acknowledge that the three basic needs are not entirely distinct. For example, the need for prediction and the need for competence may sometimes bleed together. Yet for the purpose of understanding personality development, it is useful to view them as distinct, then see how they later come together to form new needs. As I noted earlier, it is also important to acknowledge that physical and psychological needs are not always distinct. Both are necessary for survival and can serve each other. Yet for the purpose of understanding personality development, I focus on psychological needs.

The Need for Acceptance

The need for positive social engagement is the most basic form of social need. I call it the *need for acceptance* (see Ainsworth, 1979 [attachment]; Baumeister & Leary, 1995 [belonging]; Bowlby, 1969 [attachment]; Deci & Ryan, 2000 [relatedness]; Fromm, 1955 [relatedness]; McClelland, 1987 [affiliation]; Murray, 1938 [affection]; Maslow, 1943 [love, belonging]; Rank, 1945 [connectedness]; Rogers, 1961 [acceptance]; Spitz, 1965 [affection, attachment]; Stevens & Fiske, 1995 [belonging]), because it represents children's early need to participate in supportive relationships. In line with the criteria for a basic need, there is a great deal of evidence that young infants are attuned to social cues, recognize positive social interactions, and are ready to pursue acceptance-related goals. For example, newborns come with a preference for faces and human voices (e.g., Vouloumanos & Werker, 2007). They are also attentive to "accepting" (i.e., reciprocal or synchronous) social interactions and ready to engage in them: Some newborns appear to engage in imitation of adult actions (Meltzoff & Moore, 1977); 2- to 3-week-olds react when mothers violate the reciprocity of a social interaction (Tronick, Als, Adamson, Wise, & Brazelton, 1978); 3-month-olds seem to recognize and prefer positive social agents (Hamlin, Wynn, & Bloom, 2010). In other words, young infants tune into, prefer, and seek positive social interactions, that is, those indicative of acceptance.

Also in line with the criteria for a basic need, a vast literature attests to the necessity of accepting relationships for optimal development and well-being. Parental acceptance or warmth, even apart from parental predictability, is critical for optimal social and cognitive development (e.g., Davidov & Grusec, 2006; Eisenberg et al., 2005). Research also documents the highly disruptive effects of detached or depressed caregivers (e.g., Field, 1995).

The Need for Optimal Predictability

The *need for optimal predictability* (see Glass & Singer, 1972 [predictability]; Higgins, 2012 [truth]; Murray, 1938 [information]; Stevens & Fiske, 1995 [understand-

ing]; van den Boom, 1994 [responsiveness]) is defined here as the desire to know the relationships among events and among things in one's world, such as what belongs with what, what follows what, or what causes what. Young infants are highly tuned in to prediction-relevant cues, ready to learn from them, and prepared to pursue prediction-related goals. Even in the first hours of life, infants can learn associations between a stimulus and a subsequent event (e.g., Little, Lipsitt, & Rovee-Collier, 1984), and in 20-day-olds these associations are remembered over a period of 10 days (Little et al., 1984). Newborns can extract statistical patterns from an ongoing stream of auditory and visual stimuli (e.g., Bulf, Johnson, & Valenza, 2011; see Aslin & Newport, 2012), and infants as young as 6 months of age are so statistically sophisticated that they are surprised when a sample of items drawn from a glass jar does not match the numerical representation of those items in the jar (Denison, Reed, & Xu, 2013).

Thus, a wealth of findings indicate that very young infants constantly extract information from events in their environment in ways that allow them to understand the structure of those events and to predict the occurrence of future events. This is highly consistent with current theory and research in cognitive science suggesting that the brain may be built for "predictive coding," that is, for the generation, application, and revision of predictive models (see Clark, 2015). Moreover, consistent with the criteria for a basic need, predictability is necessary for well-being. For example, the importance of caretaker predictability for optimal development, independent of caretaker warmth (Davidov & Grusec, 2006) and independent of environmental harshness (Baram et al., 2012), has been well-documented, with lower predictability predicting increased vulnerability to stress. Such effects have also been documented in animal studies, in which the predictability of the environment can be carefully controlled (Seligman & Meyer, 1970; Weiss, 1971).

The Need for Competence

Whereas the need for optimal predictability is the desire to know the relationships among

events and among things in one's world, the need for competence (see Deci & Ryan, 2000 [competence]; White, 1959 [competence]; Piaget, 1936/1952 [intelligence]; McClelland, 1987 [achievement]; Fromm, 1955 [effectiveness]) is the desire to build one's skills for acting in or on the world. Children's quest for competence is at the heart of many prominent theories (Piaget, 1936/1952; Vygotsky, 1978; White, 1959), and research shows that even the youngest children are highly attuned to competence-building opportunities. Indeed, the desire for an optimal degree of novelty or challenge may represent a form of built-in preparedness that supports continued competence building over time (see, e.g., Kidd, Piantadosi, & Aslin, 2012; Gottlieb, Oudeyer, Lopes, & Baranes, 2013). Children also learn from others, and even very young infants are sensitive to "pedagogical cues"—signals from adults communicating that teaching is about to take place (R. Cooper & Aslin, 2009; Csibra & Gergeley, 2009). Finally, deprivation of competence-building opportunities leads to not only learning deficits but also dampened motivation even to explore (Kreppner et al., 2007; Spitz, 1965).

In summary, from the beginning of life, infants appear to have three basic needs: to engage in positive social interactions, to chart the predictability of their world, and to build their competence. Moreover, the opportunity to fulfill these needs appears essential for optimal development and well-being.

The Four Compound Needs

Four additional needs are proposed to arise from combinations of the basic needs: (1) the need for trust, arising from the conjunction of acceptance and predictability; (2) the need for control, representing the conjunction of predictability and competence; (3) the need for self-esteem/status, originating from the conjunction of acceptance and competence; and (4) the need for self-coherence, which is at the intersection of all of the psychological needs and represents the need to feel psychologically rooted and intact.

Whereas the basic needs are there at or near birth, the compound needs demand

more complex schemas or metacognitive skills. These include (1) more fully formed schemas or mental models for integrating basic needs (as "trust" integrates acceptance and predictability); (2) greater self-awareness (as in the need for control); and (3) greater ability to compare oneself to a standard (as in "self-esteem/status"). For example, even though newborns can *exert* control (they can perform actions to obtain a reward), the *need* for control does not seem to emerge until children become aware of themselves as agents (Heckhausen, 1988). At that point, they may strive to be a "player" in their family—a person with a will who exerts control. Similarly, with respect to self-esteem, infants may have many experiences of nonacceptance from caretakers but only later, when they are self-aware and can apply standards to the self, might they ask, "What do those experiences mean about me?" (Kagan, 1981; Stipek, Recchia, & McClintic, 1992; see also, Robins, Chapter 26, this volume).

Compound needs are not necessarily less important than basic needs and may be just as essential for well-being. However, the distinction between basic and compound needs is not just a technicality. It is important to know how and when different needs gain prominence in order to understand the opportunities and vulnerabilities that are present at different points in development. This can help us understand when the presence or absence of certain experiences (e.g., of trust, of personal control) might be vital.

The Need for Trust (the Conjunction of Acceptance and Predictability)

As we have seen, very young infants are attuned to acceptance and predictability, but they do not appear to integrate them into a higher-order, generalized schema: trust (see Stevens & Fiske, 1995 [trusting]; Erikson, 1950 [trust]; Fonagy, 2001 [epistemic trust]). Indeed, studies show that stressful or negative early experiences, such as living in impoverished orphanages, certainly have negative effects, but, remarkably, do not seem to impede the later development of secure attachments if they occur in the first 6 months or so (Ames & Chisholm, 2001; see also Kreppner et al., 2007). By 8 months of age,

they are far more likely to interfere with attachment relationships. We know that this is when infants are forming relationship schemas and begin to show phenomena such as stranger anxiety.

Thus, trust should result when children represent their world as accepting and predictable, and can integrate these representations. This combination of acceptance/warmth and predictability has been shown to promote optimal development (e.g., Bornstein, 1989; Steelman, Assel, Swank, Smith, & Landry, 2002; see also van den Boom, 1994).

The Need for Control (the Conjunction of Predictability and Competence)

The need for control (see Bandura, 1977 [control, efficacy]; Brehm, 1966 [freedom and control vs. reactance]; DeCharms, 1968 [origin vs. pawn]; Deci & Ryan, 2000 [autonomy]; Erikson, 1950 [autonomy]; Heckhausen & Schulz, 1995 [control]; Higgins, 2012 [control]; Rothbaum, Weisz, & Snyder, 1982 [control]) includes the desire for agency, autonomy, and self-control; that is, the need for control encompasses not just the desire to have an impact on the world but also the desire to make one's own choices (act freely) and the desire to exert control over the self. It appears that the need for control enters when children have grasped the order and predictability in their world and become aware of themselves as agents who can now use their competence to change things: to take charge of situations and to make or change the rules (Erikson, 1950; Shapiro, 1981; see Lewis & Brooks-Gunn, 1979). This is likely to begin sometime in the second year of life (see Heckhausen, 1988). In line with self-determination theory (Deci & Ryan, 2000), the failure to grant children control or autonomy is among the strongest predictors of heightened anxiety (McLeod, Wood, & Weisz, 2007) and has been found to have deleterious effects on children's motivation and self-regulation (Ryan, Deci, Grolnick, & LaGuardia, 2006). (It is important to note that the support of autonomy and the encouragement of control can take quite different forms in different cultures [Fu & Markus, 2014].)

The Need for Self-Esteem/Status (the Conjunction of Acceptance and Competence)

Many theories have designated the desire for self-esteem or status as a basic human need (e.g., Anderson, Hildreth, & Howland, 2015; Maslow, 1943). In the current theory, the need for self-esteem or status is seen as a compound need, arising from the conjunction of the need for acceptance and the need for competence (see Anderson et al., 2015 [status]; Leary & Baumeister, 2000 [self-esteem]; Maslow, 1943 [esteem]; McClelland, 1987 [power]; Murray, 1938 [status, power]; Stevens & Fiske, 1995 [enhancing the self]; Sullivan, 1953 [self-esteem]; Tesser, 1988 [self-esteem])—outcomes from both acceptance-related goals and competence-related goals can convey information about one's merits and one's standing relative to others. (Later, self-esteem may also rest on other things, such as adherence to one's internalized values.)

The need for self-esteem/status rests on two developments: self-awareness and standards. Children must have an awareness of the self and the ability to evaluate the self against a standard. Meeting a standard can then support feelings of worth or status. Like self-awareness, self-standards seem to appear in the second year of life (and into the third year), which is when children first show evidence of pride (rather than just pleasure) after success or shame after failure (Kagan, 1981; Lewis, Sullivan, Stanger, & Weiss, 1989; Stipek et al., 1992).

Low self-esteem is a predictor of depression and impaired functioning from childhood on (e.g., Donnellan, Trzesniewski, Robins, Moffitt, & Caspi, 2005; Orth & Robins, 2013, 2019). Unstable self-esteem (Kernis, 2003) and contingent self-esteem (Crocker & Wolfe, 2001) also appear to create vulnerability. Moreover, the correlates of low self-esteem are found across highly diverse cultures (Cai, Wu, & Brown, 2009), although, of course, self-esteem may be defined, experienced, and maintained in different ways in different cultures.

The Need for Self-Coherence. The need for self-coherence is the desire to feel that one is psychologically intact and rooted as opposed to unmoored or “falling apart”

(see Fromm, 1955 [rootedness]; Steele, 1988 [self-integrity]; Sullivan, 1953 [rootedness]; see also Pyszczynski, Greenberg, & Solomon, 1999 [terror management]). This need occupies a unique space. The other emergent needs, as we have seen, are formed from the conjunction of two basic needs. However, self-coherence is proposed to serve as the “hub” of all the needs: Outcomes from all need-related goals can feed into feelings of self-coherence. This suggests that by monitoring self-coherence, we may be able to monitor the well-being of the self (cf. Leary, Tambor, Terdal, & Downs, 1995; Heintzelman & King, 2014).

The need for self-coherence can emerge once the child has developed strong expectations for how the world should work, in which case violations of those expectations may become unsettling. This may happen early, as soon as clear expectations of acceptance, predictability, or competence are there and can be violated. However, the need for self-coherence may not arise until later in the first year, when children show evidence of schema-based phenomena, such as trust or separation anxiety. At that time, they may become able to experience more pervasive forms of psychological threat and not just fear or discomfort in the moment.

In classic theories of personality disorders (e.g., Horney, 1950; Shapiro, 1965), a prime characteristic is a fragile sense of self (see also Fonagy, Target, & Gergely, 2000). An early version of this can be seen in 1-year-olds with “disorganized” attachment, thought to stem from abusive or frightening caretakers (Van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999). When left alone in a strange situation, even briefly, these children appear to fall apart—physically collapsing, entering a dissociated state, or becoming completely disoriented.

Further, I propose that there are two major components of self-coherence that emerge as individuals develop: identity (or identities) and meaning. *Identity* answers the question “Who am I?” and can include social roles, social categories, and areas of perceived competence—things that can define and situate people (cf. Markus & Nurius, 1986). *Meaning*, on the other hand, answers the question “How does/should the world work in areas that are important to me?” and re-

fers more to the rules that govern events in the world (cf. Heine, Proulx, & Vohs, 2006). Both identity and meaning may serve as glue that binds the self and keeps it together. See Dweck (2017) for a more detailed discussion of identity, meaning, and the monitoring of self-coherence. I note here, however, that the need for meaning and the pursuit of goals related to meaning may allow people to transcend the more mundane, self-oriented goals and to fulfill a sense of purpose in the world.

Needs Can Undergo Lifelong Development

It is important to understand that each need can continue to develop and transform throughout life, that different needs can wax and wane over the course of development, that needs originating with the self may be applied to others (giving care to others, teaching others, creating a predictable world for others), and that concrete needs can later grow into more abstract values. For example, as I note elsewhere, “[V]aluing justice may be thought of as valuing trustworthiness as a characteristic of the world . . . and valuing tolerance may be thought of as valuing respect for others’ meanings and identities” (Dweck, 2017, p. 696).

In summary, this section has presented the basic and compound needs that are the foundation of the current theory, and has brought together a variety of literatures to shed light on the nature of psychological needs.

Motivation: Turning Needs into Goals

A common definition of *motivation* is “the forces that drive and direct behavior” (Hebb, 1955; McClelland, 1987; Myers, 2012; Reeve, 2005), and it is the definition I adopt here. In this context, I propose that needs play the “drive” function, and goals and goal processes serve the directive function, creating a path to need fulfillment. I suggested earlier that needs demarcate areas of chronically high value. However, they can also supply the energy or impetus for need-fulfilling goals (Deci & Ryan, 2000; Freud, 1894/1956, 1927; Jung, 1928; McClelland, 1987; Rapaport, 1960; White, 1963). The goals and goal processes may then direct this energy into particular actions designed

to bring the individual closer to his or her desired end states.

Need-Fulfilling Goals Result in “BEATs”

At the heart of the current theory is the idea that as people experience needs and pursue need-fulfilling goals, they build mental representations of what happened. These representations then help them select and pursue future goals. In this way, the mental representations help turn needs into active goals, making them a key part of motivation and, as we will see later, of personality. Let's take a closer look at these mental representations.

As people observe the world or pursue goals in it, they may implicitly ask themselves: “What did I do? What happened? How did I feel? What did it mean?” The answers take the form of mental representations that carry forward this information and help people decide what to do in the future. The attachment literature portrays the kinds of acceptance-related representations that people can carry forward from their early relationships (Bowlby, 1969), and Johnson, Dweck, and Chen (2007; see also Johnson et al., 2010) provide evidence for such representations in infants.

These mental representations are proposed to contain *one or more* goal-relevant (1) Beliefs, (2) Emotions, and (3) Action Tendencies, which I call BEATs. BEATs are closely related to past constructs, such as schemas (Markus, 1977) or cognitive-affective processing units (Mischel & Shoda, 1995), but the term BEATs is meant to call attention to the three building blocks of mental representations (particularly beliefs) that then serve as guides to future action.

What is the role of BEATs in the processes leading from needs to goals to behavior? When a need is aroused, BEATs can be activated, and these stored beliefs, emotions, and action tendencies can guide people in choosing among possible need-fulfilling goals. For example, they can help people interpret the current situation in light of past situations, evaluate possible courses of action, and project how they will feel if the actions succeed or fail. In this way, BEATs can guide goal selection and pursuit in constant interplay with concurrent on-the-ground experiences.

A Focus on Beliefs

BEATs consist of stored beliefs, emotions, and action tendencies, but the emphasis in the current theory is on beliefs. Much more so than has commonly been appreciated in psychology, beliefs are a key part of motivation and personality. Some programs of research that *have* focused on beliefs are attribution theory (Heider, 1958; Kelley, 1973; Weiner, 1985), locus-of-control beliefs (Rotter, 1966), self-efficacy beliefs (Bandura, 1977), implicit theories or mindsets (Dweck, 1999), and beliefs about the world as good or just (Janoff-Bulman, 1992; Lerner, 1980). These beliefs all have been shown to have clear motivational impact, in that they influence the selection and pursuit of goals.

Although BEATs, such as beliefs, can be formed from and applied to very specific goals in very specific situations, they can also be developed over many goal-relevant experiences and become more context general in their application (see Epstein, 1990). When this happens, they can become people's broad guides to how to fulfill their needs in the world. Indeed, it is no accident that the research programs cited earlier collectively revolve around the important question of whether people believe the world is good/fair and whether they believe they can exert control to achieve their goals in the world. These are things people must know in order to navigate their world successfully, and I return to this point later.

It is important to acknowledge that some personality theories have featured beliefs, such as cognitive-affective encodings (e.g., Mischel & Shoda, 1995) or personal constructs (Kelly, 1963), although they have typically not emphasized the motivational origins of these beliefs (i.e., their origins in needs and need-relevant goals) or focused on their motivational consequences (for a clear exception, see Epstein, 1990; see also Beck, 1996).

Goals Are Accompanied by Online Acts and Experiences

I have suggested that BEATs, the stored representations of past experiences, set the stage for goal pursuit. This goal pursuit now results in *online acts and experiences*—the

thoughts, feelings, and actions that people actually experience or exhibit as they pursue their goals. Moreover, every time a goal is pursued, the resulting online acts and experiences (“online acts” for short) can feed back and potentially change existing BEATs or create new ones.

These processes are depicted in Figure 3.2a. They are the processes that capture motivation and its output—that drive and direct goal pursuit and result in online acts and experiences (see Dweck, 2017, for a more in-depth discussion of motivational processes). In the next section, I suggest how recurrent patterns of BEATs, goals, and online acts can yield personality traits.

Some Theories Neglect Needs or Need-Related Goals

For decades after the behaviorist era, psychology seemed to lose interest in motivation. During this time, some personality theories lost contact with the idea that people are constantly pursuing need-fulfilling goals and that their personalities have been shaped by the history of these goal pursuits (for exceptions, see, e.g., Deci & Ryan, 2000; Epstein, 1990; Pervin, 1989). It is in this context that I turn to two highly important and influential theories in modern personality psychology: the five-factor theory (McCrae

& Costa, 1999; McCrae & John, 1992), which is built around personality traits, and the cognitive–affective processing systems (CAPS) theory (Mischel & Shoda, 1995, 2008), which is built around “cognitive–affective processing units,” psychological processes and representations that shape behavior.

Both theories capture something essential. The five-factor theory captures the intuitive idea that people differ in their characteristic traits, such as how conscientious, extraverted, neurotic, agreeable, or open to experience they are. Indeed, these traits predict important outcomes (Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007), and show heritability (Krueger & Johnson, 2008) and rank-order consistency over time (Roberts & DelVecchio, 2000). However, as Roberts (2009) observes, “A valid criticism of many modern personality trait theorists and researchers is that they have not provided a deeper analysis of the constituent elements that make up traits, nor the mechanisms that elucidate how they cause things to occur” (p. 139).

This is precisely why Mischel and Shoda (1995, 2008) set out to capture the underlying dynamics of personality. They did so by proposing that people develop cognitive–affective “processing units” that are activated in relevant contexts to shape behavior.

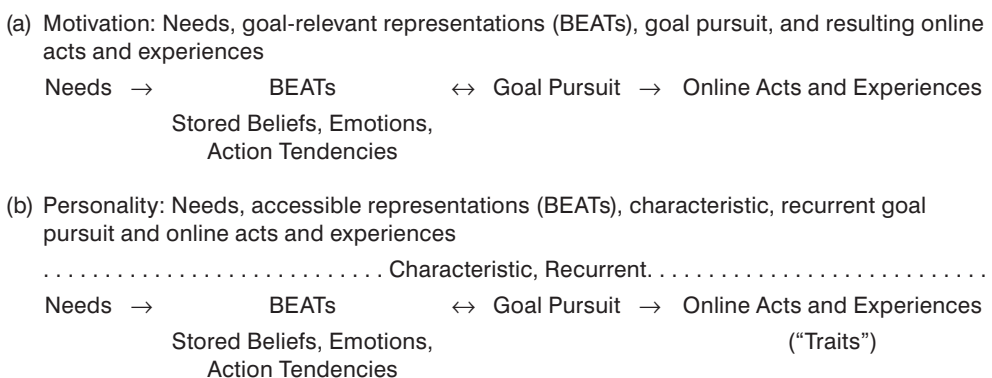


FIGURE 3.2. Depiction of (a) motivational processes and their outcomes and (b) personality processes. For (b) it is important to distinguish the BEATs (the more latent part of personality) from the online acts and experiences that accompany goal pursuit (the more manifest part of personality). All processes take place in the context of the background needs, and in all cases concurrent internal and external stimuli feed into the interplay between BEATs and goal pursuit. Reprinted, with permission from the American Psychological Association, from Dweck (2017).

ior. Their CAPS model portrays the way in which the processing units that are most accessible in particular contexts can give rise to characteristic and relatively stable patterns of behavior. Their model thus puts forward a mechanism through which traits can come to life. Indeed the proposal of such a mechanism is what makes this theory powerful and has made it one that must be contended with in future theories of personality (see Fleeson & Jayawickreme, 2015; Roberts, 2009).

As I suggested at the outset, for some time the two theories were seen as two opposing viewpoints, but personality psychologists have increasingly called for their integration (Fleeson & Jayawickreme, 2015; Read et al., 2010; Roberts, 2009). The current theory, building on these prior approaches, attempts to address this call by bringing together traits and mental representation within a unifying motivational framework. Like CAPS, the current theory seeks to capture the underlying psychological dynamics of personality and is built on mental representations, but the current theory has a motivational core: the mental representations (BEATs) that develop around people's needs and goals, then shape their future goals. Like the five-factor model, the current theory is interested in common, widely shared traits (common online acts and experiences), but it also seeks to understand the motivational origins and the ongoing motivational underpinnings of traits.

What Is Personality and What Does a Motivation-Based Theory of Personality Require?

In the current theory, personality is made up of the elements portrayed in Figure 3.2b. These are precisely the *same* elements that make up motivation and its outcomes (Figure 3.2a), except that here we are dealing with *characteristic* and *recurrent* patterns: (a) characteristic and recurrent online acts and experiences underpinned by (b) characteristic and highly accessible BEATs. Let us look at each.

Characteristic, recurrent online acts and experiences are patterns of thoughts, feelings, and behavior that accompany need-

fulfilling goal pursuit. This is the more *manifest* or overt part of personality. As I noted earlier, these online acts and experiences are the thoughts people actually think, the feelings they actually feel, and the actions they actually perform as they pursue their need-fulfilling goals. These recurrent online acts and experiences can be thought of as traits, and this is the part of personality that the five-factor model has primarily addressed. Indeed, traits in the five-factor model are assessed in terms of people's report of their characteristic patterns of thoughts (e.g., being a person who worries a lot; likes to reflect, plays with ideas; is curious about many different things), feelings (e.g., being a person who is depressed, blue; can be moody) and behaviors (e.g., being a person who tends to be lazy; perseveres until the task is finished) (John, Chapter 2, this volume).

Characteristic and highly accessible BEATs (in the context of needs) make up the latent, background part of personality. These BEATs are the subset of mental representations that are highly and stably accessible (readily activated)—but not necessarily conscious—and consist of prominent beliefs, representations of strong emotional tendencies, and representations of high-probability action tendencies. In the context of needs, these highly accessible BEATs set the stage for goal pursuit and thus for the characteristic and recurrent online acts. This is the underlying part of personality that the CAPS theory has, by and large, sought to capture.

Thus, the current model portrays both personality traits (recurrent online acts and experiences) and the representational and motivational processes that give rise to them (BEATs in the context of needs). In this theory, then, personality is not just about having traits or being a certain kind of person, but is rather about people having a palette of needs and a repertoire of mental representations (BEATs) that lead them to pursue their need-fulfilling goals in particular ways in particular contexts (see Cantor, 1990).

Matching Needs and BEATs to Traits

In this section, I suggest, in a very preliminary way, how particular needs and BEATs may contribute to the expression of traits.

Matching Needs and Traits

Although all people are presumed to have all needs, some needs may be more focal than others for certain individuals. Here I propose that different traits are rooted in different focal needs.

I begin by matching Big Five traits to needs within the current model, for brevity focusing on the “social traits” (see Dweck, 2017, for consideration of the competence/control-oriented traits of *conscientiousness* and *openness to experience*.) Three of the five traits—*extraversion*, *agreeableness*, and *neuroticism*—appear to be rooted in the social needs, that is, in the need for acceptance and the social aspects of self-esteem/status. When matching Big Five traits with Murray’s (1938) 21 “midlevel” needs, Costa and McCrae (1988) found that extraversion had a high joint factor loading with the need for affiliation, and that neuroticism had a high joint factor loading with the need for social recognition (see also John, Naumann, & Soto, 2008). In addition, Leary, Kelly, Cottrell, and Schreindorfer (2013) found all three traits (extraversion, agreeableness, and neuroticism) to be positively correlated with the need for social belonging.

Going from Needs and BEATs to Traits

Next, it is possible to propose BEATs that could help take one from the social needs to the online acts characteristic of the social traits. To illustrate this process, I turn to the two dimensions of beliefs I briefly noted earlier: goodness (“I believe my world is good/safe or not”) and controllability (“I feel highly capable/confident/in control of getting important needs met in my world or not”). I focus on these beliefs, because in order for people to feel safe and effective, they have to decide what their world is like and how much they are able to exercise control in it. Indeed these are the very kinds of beliefs that can form the basis for how people approach their world and its situations. Of course, these are not the only dimensions of beliefs or the only dimensions of beliefs that are important for personality, but they are key ones, and I use them here for illustrative purposes. To be clear, I do not claim that traits begin with beliefs; rather, I suggest

that as beliefs are formed, they can come to play a prominent role.

The main point of this section is that *traits can be seen as the characteristic ways in which people try to fulfill their focal needs within the parameters set by their accessible BEATs*. In our example of traits rooted in social needs, this would refer to how people fulfill their social needs within the parameters set by their prominent beliefs. McCabe and Fleeson (2012, 2016) present a compelling case that traits are the ways in which people pursue goals. What the current model adds is (1) the origin of the trait-producing goals in focal needs and (2) the way in which BEATs can constrain and guide the selection and pursuit of these goals.

Thus, although all three social traits (agreeableness, extraversion, and neuroticism) may be rooted in similar needs (the need for acceptance and the social aspects of self-esteem/status) we can distinguish them from each other based on their salient BEATs.

For people high on the trait of *agreeableness*, I suggest that a key underlying BEAT that guides goal selection and pursuit in the domain of social needs is a belief about the goodness of their world—the belief that the world they live in is good, safe, and trustworthy (see Costa, McCrae, & Dye, 1991). (Note that people can believe that the larger outside world is unsafe and untrustworthy, but that the world that they inhabit and in which they try to meet their needs is a good and safe one. The latter is the one that should carry more weight in everyday personality.) Given a strong need for acceptance and a belief in a good world—but not necessarily a strong belief in firm, direct, personal control (see Costa & McCrae, 1988)—how might people best pursue their need-fulfilling social goals? The answer is likely to be through the online acts that characterize agreeableness: forgiveness, warmth, and kindness (John & Srivastava, 1999; Soto & John, 2009). These acts serve the need for acceptance and self-esteem/status within parameters created by the BEATs.

In contrast, for people high on the trait of *extraversion*, I propose that a key BEAT guiding goal selection and pursuit is a strong belief in personal control—the belief that one is capable of actively, directly control-

ling one's world to gain acceptance and self-esteem/status (see Depue & Collins, 1999). Given this belief, how would people pursue their need-fulfilling social goals? The answer is likely to be through the online acts that characterize extraversion, such as sociability and assertiveness (John & Srivastava, 1999; Soto & John, 2009).

Finally, for people high in *neuroticism*, I propose that the key underlying BEATs guiding goal pursuit are negative beliefs about both goodness and control—the belief that one's world is unsafe, combined with a lack of confidence in one's ability to wield control and meet important social needs in that world (see Costa & McCrae, 1988, for evidence of expected adversity, dependency, and low autonomy). Given negative beliefs about goodness and control, what would characterize the pursuit of need-fulfilling goals?

The answer is likely to be the online acts and experiences that characterize neuroticism. However, unlike the other two traits I have considered, neuroticism is assessed through reports of recurrent internal experiences (e.g., anxiety or depressed affect) rather than reports of recurrent online acts. Nonetheless, the literature also speaks to online acts. In line with negative beliefs about the world and one's control, the literature shows that many of the online acts of people high in neuroticism involve preventing or relieving harm to the self: vigilance for harm (Wilson, Kumari, Gray, & Corr, 2000), harm-avoidance and failure-avoidance (e.g., Elliot & Thrash, 2002; Lommen, Engelhard, & van den Hout, 2010), and avoidant coping, that is, coping by soothing oneself (e.g., with alcohol) rather than addressing the problem itself (M. Cooper, Agocha, & Sheldon, 2000). In addition, with an unsafe world and a low sense of control, it is not surprising that the online experiences that define neuroticism (e.g., anxiety, depressed mood; John & Soto, 2009; John, Chapter 2, this volume) reflect concerns about *not* meeting one's social needs.

On a more general level, it is interesting to consider whether people might focus on certain needs and need-fulfilling goals as a way of seeking self-coherence. For example, people high on extraversion may feel a strengthened sense of self-coherence when they are active and assertive in social situations.

In this section, I have very tentatively suggested how focal needs and strong BEATs can plausibly set the stage for common traits.

Recurrent Online Acts as Styles of Fulfilling Needs, Continued

Going beyond the Big Five traits, I propose that other recurrent online acts may also be seen as styles of pursuing need-fulfilling goals (cf. McCabe & Fleeson, 2012, 2016) within the constraints of particular BEATs. For example, aside from the Big Five traits, people may have characteristic styles of fulfilling acceptance needs (see, e.g., the attachment literature: Ainsworth, 1979; Mikulincer & Shaver, 2007) or competence needs (see, e.g., the implicit theories or mindset literature; Dweck, 1999). In both cases, different patterns of goal pursuit are underpinned by particular BEATs (e.g., attachment schemas, intelligence mindsets). Thus, the current model may allow us to understand a variety of online acts within the same conceptual framework.

What Do We Gain from This Approach?

What does this approach contribute to trait theories? The current theory places traits in a motivational framework (involving needs and goals) and in the context of their underlying dynamics (involving experience-based BEATs). Building the current theory around experience-based representations allows us to capitalize on the cardinal virtues of Mischel and Shoda's (1995) dynamic CAPS model, with the representations serving at the same time as (1) a foundation of behavior (BEATs underlie behavior), (2) a vehicle for contextual variation in behavior (different BEATs can be activated in different situations), (3) the object of development (BEATs are formed from experiences over time), and (4) the target of change through direct intervention (changing BEATs/beliefs can change behavior). In these ways, the theory can help us understand the processes through which traits develop and come to life in relevant settings.

What would the current approach contribute to social-cognitive theories such as Mischel and Shoda's (1995) CAPS model? First, it places the CAPS model in a more explicitly motivational framework. Second,

social-cognitive theories are sometimes said to be theories about individuals (their particular mental processes or situated behavior) and not enough about what people or groups of people have in common (although see Mischel & Shoda, 2008). The current theory strives to portray the dynamic functioning of individuals, while also highlighting commonalities among people.

It does this by suggesting that all people come with the same basic needs and that, from the beginning, they all pursue need-related goals. Virtually everyone needs and seeks first acceptance, predictability, and competence and then trust, self-esteem, control, and self-coherence—and there may be common ways in which infants and young children strive to fulfill these needs. Further, children may live in social worlds that vary in common ways, such as their warmth (goodness) or responsiveness (controllability), leading to common types of mental representations. These in turn can shape the pursuit of need-related goals in common ways. Children, too, may differ in identifiable, measurable ways, such as in their temperaments, and this too can help us map commonalities among people.

The important point is that, to the degree that people have similar needs, pursue them (at least early on) in a finite number of ways, and meet with a finite number of typical reactions, we can develop theories of personality that capture both people's differences and their commonalities.

Finally, the current perspective, in addition to fostering a greater understanding of the nature and workings of personality, could also foster a greater understanding of how to help people develop in optimal ways. I turn now to this issue.

Can Personality Be Changed?

An enduring question in psychology is whether personality can be changed in meaningful ways. When a theory portrays personality as emerging, at least in part, from the pursuit of goals and the development of mental representations, then the theory can more readily offer targets of change. Below are some examples, mainly from our work, of how interventions aimed at BEATs (beliefs) can create meaningful changes in patterns of online acts and experiences. To be clear, I am not

suggesting that changing a belief changes an entire personality trait, but rather that it can modify certain acts and experiences that typically fall within or characterize a trait.

Conscientiousness

Adolescents who received an eight-session workshop that taught a growth mindset about intelligence (the belief that intelligence can be developed) devoted more effort to their schoolwork and did not show the decline in math grades demonstrated by the control group (Blackwell, Trzesniewski, & Dweck, 2007; see also Aronson, Fried, & Good, 2002). In other research, African American college students who received an intervention conveying the belief that students like them “belonged” in their school showed increases in study time, contact with professors, and grades over their college years compared to the control condition (Walton & Cohen, 2007). Short-term experiments (not yet interventions) that fostered the belief that willpower can be abundant and self-generating (as opposed to scarce and easily depleted) led people to exhibit higher levels of self-regulation and performance even after performing “depleting” tasks (Job, Dweck, & Walton, 2010; also see Job, Walton, Bernecker, & Dweck, 2015). In short, all of these studies, whether they targeted beliefs in the area of competence, acceptance, or control, suggest that aspects of “conscientiousness” can be increased by addressing relevant beliefs.

Agreeableness

Yeager, Trzesniewski, and Dweck (2012) conducted a six-session workshop for high school students in which they were taught a growth mindset about personality (the idea that people have the potential to grow and improve) and its application to peer conflicts. Those participating in this workshop showed a clear decrease in aggression and a clear increase in prosocial behavior, compared to an active control group.

Neuroticism/Negative Affectivity

Miu and Yeager (2015) taught entering high school students a growth mindset about personality, which, again, highlighted people's

potential to grow and improve over time. Those receiving this intervention, when assessed 9 months later, showed a reduced incidence of clinically significant levels of depressive symptoms compared to control participants. Another study using this kind of intervention showed relatively long-term decreases in stress among adolescents (Yeager et al., 2014; see also Schleider & Weisz, 2016, for related interventions for depression and anxiety).

Openness to Experience

Short-term experiments from our laboratory, although they are not interventions, suggest the possibility of enhancing openness to experience. Students who received “process praise” (for hard work, strategies, etc.), as opposed to “person praise” (for intelligence or ability), showed a greater desire for intellectual challenge, an aspect of openness to experience (Mueller & Dweck, 1998). In a later, longitudinal study, mothers who gave more process praise (as a proportion of total praise) to their toddlers had children who showed higher levels of intellectual challenge-seeking 5 years later (Gunderson et al., 2013; see also Pomerantz & Kempner, 2013).

Researchers within the five-factor tradition are also creating interventions that are successful in altering traits such as openness to experience and conscientiousness (see Jackson, Beck, & Mike, Chapter 38, this volume, for a review). In one study, Jackson, Hill, Payne, Roberts, and Stine-Morrow (2012) gave older adults 12 weeks of training in inductive reasoning, along with crossword and Sudoku puzzles. Compared to a control group, these adults reported increased openness to experience, as shown by greater openness to and enjoyment of cognitively engaging activities.

In contrast to our approach, which changes beliefs to change behavior, such studies have typically taken the route of training trait-consistent actions, with changes in reported traits following suit over time. This is completely consistent with the current theory, in which changes can be brought about by changing any of the three types of representations: stored beliefs, emotions, or action tendencies. It may also be the case

that sometimes changing one type of representation will change others. The Jackson et al. (2012) intervention targeted actions but may also have changed people’s beliefs about and emotions toward cognitively engaging activities.

A Research Agenda

The present theory, by pointing the way toward a synthesis of motivation, personality, and development, can also point the way toward future research.

Personality

The current theory portrays traits as the end product of a series of motivational and social-cognitive processes. These processes have been molded over time as individuals, with their biological endowment, interact with their environment and form mental representations of their experiences. Why do people differ? Within the current theory, they may differ, for example, because their needs differ in strength, they have different highly accessible BEATs, or they pursue different goals in different ways. Thus, future research needs to further explore the motivational and social-cognitive bases of characteristic patterns of online acts and experience.

1. First, researchers can identify new representations (BEATs) that are relevant to personality, such as potentially important but unstudied or understudied beliefs. They can then test hypotheses about the goals and the traits that these BEATs foster. I have suggested two dimensions of beliefs (goodness and controllability). Many variants of these beliefs have been studied but many remain to be understood, such as beliefs about goodness and controllability within different need domains or with respect to different aspects of people or the world (e.g., the goodness or controllability of one’s fate or destiny).

2. Researchers may also begin with particular patterns of acts and experiences, other than Big Five traits, that play an important role in effective functioning and well-

being. They may then test hypotheses about underlying BEATs and goals. Take the case of self-control or prosocial behavior. Both have sometimes been portrayed as rather stable individual differences, yet both have been shown to be influenced by underlying beliefs. For self-control, these include the belief that self-control is abundant rather than highly limited (Job et al., 2010); that the world and the people in it are reliable (e.g., Kidd, Palmeri, & Aslin, 2013); and that the resources at your disposal are plentiful rather than scarce (Mullainathan & Shafir, 2013). For prosocial behavior, these include expectations of benevolence arising from the experience of reciprocity (Barragan & Dweck, 2014), the belief that others' negative acts toward us are often not purposeful (Dodge & Frame, 1982), and the belief that those who have performed negative acts do not have fixed personalities (Yeager, Trzesniewski, Tirri, Nokelainen, & Dweck, 2011). Perhaps almost all prominent pattern of acts and experiences have underlying BEATs that can be identified and fruitfully explored.

3. Personality disorders can be studied in terms of underlying BEATs that foster maladaptive patterns of goals and online acts and experiences. Examples of such BEATs might include exaggerated beliefs about the danger of or safety of certain situations, too-rapid triggering of extreme emotions, and exaggerated approach (impulsive) or avoidance (withdrawal) tendencies. Often these BEATs can be overly rigid and resistant to change with new experiences, but sometimes they may be highly reactive to experience, such that each new experience supersedes past ones, leading to a roller coaster of self-esteem, trust, or feelings of control.

The great contribution of Aaron Beck and his colleagues (2001) has been to point to beliefs that play a role in psychopathology. A task for the field is to continue to identify important constellations of BEATs that accompany or underlie particular disorders and to test targeted ways of influencing them. Perceptions of goodness and control—considered in relation to self, others, and the world, and in relation to the different needs—can provide an initial framework for thinking about the ways in which BEATs can go awry.

Personality Development

1. Within the current theory, much of development can be seen as motivated BEAT building. Studying the BEATs that children construct is essential for understanding social—personality development. However, much socialization research has taken the form of large correlational studies, with little attention to psychological mediators (see Olson & Dweck, 2008). For example, the effects of negative life events on children's well-being have been extensively studied, but not typically in terms of the BEATs these events may promote. However, research shows that the particular BEATs that follow on the heels of negative life events, whether they are beliefs, emotional tendencies, or behavioral tendencies, may be key to subsequent well-being (e.g., Feiring, Taska, & Lewis, 2002; Grych, Jouriles, Swank, McDonald, & Norwood, 2000; Nolen-Hoeksema, Girgus, & Seligman, 1992). In a similar vein, rearing practices, such as the effects of authoritarian, authoritative, and permissive parental policies (Baumrind, 1966), have been widely studied but not typically in terms of the BEATs they foster in children. An important research goal, then, is to identify BEATs that are pivotal to optimal development and the experiences and socialization practices that promote them.

2. Temperament, in the current theory, is an important contributor to personality development through its influence on motivation and the formation of BEATs. It can exert this influence, for example, by making certain needs stronger or weaker, or by fostering certain perceptions, affective reactions, or action tendencies in given contexts. In this way, temperament can have marked effects on the representations that children construct and carry forward with them. Moreover, these BEATs can either augment or diminish the effects of early temperament over time (see Dweck, 2017, for an extended treatment of temperament and personality). Future research can seek to understand the impact of temperament on personality development by examining more closely the BEATs children build as they act on and experience their worlds (see Rothbart, 2011). Indeed, this view brings to life the idea of temperament and environment as interactive

shapers of personality through their joint contributions to the formation of BEATs.

Conclusion

In this chapter, I have suggested how personality develops as infants, starting with a set of basic needs, pursue need-fulfilling goals and form mental representations of their experiences. These mental representations (BEATs), in the context of needs, then guide future goal pursuit to foster the recurrent, characteristic patterns of actions and experiences that we call traits. Thus, I have proposed a theory that outlines how the more visible parts of personality (the pattern of acts and experiences, or traits) are underpinned by the less visible parts (including the BEATs in the context of needs). In the process, I have put a spotlight on potential routes for personal change.

The distinguished motivation and personality psychologist David McClelland (1951) proposed that a theory of personality requires three key elements: dynamic motives or needs, cognitive schemas, and stylistic traits. The current theory encompasses all three in the form of needs, BEATs, and patterns of online acts and experiences. In proposing this theory, I have tried to integrate these elements into a framework in which diverse theories (and fields) might find a home together.

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This chapter is based in part on Dweck (2017). Please refer to this article for a more extensive treatment of many topics, including temperament, culture, and new perspectives on developmental theory.

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CHAPTER 4

Achievement Goal Complexes

Integrating the “What” and the “Why” of Achievement Motivation

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Kennon M. Sheldon

The origin of psychology’s conceptual difficulties is to be found in part in the fact that the subject is young as a science but old as a topic of investigation.

—DUFFY (1941, p. 178)

A core part of personality are the goals and reasons that drive individual behaviors. In this chapter, we focus on the achievement domain and discuss how achievement goals and reasons behind achievement goals can predict achievement behaviors. The achievement goal framework focuses on the question of *what* is competence and provides information regarding the psychological *direction* of achievement behavior (i.e., toward or away from a particular standard of [in]competence; Elliot, 1999). However, a complete, coherent, and operative theory of achievement motivation must also address the question of *why* one wants to be competent and provide information regarding the *energization* of achievement behavior (i.e., the reasons behind achievement goals; Deci & Ryan, 2000; DeShon & Gillespie, 2005; Elliot, 1999; Sheldon, 2004).

In recent years, scholars have shown a growing interest in studying *achievement goal complexes*, that is, the combinations between an achievement goal and an energizing reason (e.g., Grant & Dweck, 2003; Dompnier, Darnon, & Butera, 2009; Urdan

& Mestas, 2006; Warburton & Spray, 2014; Wang, King, & Rao, 2019). In particular, scholars have extensively used self-determination theory (SDT; Ryan & Deci, 2000) to assess the reasons behind achievement goals (for a review, see Vansteenkiste, Lens, Elliot, Soenens, & Mouratidis, 2014). Our chapter is organized as follows: First, we describe how achievement goals are conceptualized; second, we provide an overview of how SDT-derived achievement goal complexes are conceptualized and operationalized; and third, we reexamine the extant empirical results regarding the consequences of SDT-derived achievement goal complexes.

The “What” of Achievement Motivation

Conceptualization of Achievement Goals

The First Generation of Achievement Goal Research: The Goal Orientation Model

In the late 1970s to the mid-1980s, a group of researchers from the University of Illinois began to work both independently and col-

laboratively on the types of goals that individuals pursue in achievement contexts (Ames, 1984; Dweck, 1986; Maehr, 1984; Nicholls, 1984; for a historical review, see Elliot, 2005). For example, Dweck and her colleagues highlighted why learners with equivalent ability reacted differently to failure (Dweck, 1975, 1986; Dweck & Legget, 1988; Elliott & Dweck, 1988). They showed that learners' goal orientation (rather than ability) predicted different patterns of response to failure. Goal orientation was then understood as the overarching purpose for which learners engage in achievement behavior: Mastery goals focused on the purpose of *developing* competence (learning), whereas performance goals focused on the purpose of *demonstrating* competence relative to others (seeking favorable judgments or avoiding unfavorable judgments of one's competence). Dweck and her colleagues showed that mastery-oriented learners tended to believe that ability is an expendable quality (i.e., they held incremental beliefs), attribute failure to a controllable lack of effort, and show resilience in the face of obstacles. However, performance-oriented learners were found to believe that ability is a fixed quantity (i.e., they held entity beliefs), attribute failure to an uncontrollable lack of intelligence, and show helplessness in the face of obstacles.

At that time, a considerable array of research confirmed that mastery goals were associated with a pattern of *adaptive* cognitive, affective, and behavioral achievement-relevant outcomes (for a representative review, see Dweck, 1991). For instance, mastery-oriented individuals were found to report a higher level of cognitive engagement (Meece, Blumenfeld, & Hoyle, 1988), to verbalize less, or exhibit the absence of negative affect during difficulty (Elliott & Dweck, 1988) or to display a behavioral preference for task-related rather than normative feedback (Butler, 1992). However, research was not as consistent when it came to performance goals (for a review, see Midgley, Kaplan, & Middleton, 2001). As an illustration, performance-oriented individuals were sometimes found to use surface rather than deep learning strategies (Greene & Miller, 1996; Miller, Greene, Montalvo, Ravindran, & Nichols, 1996; Nolen, 1988), but

at other times they were found to use deep learning strategies (Archer, 1994; Miller, Behrens, Greene, & Newman, 1993; Wolters, Yu, & Pintrich, 1996). To resolve this kind of empirical inconsistency, the goal orientation model needed to be revised.

The Second Generation of Achievement Goal Research: The Goal Standard Model

In the late 1990s to the early 2000s, Elliot and his colleagues sought to revise the goal orientation model, suggesting that achievement goals had thus far been characterized as *omnibus* constructs (Elliot, 1994; Elliot & Church, 1997; Elliot & Harackiewicz, 1996). They pointed out two elements.

First, in early achievement goal research, achievement goals were conceptualized as a mixture of the goal (or aim) that the individual strives to achieve *and* the reason (or motive) the individual wants to achieve (Elliot & Thrash, 2001). Specifically, mastery goals were often conceptualized as the aim of attaining task-referenced competence (the goal component: mastering the task) *and* the self-improvement motive (a reason component: to improve one's skills and abilities). However, performance goals were often conceptualized as the aim of attaining other-referenced competence (the goal component: outperforming others) *and* the self-presentation motive (a reason component: to prove one's ability; Pintrich, 2000a).

Second, in early achievement goal research, achievement goals were conceptualized as a mixture of the tendency to approach competence *and* the tendency to avoid incompetence (Elliot & McGregor, 2001). In particular, performance goals were conceived as the purpose of demonstrating the adequacy of one's competence (especially for individuals having high self-perceived competence) *and* as the purpose of avoiding the demonstration of inadequate competence (especially for individuals having low self-perceived competence; Dweck & Legget, 1988).

To address these issues, Elliot and his colleagues adopted a *constrained* conceptual definition of achievement goals, focusing exclusively on the focal goal component (Elliot, 1999; Elliot & Murayama, 2008; Elliot & Thrash, 2001). From this perspective,

achievement goals are *cognitive representations of a competence-related possibility that an individual is committed to approach or to avoid*. Achievement goals are differentiated according to how competence is defined and valenced. The *definition* of competence refers to the standard used in competence evaluation (task- or self-referenced vs. other-referenced), whereas the *valence* refers to the positive or negative focus of the goal (approaching competence vs. avoiding incompetence). As seen in Figure 4.1, the mastery-performance definition distinction is crossed by the approach-avoidance valence distinction, which results in 2×2 types of achievement goals: mastery-approach goals (the aim to master a task; improve over time), performance-approach goals (the aim to outperform others), mastery-avoidance goals (the aim to not fall short of mastering a task; not decline over time), performance-avoidance goals (the aim to not be outperformed by others).

Operationalization and Consequences of Achievement Goals

It is crucial for the operational definition of *achievement goals* to be consistent with their conceptual definition. From our perspective, this means that achievement goal items should assess the goal separate from

the non-goal-related elements, in particular, stripped of any peripheral reason content (e.g., self-presentation motives; Elliot & Murayama, 2008; Hulleman, Schrager, Bodmann, & Harackiewicz, 2010; Hulleman & Senko, 2010). An example of a measure that carefully attends to these issues is the Achievement Goal Questionnaire—Revised (Elliot & Murayama, 2008). In this measure, the performance-approach goal items, for instance, focus exclusively on approaching normative competence (e.g., “My goal is to perform better than the other students”), whereas the performance-avoidance goal items focus exclusively on avoiding normative incompetence (e.g., “My goal is to avoid performing poorly compared to others”; Elliot & Murayama, 2008, p. 617).

We believe that using a *constrained* operational definition of achievement goals is the optimal way to determine the consequences of the core goal component (akin to the signal) detached from reason elements (akin to the noise). Recent meta-analyses relying (or mostly relying) on such a *constrained* definition shed light on the consequences of achievement goals per se. First, meta-analyses show that focal mastery-approach goals are *predominantly beneficial* for achievement-relevant outcomes. Mastery-approach goals are a robust positive predictor of interest (Baranik, Stanley,

		Definition of Competence	
		Task- or self-referenced standard (using task requirement or past attainment as a benchmark to assess competence)	Other-referenced standard (using others' attainment as a benchmark to assess competence)
Valence of Competence	Positive (approaching competence)	Mastery-approach goals master a task; improve over time <i>predominantly beneficial: primarily for interest</i>	Performance-approach goals outperform others <i>predominantly beneficial: primarily for performance</i>
	Negative (avoiding incompetence)	Mastery-avoidance goals not fall short of mastering a task; not decline over time <i>not beneficial; neither for interest nor for performance</i>	Performance-avoidance goals not be outperformed by others <i>not beneficial; neither for interest nor for performance</i>

FIGURE 4.1. The 2×2 achievement goal framework. Adapted from Elliot and McGregor (2001). The nature of the pattern of achievement-relevant outcomes associated with each goal is reported in *italics*.

Bynum, & Lance, 2010; Hulleman et al., 2010), as well as other beneficial outcomes such as self-efficacy (Baranik et al., 2010; Huang, 2016), positive emotion (Baranik et al., 2010; Huang, 2011), and help-seeking (Baranik et al., 2010). Mastery-approach goals sometimes show a weak positive correlation with performance (Baranik et al., 2010; Huang, 2012; Lochbaum & Gottardy, 2015; Van Yperen, Blaga, & Postmes, 2014; Wirthwein, Sparfeldt, Pinquart, Wegerer, & Steinmayr, 2013), but this link is not very consistent (Hulleman et al., 2010; see also, Linnenbrink-Garcia, Tyson, & Patall, 2008). This illustrates that mastery-approach goals facilitate interest-based studying, increasing the subjective value of achievement activities and self-regulated learning (Nicholls, 1984; Pekrun, 2006; Pintrich, 2000b), but that this does not necessarily translate into higher performance attainment (Senko, Durik, & Harackiewicz, 2008).

Second, meta-analyses reveal that focal performance-approach goals are *predominantly beneficial* for achievement-relevant outcomes. Performance-approach goals are a robust positive predictor of performance (Baranik et al., 2010; Huang, 2012; Hulleman et al., 2010; Lochbaum & Gottardy, 2015; Murayama & Elliot, 2012; Van Yperen et al., 2014; Wirthwein et al., 2013), as well as other beneficial outcomes such as self-efficacy (Baranik et al., 2010; Huang, 2016), positive emotion (Baranik et al., 2010; Huang, 2011; Senko & Dawson, 2017), and adaptive surface learning strategies (Senko & Dawson, 2017). However, performance-approach goals are a positive predictor of some detrimental achievement-relevant outcomes, such as anxiety (Senko & Dawson, 2017). This illustrates that performance-approach goals arouse performance pressure, which increases a strategic approach to studying and effort toward one's aspirations (Senko & Harackiewicz, 2005), but may also increase negative activity emotion (Pekrun, Elliot, & Maier, 2009).¹

Third, meta-analyses reveal that both focal mastery-avoidance and focal performance-avoidance goals are negative or null predictors of interest and performance (Hulleman et al., 2010; Lochbaum & Gottardy, 2015; Van Yperen et al., 2014). However, the meta-analytic literature is somehow more

limited for avoidance-based achievement goals. On the one hand, mastery-avoidance goals have not been as extensively studied as the other achievement goals, perhaps due to their lower prevalence and less general ecological relevance (Ciani & Sheldon, 2010; Senko & Freund, 2015). On the other hand, performance-avoidance goals have mostly been operationalized using older subscales that include non-goal-related elements, thereby limiting the conclusions that can be drawn for most meta-analyses (e.g., Cellar et al., 2011; Payne, Youngcourt, & Beaubien, 2007). Nevertheless, it can be stated that the extant data suggests that performance-avoidance goals are problematic for many achievement-relevant outcomes (for a review, see Senko, Hulleman, & Harackiewicz, 2010).

Summary

In the first generation of achievement goal research, achievement goals were conceptualized and operationalized as a mixture of goals and reasons (the goal orientation model). Mastery goal orientation was found to be mostly beneficial for achievement-relevant outcomes, whereas the effects of performance goal orientation were inconsistent. In the second generation of achievement goal research, achievement goals have been conceptualized and operationalized as focal goals stripped of reason elements (the goal standard model). Mastery-approach goals were found to be primarily beneficial for interest, performance-approach goals were found to be primarily beneficial for performance, and mastery- and performance-avoidance goals were found to be detrimental (or, at least, not beneficial) for both performance and interest. More recently, a third generation of achievement goal research is emerging, emphasizing that achievement goals do not come from a "motivational vacuum" and showing that the reasons behind achievement goals have predictive utility (e.g., see Dompnier et al., 2009; Urdan & Mestas, 2006; Vansteenkiste, Smeets, et al., 2010). These innovative new lines of inquiry (see Senko, 2016) have begun to lay the empirical foundation for the goal complex approach to achievement goals (Elliot & Thrash, 2001).

The “Why” Behind Achievement Goals

The goal standard model enabled scholars to address the question of *what* one wants to achieve (the *direction* function of achievement motivation). However, by removing all reason elements from definition and measurement, the goal standard model left open the question of *why* one wants to achieve (the *energization* function of achievement motivation).

Achievement motivation has long been viewed as serving a directional *and* an energizing function (for a historical review, see Thrash & Elliot, 2001). For instance, Murray (1938) already envisaged that *needs* (defined as subjective inner states, wishes, reasons) manifested themselves by leading the organism to approach or avoid certain encounters, and—when eventually facing these encounters—by driving one’s cognitive and behavioral responses. Murray called this multicomponent motivational construct a “need integrate” (p. 64; also see pp. 123–124).

Similar to Murray’s need integrate, Elliot and Thrash (2001) conceptualized *the achievement goal complex* (see also Elliot, 2006; Thrash & Elliot, 2001). An achievement goal complex is a motivational hybrid comprising a particular type of achievement goal connected to a particular type of reason. An achievement goal complex emerges when a reason prompts the endorsement of an achievement goal. Reasons may vary from relatively conscious cognitive values to which individuals have easy and direct access to relatively nonconscious affective motives to which individuals have incomplete or indirect access (see McClelland, Koestner, & Weinberger, 1989, for related points). The reason provides the primary motivational impetus for goal endorsement and the achievement goal provides the specific guidelines to interpret, process, and cope with the achievement situation.

The structural form of an achievement goal complex is “*achievement goal IN ORDER TO reason*” or “*achievement goal BECAUSE reason*.” Examples of achievement goal complexes are “*the goal to learn IN ORDER TO become a recognized expert in one’s job*” or “*the goal to learn BECAUSE learning is fun*.” From this perspective,

in the first generation of achievement goal research, the performance-approach goal orientation was often conceptualized and/or operationalized as an achievement goal complex (rather than an achievement goal per se), namely “*outperforming other* [the goal component] *IN ORDER TO demonstrate competence* [a self-presentation reason component]” (e.g., Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997; Ryan & Pintrich, 1997; Urdan & Maehr, 1995).

While there is only a *finite* number of possible achievement goals (i.e., three conceivable definitions of competence $\times$ two conceivable valences of competence; Elliot, Murayama, & Pekrun, 2011; Elliot & Thrash, 2001), there is an *infinite* number of possible reasons behind achievement goals, and therefore an *infinite* number of possible achievement goal complexes. Different achievement goals may be undergirded by similar reasons: One may endorse a performance-approach goal for self-presentation reasons (an appearance-grounded performance-approach goal complex), whereas another may endorse a mastery-approach goals for the very same self-presentation reasons (an appearance-grounded mastery-approach goal complex; Hodis, Tait, Hodis, Hodis, & Scornavacca, 2016). Conversely, similar achievement goals may be undergirded by different reasons: One may endorse a performance-approach goal because outperforming others is viewed as a challenge, whereas another may endorse the same performance-approach goal in response to pressure from their teammates (Vansteenkiste, Mouratidis, & Lens, 2010).

The *functional significance* of an achievement goal (i.e., the meaning attributed to the goal) is presumed to depend on its underlying reasons (Vansteenkiste et al., 2014; see also, Deci & Ryan, 1985). During the regulatory process, the achievement goal is viewed as the channel through which the overarching reason affects achievement behavior. Similar achievement goals may therefore differ in meaning as a function of the reason they serve and—by extension—these similar achievement goals can be tied to different mechanisms and produce different effects. For instance, a mastery-approach goal endorsed with a sense of choice and interest is arguably more adaptive in terms of achievement-relevant outcomes than a

mastery-approach goal endorsed with a sense of internal or external compulsion (Benita, Roth, & Deci, 2014; see also Benita, Shane, Elgali, & Roth, 2017; Pulfrey, Vansteenkiste, & Michou, 2019; Spray, Wang, Biddle, & Chatzisarantis, 2006). Thus, taking both achievement goal and reason content into account allows for not only a more complete description of achievement motivation but also sharper predictions of achievement behavior.

Which theoretical framework should be used to conceptualize achievement goal complexes? To answer this question, one needs to define the nature of the reason component of a goal complex. A reason corresponds to “the *psychological starting point* for action” (Elliot & Thrash, 2001, pp. 143–144). As such, it is important to distinguish between the various possible reasons behind achievement goals and the various *antecedents* of achievement goals. Specifically, contextual antecedents (or mere social perceptions) are not reasons per se, because they do not *directly* instigate achievement goals. For instance, competitive environments (antecedent) are presumed to fuel competitive motives (reason) before further fostering performance-based goals (for a related point, see Murayama & Elliot, 2012). The same applies to dispositional antecedents (or self-perceptions), which are not reasons per se unless *directly* instigating achievement goals. For instance, incremental beliefs about intelligence (antecedent) are presumed to fuel self-improvement motives (reason) before further fostering mastery-approach goals (for a related point, see Heslin & Keating, 2017).

One can list various lines of research in which the reasons behind achievement goals serve an energizing function. For instance, in the hierarchical model of achievement motivation (Elliot & Church, 1997), need for achievement and fear of failure (McClelland, 1985) are posited to exert a distal, latent, and indirect influence on achievement-relevant outcomes, with motive-charged achievement goals serving as regulatory surrogates and exerting a proximal, manifest, and direct influence. Other example includes the model action theory (in which self- and principle goals are conceived as higher-level goals, and achievement goals are consid-

ered as lower-level goals; DeShon & Gillespie, 2005), research on the social value of achievement goals (in which social desirability and social utility reasons are shown to alter the predictive utility of achievement goals; Dompnier et al., 2009, 2013; Smeding et al., 2015) or, more recently, a theoretical proposition to combine Bronfenbrenner’s bioecological model with the achievement goal framework (in which macro- [e.g., cultural] to micro-level [e.g., family] antecedents predict distal and proximal reasons for achievement goal adoption; Liem & Elliot, 2018). However, SDT has thus far been the most generative approach to operationalize reasons behind achievement goals and achievement goal complexes (for reviews, see Senko, 2016; Vansteenkiste et al., 2014; Vansteenkiste & Mouratidis, 2016).

Conceptualization of SDT-Derived Achievement Goal Complexes

A fundamental aspect of SDT is that the regulatory processes tied to goals depend on whether three basic psychological needs are satisfied (for a review, see Ryan & Deci, 2008). These three needs are conceived as innate, cross-developmental, and culturally universal antecedents (as in Hull’s [1943] or White’s [1959] traditions) rather than acquired reasons (as in Murray [1938] and, by extension, as in McClelland [1985]). These three needs are the need for autonomy (the necessity to self-endorse one’s own goals and behaviors), the need for competence (the necessity to feel efficacious), and the need for relatedness (the necessity to be connected to others).

An environment providing the nutrients of need fulfillment (especially need for autonomy and competence) facilitates intrinsic motivation. In an autonomy- and competence-supportive context, individuals will be more likely to adopt goals and goal-directed behaviors for the inherent satisfaction they procure, out of interest and enjoyment (Koestner, Powers, Milyavskaya, Carbonneau, & Hope, 2015). Conversely, an environment thwarting need satisfaction generates extrinsic motivation. In a controlling and competence-threatening context, individuals will be more likely to adopt goals and goal-directed behaviors for operational-

ly separable reasons, because of self-imposed pressure or external contingencies (Kanat-Maymon, Benjamin, Stavsky, Shoshani, & Roth, 2015).

Most daily activities are instrumental in nature, thereby producing extrinsically motivated goals and behavior (e.g., the grading system prompts students to focus on normative performance; Pulfrey, Buchs, & Butera, 2011). However, when conditions favor basic need satisfaction, individuals may attempt to internalize these goals and behaviors, that is, to transform them into their own. As seen in Figure 4.2, SDT can be used to describe a continuum of reasons behind achievement goals, each reflecting the degree to which the goal has been internalized. The self-determination continuum extends from highly controlled reasons (no goal internalization) to highly autonomous reasons (full goal internalization).

In the left-most side of the continuum, there is extrinsic motivation with external regulation (labeled *external reasons*). An achievement goal undergirded by external reasons is endorsed as a response to an external demand, that is, to earn a reward or avoid a punishment administered by others (e.g., a mastery-approach goal enacted to comply with teachers' expectations). Further to the right, there is extrinsic motivation

with introjected regulation (labeled *introjected reasons*). An achievement goal undergirded by introjected reasons is endorsed as a response to an internal pressure, that is, to garner self-esteem or avoid projected disapproval, applied by individuals to themselves (e.g., a performance-avoidance goal pursued to avoid the shameful experience of failure). External and introjected reasons are considered as two subtypes of *controlled reasons*.

In the middle of the continuum, there is extrinsic motivation with identified regulation (labeled *identified reasons*). An achievement goal undergirded by identified reasons is consciously valued and accepted as personally important (e.g., a performance-approach goal endorsed as a means to reaching academic success). Further to the right, there is extrinsic motivation with integrated regulation (labeled *integrated reasons*). An achievement goal undergirded by integrated reasons is fully assimilated to the self and brought into congruence with other aspects of one's values and identity (e.g., a mastery-approach goal pursued because of an overarching and inner inclination toward growth and progress). Along with intrinsic motivation (i.e., when the goal is pursued for its own sake), identified and integrated reasons are considered as three subtypes of *autonomous reasons*.

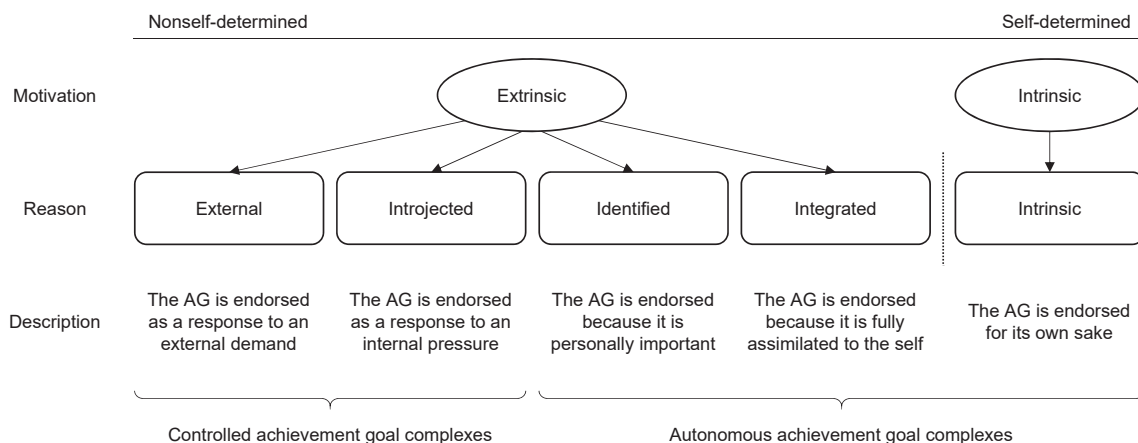


FIGURE 4.2. The self-determination continuum applied to achievement goals. Adapted from Ryan and Deci (2000); a brief description of the reason for goal endorsement is given for each reason. AG, achievement goal.

Operationalization and Study of SDT-Derived Achievement Goal Complexes

Vansteenkiste, Smeets, et al., (2010) were the first to use SDT to operationalize reasons behind achievement goals. In two studies, secondary school students first reported their performance-approach goals (e.g., “My goal at school is to get a better grade than most other students”; p. 210). Then, they reported the autonomous reasons connected to their performance-approach goals (e.g., “[I pursue this goal because] I find this a highly stimulating and challenging goal”), as well as the controlled reasons connected to these same goals (e.g., “[I pursue this goal because] I have to comply with the demands of others such as parents, friends, and teachers”; p. 338). The authors observed that autonomous reasons connected to performance-approach goals were a positive predictor of beneficial educational outcomes (e.g., adaptive learning strategies, persistence, performance). More importantly, they observed that the relation between performance-approach goals and most of these beneficial educational outcomes dropped to nonsignificance (or diminished considerably) when they statistically controlled for the autonomous reason variable. Similar findings were later observed for other types of outcomes (e.g., satisfaction, positive affects), other achievement domains (e.g., work settings, sport setting), as well as with mastery-approach goals and autonomous reasons connected to mastery-approach goals (Gaudreau & Braaten, 2016; Gillet et al., 2017; Gillet, Lafrenière, Huyghebaert, & Fouquereau, 2015; Gillet, Lafrenière, Vallerand, Huart, & Fouquereau, 2014; Vansteenkiste, Smeets, et al., 2010).

The disappearance (or diminishment) of the influence of achievement goals when partialing out the influence of the autonomous reasons to which they are connected has often been interpreted as indicating that the influence of achievement goals might be reducible to the influence of reasons. For instance, Vansteenkiste, Mouratidis, et al. (2010) stated that such findings “suggest that the association between PAP [i.e., performance-approach goals] and well-being outcomes is not very robust” (p. 236). More-

over, Gillet et al. (2015) stated that “motivation underlying achievement goals are stronger predictors of subjective well-being than the endorsement of goals themselves” (p. 858), whereas Deci and Ryan (2016) concluded that “people’s motives . . . [are] more important than the strength of the goals themselves in predicting various educational outcomes” (p. 19). These interpretations—at least implicitly—question the predictive utility of achievement goals when studying achievement motivation (but see Vansteenkiste, Mouratidis, et al. [2014, p. 142] for more nuanced “theoretical reflections”).

Sommet and Elliot (2017) challenged these interpretations. They noted that the structural form of the reason variable in the aforementioned research is in fact that of an achievement goal complex (i.e., “*achievement goal* BECAUSE *reason*”). Thus, it should not be surprising that the influence of a given achievement goal is eliminated or reduced when researchers control for a related achievement goal complex, since the two variables overlap in content (see Senko & Tropicano, 2016, for a similar point). Simply put, the achievement goal is assessed a first time as a focal goal, and a second time as part of a composite goal complex. An alternative approach to assessment that disentangles the influence of goals from the influence of reasons focuses on three components: (1) the focal goal component; (2) the focal reason component; and (3) the goal complex. From this perspective, the focal goal component should be detached from any exogenous reason elements and assessed with items such as “My goal is to learn” (mastery-approach goals) or “My goal is to outperform others” (performance-approach goals). The focal reason component should be detached from any specific exogenous goal elements and assessed with items such as “I pursue goals because I find them challenging” (autonomous reasons) or “I pursue goals because others will reward me only if I achieve these goals” (controlled reasons). The goal complex should encompass one “pure” goal and one “pure” reason, and be assessed with items such as “My goal is to learn because I find this a challenging goal” (autonomous mastery-approach goal complex) or “My goal is to outperform oth-

ers because others will reward me only if I achieve this goal” (controlled performance-approach goal complex).² When including a “pure” goal, a “pure” reason, and their related goal complex in the same statistical model, one can disentangle the effect of each construct from the others, that is, testing the unique variance explained by each construct after removing the shared variance explained by the other two.

Sommet and Elliot used this approach in four studies involving more than 1,700 participants and reached three main conclusions. First, testing goals and reasons *separately*, mastery-approach goals and autonomous reasons were each a positive predictor of beneficial experiential and self-regulated outcomes (e.g., interest, positive emotion, deep learning, and persistence). This replicates the well-known findings from the achievement goal literature reviewed earlier, as well as those from the SDT literature showing that autonomous reasons make tasks more meaningful and foster personal growth (Deci, Vallerand, Pelletier, & Ryan, 1991; Vansteenkiste, Zhou, Lens, & Soenens, 2005).

Second, testing goals and reasons *simultaneously*, mastery-approach goals and autonomous reasons were each still a positive predictor of most of the beneficial outcomes, with the predictive strength of *both* mastery-approach goals and autonomous reasons being diminished when controlling for the other (without dropping to nonsignificance). This demonstrates that mastery-approach goals and autonomous reasons are both distinct (operating at different level) and overlapping (predicting similar outcomes), but that none of the construct unilaterally “captures” all the variance explained by the other. In light of this set of results, it cannot be concluded that the influence of goals is reducible to the influence of reasons or, for that matter, vice versa.

Third, testing goals, reasons, and goal complexes *together*, the autonomous mastery-approach goal complex was found to be a positive predictor of most of the beneficial outcomes, with the predictive strength of *both* mastery-approach goals and autonomous reasons being diminished when controlling for the goal complex construct (without dropping to nonsignificance). This

demonstrates that mastery-approach goals and autonomous reasons may fuse into an autonomous mastery-approach goal complex and produce additional benefits. Moreover, as in the extant research, controlling for the autonomous mastery-approach goal complex diminished the effect of “pure” mastery-approach goals (since the goal component is assessed two times), but *in the same way it* diminished the effect of “pure” autonomous reasons (since the reason component is also assessed two times). Similar results were observed for performance-approach goals, the autonomous performance-approach goal complex, and performance goal-relevant outcomes (e.g., grade aspiration, persistence).

Interestingly, Sommet and Elliot’s (2017) findings are reminiscent of a past controversy regarding the relative influence of financial goal content and autonomous goal motives. Kasser and Ryan (1993) demonstrated that financial goals (striving for status or wealth) were a negative predictor of well-being. Later, Srivastava, Locke, and Bartol (2001) disputed these findings, suggesting that this relation could be accounted by “the ‘why’ behind the [financial] goal, rather than the goal itself” (p. 959; see also Carver & Baird, 1998). Accordingly, the authors showed that the negative relation between financial goals and well-being was eliminated when including the controlled reasons connected to these financial goals (e.g., appearance reasons). However, Sheldon, Ryan, Deci, and Kasser (2004) critiqued their operationalization, arguing that there was a confound in the assessment of goals and reasons. Once the ambiguity had been resolved, the authors observed that financial goals had a negative effect on well-being, with controlled reasons (relative to autonomous reasons) having an additional, independent, and incremental negative effect on well-being.

The idea that both the energizing force of reasons and the directive force of goals are needed to give a full account of human motivation can be found in other lines of inquiry as well, such as intrinsic *versus* extrinsic exercise goal content and autonomous *versus* controlled reasons (Sebire, Standage, & Vansteenkiste, 2009; see also Sheldon, Sommet, Corcoran, & Elliot, 2018; Vansteenkiste, Lens, & Deci, 2006), short-term emotional preference and long-

term instrumental reasons for emotion regulation (Tamir, 2009), or the relation between superordinate goals and their corresponding attainment means (Shah & Kruglanski, 2003). In the case of achievement motivation, this analysis supports the idea that studying achievement goals and SDT-derived reasons is best served by adopting an integrative rather than comparative or even competitive approach.

Consequences of SDT-Derived Achievement Goal Complexes: A Systematic Review

As stated earlier, we believe that the SDT-derived reason variables used in the extant work are based on a *twin-track* operationalization, encompassing a focal goal and a focal reason (e.g., in Gaudreau & Braaten, 2016; Gillet et al., 2015; Vansteenkiste, Mouratidis, et al., 2010). As such, these SDT-derived reason variables really correspond to SDT-derived achievement goal complexes and the past findings should be (re)interpreted accordingly.

Three basic patterns of results may emerge from this approach. The first possibility is that specific goals are systematically associated with (dis)advantageous outcomes, *regardless of the reason to which they are tied* (a goal-driven pattern). If that is the case, all possible *approach*-based achievement goal complexes are likely to have equally beneficial consequences, whereas all possible *avoidance*-based achievement goal complexes are likely to have equally detrimental consequences.

The second possibility is that specific reasons are systematically associated with (dis)advantageous outcomes, *regardless of the goal to which they are tied* (a reason-driven pattern). If that is the case, all possible *autonomous* achievement goal complexes are likely to have equally beneficial consequences, whereas all possible *controlled* achievement goal complexes are likely to have equally detrimental consequences. This position is advocated by some SDT researchers: For instance, in reviewing the literature, Özdemir Oz, Lane, and Michou (2016) stated that it reveals that “the same underlying reasons of different achievement goals account for the same outcomes irrespective of the goal to which they are tied” (p. 1160).

We favor a third possibility: Specific achievement goal complexes are associated with specific (dis)advantageous outcomes (a goal complex-specific pattern). From a theoretical perspective, the reason component of a goal complex gives a certain color or flavor to the goal, whereas the goal component takes a particular route to serve the reason (Elliot & Thrash, 2001). On the one hand, autonomous reasons enhance goal ease, progress, and attainment (an adaptive form of goal regulation; see Koestner, Otis, Powers, Pelletier, & Gagnon, 2008; Ntoumanis et al., 2014; Werner, Milyavskaya, Foxen-Craft, & Koestner, 2016), and achievement goals energized by autonomous reasons, in turn, efficiently direct individuals toward specific behavior. On the other hand, controlled reasons diminish goal ease, progress, and attainment (i.e., a maladaptive form of goal regulation), and achievement goals energized by controlled reasons fail to efficiently direct individuals toward specific behavior. In particular, controlled mastery- and performance-approach goal complexes may not be as beneficial as their autonomous reason-grounded counterparts.

To examine the pattern of outcome associated with each SDT-derived achievement goal complex, we systematically gathered hundreds of correlations from the literature. To date, we know of 15 published empirical articles on the consequences of SDT-derived achievement goal complexes measured using a twin-track operationalization. As seen in Figure 4.3, these 15 articles reported 391 zero-order correlations between SDT-derived achievement goal complexes and a set of achievement-relevant outcomes from 25 independent samples involving 6,859 participants. We chose to focus on zero-order correlations rather than regression coefficients, because research designs and regression models varied from one sample to another, making it impossible to compare regression results across studies.³

Several findings emerged. First, the autonomous mastery-approach goal complex is *predominantly beneficial* in terms of achievement (86% of the correlations are beneficial). The autonomous mastery-approach goal complex shows robust moderate-to-strong positive correlations with beneficial affective (e.g., positive emo-



FIGURE 4.3. Word clouds of the variables with which SDT-derived achievement goal complexes are significantly correlated (based on 390 correlations from 24 independent samples involving 6,693 participants). For each word cloud, the font size of the word is proportional to the correlation between the achievement goal complex and the variable (nonsignificant correlation were not considered). The correlations were collected from the following articles: Delrue et al. (2016), $N = 221$; Gaudreau and Braaten (2016), $N = 515$; Gaudreau (2012), $N = 220$; Gillet et al. (2014), $N_1 = 424$, $N_2 = 123$; Gillet et al. (2015), $N_1 = 278$, $N_2 = 327$, $N_3 = 169$; Gillet et al. (2017), $N = 330$; Michou et al. (2014), $N_1 = 606$, $N_2 = 435$; Michou et al. (2016), $N_1 = 226$, $N_2 = 331$; Özdemir Oz et al. (2016), $N = 212$; Senko and Tropiano (2016), $N_1 = 168$, $N_2 = 160$; Sommet and Elliot (2017), $N_2 = 406$, $N_3 = 429$, $N_4 = 457$; Vansteenkiste, Mouratidis, et al. (2010), $N_1 = 304$, $N_2 = 245$; Vansteenkiste, Smeets, et al. (2010), $N_1 = 150$, $N_2 = 190$; Vansteenkiste, Mouratidis, et al. (2014), $N = 67$; the full set of correlations is presented in supplementary material (at <https://figshare.com/s/7a47f3a688b62c49760d>).

tion, satisfaction), (meta)cognitive (e.g., self-regulated learning, interest), and behavioral (e.g., persistence) responses to achievement activities. However, the controlled mastery-approach goal complex shows, in most cases, *no predictive utility* (63% of the correlations are null). As an illustration, the controlled mastery-approach goal complex is never or seldom correlated with positive emotion, self-regulated learning, or persistence.

Second, the autonomous performance-approach goal complex is *mainly beneficial* in terms of achievement (61% of the correlations are beneficial). The autonomous performance-approach goal complex shows rather moderate positive correlations with the same beneficial affective (e.g., positive emotion, satisfaction), (meta)cognitive (e.g., self-regulated learning, interest), and behavioral (e.g., persistence) responses to achievement activities as the autonomous mastery-approach goal complex. However, these correlations are not necessarily as robust as those involving the autonomous mastery-approach goal complex (e.g., null effects were reported with positive emotion, satisfaction, self-regulated learning). However, the controlled performance-approach goal complex shows, in most cases, *no predictive utility* (60% of the correlations are null). Taken together, the empirical research therefore indicates that individuals pursuing autonomous mastery- or performance-approach goal complexes may reap the epistemic benefits of the goal and the reason constructs, with the autonomous mastery-approach goal complex being particularly adaptive. However, both mastery- and performance-approach goals enacted through controlled regulation no longer seem beneficial.

Third, the autonomous avoidance-based goal complexes are predominantly beneficial in terms of achievement-relevant outcomes (88% of the correlations are beneficial for mastery goals, and 92% are beneficial for performance goals). Controlled avoidance-based goal complexes show little, if any, predictive utility (85% of the correlations are null for mastery goals, and 77% are null for performance). However, these correlations were collected from studies in which it was not possible to disentangle the effects of approach-based and avoidance-based achievement goal complexes.⁴ That is, be-

cause we are examining zero-order correlations, the influence of a goal complex might be confounded with the influence of its goal component, its reason component, another goal to which it is correlated, and/or another reason to which it is correlated. Moreover, participants may have trouble recognizing seemingly ambiguous, convoluted, or even antithetical achievement goal complexes, such as the autonomous performance-avoidance goal complex (i.e., the goal not to be outperformed by others because one find this a highly stimulating and challenging goal). Finally, it is possible that maladaptive avoidance-based achievement goals endorsed with a sense of volition, willingness, and congruence may produce beneficial achievement-relevant outcomes, at least in some instances. Future research is needed to test this provocative possibility.

Summary and Conclusion

An achievement goal complex is conceptualized as the combination of an achievement goal and an energizing reason. Although countless theoretical frameworks could be used to operationalize reasons behind goals (e.g., achievement motives, social values), SDT has, to date, spurred considerable interest among researchers. Within this framework, autonomous achievement goal complexes (pursuing an achievement goal because it is stimulating and valued) are differentiated from controlled achievement goal complexes (pursuing an achievement goal because it enables one to bolster one's ego or to obtain a reward). In contrast to the extant research, Sommet and Elliot (2017) showed that focal reasons, focal achievement goals, and achievement goal complexes all made *independent* contributions to achievement-relevant outcomes. In other words, none of the three motivational constructs seems reducible to any of the others. A systematic examination of the literature reveals that autonomous mastery- and performance-approach goal complexes are both beneficial in terms of achievement-relevant outcomes, whereas controlled mastery- and performance-approach goal complexes are not. It is premature to draw any conclusions regarding the influence of au-

tonomous and controlled avoidance-based achievement goals.

In conclusion, we believe that if scholars are able to reach an agreement regarding the conceptualization, operationalization, and nature of the consequences of achievement goal complexes, the goal complex approach is likely to become a full-grown model of achievement motivation. Obviously, many research questions need to be addressed, in particular in the field of personality: To what extent do achievement goal complexes remain stable or change over time? What are the dispositional antecedents of achievement goal complexes (e.g., trait competitiveness, temperament, needs)? Do self-regulatory processes such as challenge and treat appraisal mediate the relation between achievement goal complexes and achievement-relevant outcomes? We believe that motivation scientists from different theoretical perspectives could collaborate to answer such questions, helping us to better grasp the complexity of achievement motivation.

NOTES

1. For both Hulleman et al.'s (2010) and Senko and Dawson's (2017) work, we focus on the meta-analytic correlation involving *normative* goals.

2. One could consider achievement goal complex statements as double-barreled questions, that is, as assessing two elements simultaneously (i.e., a goal and a reason; see Podsakoff, MacKenzie, & Podsakoff, 2012). However, this twin-track operationalization directly relates to the ontology of the achievement goal complex construct. Echoing the principles of Gestalt psychology, achievement goal complexes are more than the mere sum of a goal and a reason. As such, they are inseparable motivational units and they may only be assessed with single and indivisible items. Importantly, this implies that an achievement goal complex could not be constructed as an interaction variable between a "pure" goal and a "pure" reason, because such an interaction variable does not necessarily indicate a goal complex. For instance, a high mastery-approach goal and high autonomous reasons does not necessarily indicate a high autonomous mastery-approach goal complex: The mastery-approach goals may very well be energized by controlled reasons, while the autonomous reasons may be directed by performance-approach goals.

3. A correlation of $r = .1$ is regarded as weak, a correlation of $r = .3$ as moderate, and a correlation of $r = .5$ as strong (Cohen, 1992).

4. In Gillet et al. (2017) and Michou, Vansteenkiste, Mouratidis, and Lens, 2014 (Study 1), multicollinearity was so high that autonomous approach- and avoidance-based achievement goals were collapsed into a single score. In Gillet et al. (2015), principal component analyses revealed that autonomous mastery-approach and -avoidance goals and autonomous performance-approach and -avoidance goals each loaded on the same factor in Studies 1 and 2 (the pattern was less clear for Study 3; Nicolas Gillet was kind enough to share the raw data for us to run the analyses; the findings do not change the conclusions of his and his coauthors' paper). In Delrue et al. (2016), achievement goal complexes were assessed for the focal dominant goal only, and the emphasis was put on dominant mastery approach and avoidance goal; however, Ciani and Sheldon (2010) have shown that the approach and avoidance form of these goals were often hard to discriminate.

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CHAPTER 5

Narrative Identity and the Life Story

Dan P. McAdams

Over the past two decades, research on life stories has moved from the periphery of personality psychology to the center. Building on broadly based narrative theories of personality and identity (e.g., McAdams, 1996; McLean, Pasupathi, & Pals, 2007) and incorporating insights regarding life stories and autobiographical memory to be found in cognitive science, developmental and social psychology, life-course sociology, education, literary studies, and psychotherapy practice, a new generation of personality researchers has established laboratories and programs dedicated to the empirical study of personal narratives (Adler, Lodi-Smith, Philippe, & Houle, 2016). Rather than proposing a radical alternative paradigm, narrative studies of personality tend to serve as an important complement to traditional nomothetic approaches in personality science, such as those that focus on dispositional personality traits, social-cognitive concerns, and motivation (McAdams & Pals, 2006). At the same time, narrative approaches have begun to show promise for revitalizing the field's historical commitment to idiographic inquiry (Allport, 1937), as evidenced in psychologically informed case studies and psychological biography (Schultz, 2005).

This chapter begins by situating the study of life stories in historical context, defining key terms and articulating important distinctions. While many different approach-

es to studying life stories have arisen, the concept of *narrative identity* has recently emerged as a central organizing construct (McAdams & McLean, 2013). Next, the chapter synthesizes recent research on the development of narrative identity and on the recognizable features that distinguish one person's life story from another, with some attention to describing empirical methods for collecting, coding, and analyzing life-narrative accounts. The chapter then considers two issues that have received considerable attention in the research literature on life stories—the narration of suffering and the role of culture in shaping life narrative. The chapter concludes by highlighting recent efforts to adapt life-narrative concepts to the study of the single case.

Background and Key Ideas

In the first half of the 20th century, a number of psychoanalytic theorists wrote about dreams, myths, and imaginative stories as deep wellsprings of personality formation (e.g., Jung, 1936/1969). In his founding text for personality psychology, Murray (1938) argued that salient themes in Thematic Apperception Test (TAT) stories and in autobiographical accounts reflect pervasive motivational trends in human lives. But none of these classic sources for personality theory

explicitly imagined human beings as storytellers and human lives as stories to be told.

Instead, the first *narrative* theories of personality emerged in the late 1970s and early 1980s. Tomkins (1979) proposed a *script theory* of personality that conceives of the developing person as akin to a playwright who organizes emotional life in terms of salient scenes and recurrent scripts. Integrating psychoanalytic trends with life-course sociology, Cohler (1982) argued that human lives take on a narrative form, with developmental stages representing chapters in a self-defining narrative arc. In a similar vein, McAdams (1985, 1996) proposed a *life-story model of identity*, contending that people living in modern societies begin, in late adolescence and young adulthood, to construe their lives as dynamic stories that integrate the reconstructed past and imagined future. These internalized and evolving narratives function as a psychological resource by providing adult life with some semblance of temporal unity, purpose, and meaning. Importantly, McAdams (1985) developed a life-narrative research agenda (built around a life-story interview) and delineated specific features of life stories that would be amenable to empirical scrutiny. These features included an *ideological setting* (a backdrop of fundamental belief and value for the story), specific *scenes* (high points, low points, turning points, and self-defining memories; see also Singer & Salovey, 1993), a *generativity script* (an envisioned ending for the story through which the protagonist leaves something behind for future generations), and recurrent *thematic lines* (or motivational themes) of agency (autonomy, power, and achievement) and communion (love, intimacy, and affiliation).

The emergence of narrative conceptions and methods in personality psychology roughly coincided with what has been called *the narrative turn* in the humanities, the qualitative social sciences, and in American culture more generally. The 1980s and 1990s witnessed a tremendous upsurge of interest among academic humanists in the nature of narrative, discourse, and communicative performance, as evidenced in the rise of social-constructionist and postmodernist conceptions in literary and cultural studies and the proliferation of personal

diaries, memoirs, life writing, and the like. Whereas McAdams (1985) imagined life stories as internal autobiographical projects that have enough staying power to be analyzed for self-defining themes, postmodern conceptions questioned the permanence, even the existence, of such grand projects and argued instead that people tell and enact as many different kinds of stories in social life as there are situations within which to tell and enact them (Gergen, 1991). Certain approaches that came out of the latter tradition conceived of life stories as fleeting, evanescent texts, revealing little beyond the exigencies of a social moment. Others, however, took more seriously the idea that human lives are decisively shaped in the long term by broad cultural narratives embedded in families, communities, institutions, social classes, and the power structures of society (Goodson, 2017). Bringing together homologous lines of scholarship in psychology, sociology, political science, communication studies, education, and medicine in the 1990s, Josselson and Lieblich (1993) launched an important book series entitled *The Narrative Study of Lives*. In so doing, Josselson and Lieblich gave name to an international movement aimed at pursuing and promoting systematic inquiry into life stories, life history, personal narratives, and psychological and social biography (see also McAdams, Josselson, & Lieblich, 2006).

Within the field of personality psychology, a growing number of researchers have focused on the specific concept of narrative identity (McAdams & McLean, 2013). Developing out of McAdams's (1985) original life-story model of identity, *narrative identity* refers to the particular stories people have in their minds about how they have come to be the particular people they are becoming. For any given person, a narrative identity integrates a person's reconstruction of the past ("how I came to be") and imagined projection of the future ("who I will become") into a single narrative arc, providing life with some sense of unity, purpose, and temporal coherence. People are not born with narrative identities, of course. Instead, they construct them over time, with important developmental advances witnessed in adolescence and the emerging adulthood years. Through adulthood and even into old age, people con-

tinue to “work on” their narrative identities as they accumulate new experiences in life and as their perspectives on the past and the future continue to change.

At any given point in time, moreover, people’s narrative identities can be said to differ from each other in observable, measurable ways (McAdams & McLean, 2013). As such, narrative identity is an important feature of personality itself (McAdams & Pals, 2006), and its development parallels the development of dispositional traits, motivations, and other features of human personality (McAdams & Olson, 2010).

McAdams (2015a, 2015b) has delineated three strands of personality development that run across the human life course. The first runs from early temperament inclinations to the full expression of dispositional personality traits. In that personality traits mainly capture the different social–emotional styles through which human beings perform their characteristic roles, this first line tracks the development of the person as a *social actor*. The second line of personality development runs from the emergence of a theory of mind in early childhood (wherein the child first conceives of the self as an agent who desires and plans) to the articulation of a motivational agenda—life goals and values—in the adult years, depicting the person as a *motivated agent*. The third line features narrative identity, tracing how the person as an *autobiographical author* comes to create an integrative story of the self, beginning in adolescence and running through old age. People

begin life as social actors only. Eventually personality thickens beyond dispositional traits to encompass both the goals and values of the motivated agent and the narrative identity constructed by the autobiographical author. In personality development, then, life stories layer over goals and values, which layer over dispositional personality traits (McAdams, 2015a, 2015b), as indicated in Figure 5.1.

Scientific understanding of narrative identity has advanced considerably since the turn of the century. Within the field of personality psychology, the progress can be marked by noting four landmark papers, published between the years 2000 and 2016.

The first paper demonstrated the developmental role of *autobiographical reasoning* in the construction of a life story (Habermas & Bluck, 2000). In his original conception, McAdams (1985) asserted that the formulation of a life story begins in adolescence with the emergence of what Piaget (1970) called formal operations. Following Erikson’s (1963) conception of identity in general, McAdams (1985) viewed the life story (narrative identity) to be an internalized abstraction that presupposes the formal operational ability to imagine alternative life paths. In their authoritative review of the literature on cognitive development, Habermas and Bluck (2000) focused instead on more specific cognitive skills that enable the person to sequence memories of events into causal accounts, derive general themes from specific episodes to characterize the self, and arrange

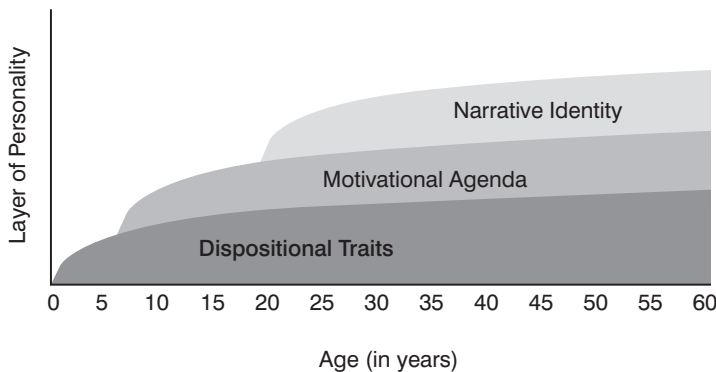


FIGURE 5.1. Three layers of personality development. Adapted from McAdams (2015a, p. 5).

the remembered past and imagined future into a coherent story. Rather than relying on hypothesis testing and abstract thought, adolescents create narrative identity through autobiographical reasoning. Habermas and Bluck described a number different forms of such reasoning (also see Habermas & de Silveira, 2008), but they all involve the person's derivation of semantic, self-relevant meaning from specific episodic events.

The second landmark paper (McLean et al., 2007) shifted attention from the cognitive prerequisites to the interpersonal and social aspects of narrative identity development. Following Erikson (1963), McAdams (1985) highlighted the importance of peer groups and societal expectations in the formulation of narrative identity in adolescence and young adulthood. McLean et al. (2007) dug deeper into the process to show how young people tell stories about events in their lives to others, then use feedback they receive from those tellings to shape a narrative understanding of self. Selves create stories, which in turn create new selves. Narrative identity emerges gradually, in fits and starts, through daily conversations and social interactions, introspection, decisions young people make regarding work and love, and normative and serendipitous passages in life, for example, when a student meets with a vocational counselor to discuss "What do I want to do with my life?" or young couples sit down to write their wedding vows.

Whereas adolescents and young adults employ autobiographical reasoning to create self-stories, which they then "try out" on their friends and family, revising their stories as they go along, the process of developing an integrative narrative identity unfolds within the broader context of *culture*. Drawing on Giddens (1991) and other sociological conceptions, McAdams (1996) originally argued that narrative identity becomes an especially salient psychological problem under the aegis of cultural *modernity*. Prizing individualism and the articulation of unique selves, modern cultures encourage their constituencies to craft self-defining life narratives that provide dynamic identity answers in an ambiguous and ever-changing world (Taylor, 1989). In a seminal contribution that drew widely from the social sciences, history, and the humanities, Ham-

mack (2008) elaborated on this idea to show how many different cultures prescribe their own *master narratives* regarding how a person should live a good life. Whereas master narratives provide a wellspring of culturally approved and morally infused metaphors, images, and plots to be appropriated for the construction of individual life stories, they also exert a hegemonic influence. Culture affords, but it also constrains. Hammack (2008) highlighted the tension that develops between the authorial self on the one hand and the institutions and ideologies that convey cultural meanings on the other, a tension that may often indicate an adversarial relationship between self and society in the construction of narrative identity.

The fourth landmark paper showed that regardless of how narrative identity develops, the variations in its expression that may be observed and quantified by personality scientists demonstrate strong predictive power (Adler et al., 2016). In order to demonstrate that individual differences in narrative identity might eventually prove to be useful as personality variables, McAdams (1985) originally documented significant empirical associations between themes of agency and communion in life stories on the one hand and independently assessed dimensions of power and intimacy motivation, respectively, on the other. Many studies have also shown that certain individual differences in narrative identity (e.g., themes of redemption and agency) are positively associated with independent assessments of psychological well-being (e.g., Adler et al., 2015; McAdams, Reynolds, Lewis, Patten, & Bowman, 2001). But such demonstrations do not directly test the extent to which narrative identity adds anything useful with respect to predictive power beyond well-established personality constructs such as traits and motives. Reviewing the recent empirical literature, Adler et al. (2016) made a very strong case for the *incremental validity* of narrative identity in the prediction of well-being. Even after accounting for the effects of dispositional personality traits such as extraversion and neuroticism, features of narrative identity account for additional increments of variance in self-reported psychological well-being, life satisfaction, depression, and related constructs.

Development of Narrative Identity

Studies of early autobiographical memory and personal storytelling show that beginning around 3 or 4 years of age, children can tell simple stories about recent events from their past (Fivush, 2011). Parents typically encourage children to tell stories about personal events as soon as they are verbally able to do so. The storytelling scaffolding that parents and other socializing agents (e.g., teachers, television) provide helps children to develop a clearer understanding of what a story is and how to tell it. Indeed, a number of studies show that when parents discuss the past in a detailed, emotional, and collaborative way (what has been called *elaborative reminiscing*), their children develop stronger autobiographical memory skills and create more coherent stories about their own personal experiences (Salmon & Reese, 2016). By the time they reach kindergarten, most children typically know that narrative accounts of human action often follow a canonical story grammar, involving a character/agent who moves in a goal-directed fashion over time, often confronting obstacles of some kind, reacting to those obstacles to push the plot forward to a concluding resolution.

Becoming a full-fledged autobiographical author, however, requires more than merely telling stories about what happened yesterday or last year. To construct a narrative identity, the person must envision his or her entire life—the past reconstructed and the future imagined—as a coherent narrative that portrays a meaningful sequence of life events, providing an explanation for how the person has developed into who he or she is now and may develop into in the future. To accomplish such an authorial feat, the person must first know how a typical life is structured—when, for example, a person typically leaves home, how schooling and work are sequenced, the expected progression of marriage and family formation, what people do when they retire, when people typically die, and so on. These kinds of normative expectations provide a *cultural script* for autobiography (Thomsen & Berntsen, 2008). Habermas and Bluck (2000) showed that children begin to internalize such a script in elementary school, but considerable

learning in this domain also occurs in adolescence.

Critical to self-authorship is the ability to demonstrate *causal coherence* (Habermas & Bluck, 2000). With increasing age, adolescents are better able to provide narrative accounts that explain how one event caused, led up to, transformed, or in some way was meaningfully related to subsequent events in one's life. An adolescent girl may explain, for example, why she rejects her parents' liberal political values—or why she feels shy around boys, or how it came to be that her junior year in high school represented a turning point in her understanding of herself—in terms of personal experiences from the past that she has selected and reconstructed to make a coherent causal narrative. Furthermore, she may now identify an overarching theme, value, or principle that integrates the many different episodes of her life and conveys the gist of who she is and what her biography is all about—an authorial achievement that Habermas and Bluck (2000) call *thematic coherence*. Causal coherence and thematic coherence are two important indicators of autobiographical reasoning. In their analyses of life narratives constructed between the ages of 8 and 20 years, Habermas and de Silveira (2008) showed that these indicators rarely appear in autobiographical accounts from late childhood and early adolescence but increase substantially through the teenage years and into early adulthood.

Revealing other manifestations of autobiographical reasoning, older adolescents also tend to construct clearer and more illuminating beginnings and endings in their life narrative accounts, incorporating foreshadowing, retrospective reflection, and other markers of mature authorship (Habermas, Ehler-Lerche, & de Silveira, 2009; Pasupathi & Wainryb, 2010). Still other forms of autobiographical reasoning have been revealed in studies of what McLean and Pratt (2006) call *meaning making*. They have formulated a continuum that runs from the lowest end, when *no meaning* is made, to an intermediate position of deriving a specific *lesson* from a personal event, to the highest level, wherein the respondent discovers a more general *insight* about life. In most samples, higher levels of meaning making tend

to be associated with increasing age and with indices of both psychological maturity and well-being (McLean & Breen, 2009; Tavernier & Willoughby, 2012). However, too much meaning making can sometimes be a bad thing, at least for certain groups. McLean, Breen, and Fournier (2010) have shown that higher levels of meaning making among young adolescent males is associated with *poorer* psychological functioning, perhaps because this form of advanced autobiographical reasoning may indicate that these young males are facing serious life problems—problems that seem to demand forms of reasoning that they have not yet mastered.

Overall, studies have shown that people engage in greater levels and more sophisticated forms of autobiographical reasoning as they move from the adolescent and early adult years up through midlife (Baddeley & Singer, 2007). Pasupathi and Mansour (2006) found that autobiographical reasoning in narrative accounts of life turning points increases with age up to midlife. Middle-aged adults showed a more interpretive and psychologically sophisticated approach to life storytelling compared to younger people. Bluck and Gluck (2004) asked adolescents (ages 15–20), young adults (ages 30–40), and older adults (age 60 and over) to recount personal experiences in which they demonstrated wisdom. Young adults and older adults were more likely than the adolescents to narrate wisdom scenes in ways that connected the experiences to larger life themes or philosophies. In a study that asked people to conceive of their entire lives as scripts punctuated by a sequence of seven scenes, Bohn (2010) found that older adults created more realistic and less idealized scripts compared to younger adults.

Singer, Rexhaj, and Baddeley (2007) found that adults over the age of 50 narrated self-defining memories that expressed a more positive emotional tone and greater interpretive meaning compared to those of college students. Older adults, compared to college students, described important memories in their lives that exhibited greater levels of thematic coherence and more emphasis on the stability of personality in a study conducted by McLean (2008). In another study, older adults exhibited less conflict in their

life stories compared to younger adults (Rice & Pasupathi, 2010). Kingo, Berntsen, and Krojgaard (2013) found that older adults (through age 70) tended to provide more emotionally vivid and coherent accounts of earliest memories than did younger adults. Bluck, Alea, Baron-Lee, and Davis (2016) discovered that the *story aside*, or a digression that elaborates on a point or offers an important life lesson, is one narrative device through which older adults often convey important meanings in life narrative accounts. Such findings dovetail with Pennebaker and Stone's (2003) demonstration, based on laboratory studies of language use and analyses of published fiction, that adults use more positive and fewer negative affect words, and demonstrate greater levels of cognitive complexity, as they age, at least up through midlife (the 40s and 50s). The findings are also consistent with a broader literature in lifespan developmental psychology showing that middle-aged adults tend to express the most complex, individuated, and integrated self-conceptions, and with research on episodic memory and aging, showing a positive memory bias among older adults (Kennedy, Mather, & Carstensen, 2004).

Findings regarding age differences in life stories have come mainly from cross sectional studies. Only a handful of longitudinal studies has directly examined how stories change over time. In a 3-year longitudinal study that asked college students to recall and describe 10 key scenes in their life stories on three different occasions, McAdams, Bauer, et al. (2006) found that only 28% of the episodic memories described at time 1 were repeated 3 months later (time 2), and 22% of the original (time 1) memories were chosen and described again 3 years after the original assessment (time 3). Despite changes in manifest content, however, the authors documented noteworthy longitudinal consistencies (in the correlation range of .35 to .60) in certain emotional and motivational qualities in the stories (e.g., positive emotional tone and strivings for power/achievement) and in the level of narrative complexity. Furthermore, over the 3-year period, students' life-narrative accounts became more complex, and they incorporated a greater number of themes suggesting personal growth and integration.

Neegle and Habermas (2010) compared adolescents' narratives of the same event over a 4-year span. They found that over time, narrators tended to tell more condensed stories of the original event, tended to distance themselves from the emotions experienced in the original event, and tended to engage in greater levels of meaning making. As they got older, the participants in Neegle and Habermas's study expended greater effort in trying to explain what the original event might mean in the context of their overall life and personality.

Dimensions of Life Stories: Methods and Constructs

Every person creates a life story in a unique way. Nonetheless, commonalities in form and content may be observed across different accounts. Research in cognitive science suggests that people readily organize their life stories in terms of (1) broad periods in life, or chapters ("childhood," "my first marriage," "when we lived on Vermont Street"); (2) recurrent or prototypical events ("family dinners," "dates with Becky," "getting fired all those times"); and (3) specific moments or scenes (sometimes extended) that stand out for their clarity, vividness, or psychological significance ("the day my mother died," "the amazing Rome vacation") (Conway & Pleydell-Pearce, 2000; Singer & Salovey, 1993; Thomsen & Berntsen, 2008).

Life-narrative researchers have developed structured interviews and other assessment protocols that parallel the categories observed in research on autobiographical memory and life stories. For example, McAdams (1985; McAdams & Guo, 2015) has developed various versions of the *life-story interview*, which typically begins by asking participants to sketch and give titles to the main chapters in their lives, to be followed by a detailed narration of specific key scenes (e.g., life-story high point, low point, turning point, positive childhood scene, negative childhood scene), then a projection of how the life-story plot is likely to develop in the future. Other researchers adopt more abbreviated approaches (some verbal, others written), zeroing in on a few key scenes or experi-

ences in life, such as a self-defining memory (Singer & Salovey, 1993) or a turning-point experience (McLean & Pratt, 2006), or they may ask participants to narrate their experiences within a particular life domain, such as experiences in psychotherapy (Adler, Skalina, & McAdams, 2008) or with respect to religion or vocation (Bauer, McAdams, & Sakaeda, 2005a).

Most research on narrative identity, therefore, asks participants to provide extended, open-ended, verbatim accounts of experiences in life. These accounts are then *coded* for expressly defined themes or forms, typically resulting in numerical ratings and scores. Along the way, researchers must be trained to analyze the narratives in a particular way, and acceptable levels of interrater reliability must be achieved. Life-narrative researchers have developed and validated a number of content analysis systems for coding life-narrative accounts. Among the more commonly used are systems to assess narrative coherence, the motivational themes of agency and communion, the emotional sequences of redemption and contamination, and variations on the ideas of autobiographical reasoning and meaning making. Each of these coding systems defines a particular construct in the study of narrative identity. Therefore, like the term *personality*, there is no single, all-encompassing measure of "narrative identity" writ large. Instead, researchers typically focus on one or two specific constructs within the broad research domain, coming at narrative identity, as it were, from a particular conceptual angle. Table 5.1 provides definitions and examples of the most commonly used coding systems for assessing individual differences in dimensions of narrative identity.

Narrative identity itself functions to provide life with coherence. Yet life-narrative accounts vary widely with respect to just how coherent they seem to be. Accordingly, a growing body of research has focused on individual differences in narrative coherence. The findings suggest that crafting narrative accounts rated by coders to be especially coherent (e.g., clear, consistent, easy to follow, exhibiting a good form) tends to be positively associated with psychological well-being (Waters & Fivush, 2015). Moreover, low

TABLE 5.1. Examples of Constructs and Coding Systems for Narrative Identity

Coding construct	Definition	Example (of high score)
Agency	The degree to which protagonists are able to effect change in their own lives or influence others in their environment, often through demonstrations of self-mastery, empowerment, achievement, or status. Highly agentic stories privilege accomplishment and the ability to control one's fate.	"I challenge myself to the limit academically, physically, and on my job. Since that time [of my divorce], I have accomplished virtually any goal I set for myself."
Communion	The degree to which protagonists demonstrate or experience interpersonal connection through love, friendship, dialogue, or connection to a broad collective. The story emphasizes intimacy, caring, and belongingness.	"I was warm, surrounded by friends and positive regard that night. I felt unconditionally loved."
Redemption	Scenes in which a demonstrably "bad" or emotionally negative event or circumstance leads to a demonstrably "good" or emotionally positive outcome. The initial negative state is "redeemed" or salvaged by the good that follows it.	The narrator describes the death of her father as reinvigorating closer emotional ties to her other family members.
Contamination	Scenes in which a good or positive event turns dramatically bad or negative, such that the negative affect overwhelms, destroys, or erases the effects of the preceding positivity.	The narrator is excited for a promotion at work but learns it came at the expense of his friend's being fired.
Coherence	Narratives with clear causal sequencing, thematic integrity, and appropriate integration of emotional responses.	Participant describes how being attacked by a dog as a child has led to his anxiety around letting his children adopt a pet.
Meaning making	The degree to which the protagonist learns something or glean a message from an event. Coding ranges from no meaning (low score) to learning a concrete lesson (moderate score) to gaining a deep insight about life (high score).	"It really made me go through and relook at my memories and see how there's so many things behind a situation that you never see. Things are not always as they seem."
Exploratory narrative processing	The extent of self-exploration as expressed in the story. High scores suggest deep exploration and/or the development of a richly elaborated self-understanding.	"I knew I reached an emotional bottom that year . . . but I began making a stable life again, as a more stable independent person. . . . It was a period full of pain, experimentation, and growth, but in retrospect it was necessary for me to become anything like the woman I am today."
Coherent positive resolution	The extent to which the tensions in the story are resolved to produce closure and a positive ending.	"After many years, I finally came to forgive my brother for what he did. I now accept his faults and, as a result, I think he and I have grown closer."

Note. From McAdams and McLean (2013, p. 234).

levels of coherence have been shown to be especially characteristic of life stories told by schizophrenics (Alle et al., 2016) and adults exhibiting features of borderline personality disorder (Adler, Chin, Kolisetty, & Oltmanns, 2012).

A significant body of research in personality psychology has examined how dimensions of narrative identity relate to dispositional personality traits. For example, individuals high in dispositional neuroticism tend to construct stories about their lives that exhibit more negative emotion, less positive emotion, less growth, and less emphasis on attitudes and perspectives about the outside world (e.g., Lodi-Smith, Giese, Robins, & Roberts, 2009; Raggatt, 2006). People high in neuroticism, like individuals who report high levels of depression, are quick to identify *contamination sequences* in their life stories, wherein emotionally positive events turn suddenly negative (Adler, Kissel, & McAdams, 2006; Baddeley & Singer, 2008). Contaminated stories undermine hope and suggest that the protagonist is doomed to repeat failures and mistakes in the future (McAdams, 2013). Openness to experience is associated with telling especially complex stories containing multiple plots and distinctions, and with higher levels of thematic coherence (McAdams et al., 2004; McLean & Fournier, 2008).

A number of studies have expressly pitted dispositional traits against dimensions of narrative identity in the prediction of important life outcomes (Adler et al., 2016). In general, the research literature shows that even when the traits of extraversion and neuroticism—both strong predictors of well-being—are factored into the prediction model, certain dimensions of narrative identity account for additional variance in well-being. For example, Bauer, McAdams, and Sakaeda (2005b) found that themes of growth and intrinsic motivation in life-narrative accounts accounted for sizable portions of the variance in self-reported well-being after they controlled for the effects of extraversion and neuroticism. In a similar vein, Lilgendahl and McAdams (2011) found that narrative indices of positive event processing and self-growth, coded from extensive interview accounts provided by middle-aged adults, predicted the adults'

psychological well-being above and beyond the statistical effects of the Big Five traits and demographic factors.

In recent years, life-narrative researchers have shown a strong interest in documenting the relations among ethical, religious, and political values on the one hand and the construction of narrative identity on the other (e.g., Frimer, Walker, Dunlop, Lee, & Riches, 2011; McAdams, 2013). For example, McAdams and colleagues (McAdams & Albaugh, 2008; McAdams et al., 2008; McAdams, Hanek, & Dadabo, 2013) explored the full life stories of 128 highly religious midlife American adults, all Christian, who differed substantially on political values and beliefs. Providing strong empirical support for theories of political ideology developed by Lakoff (2002) and Haidt (2007), the findings showed that Christian political conservatives in the United States tend to emphasize themes of strict-father morality in their life stories and prioritize values linked to authority, loyalty, and sacredness. By contrast, Christian political liberals tend to emphasize themes of nurturing-caregiver morality and prioritize values linked to alleviating harm and promoting fairness.

The findings from these studies suggest that American conservatives adopt a *prevention-focus* perspective on their own lives, telling cautionary tales about self-discipline, control, and avoiding trouble in life. By contrast, liberals tend to adopt a *promotion-focus* perspective, privileging the discourse of growth, development, and approaching rewards. For principled conservatives who are devoted to a Christian religious tradition, life is a redemptive story of overcoming chaos, struggling to keep impulses under control in order to establish and maintain authority and social harmony. God and government function to protect the self, acting as agents of social control, keepers of the peace. For equally religious and principled political liberals, by contrast, life is a redemptive story of fulfillment, filling up the emptiness they sometimes sense, developing and expanding the self and encouraging others to do the same. As the Christian liberals narrate it, God and government provide nourishment for the self, the bread of life that enables the self to grow and flourish.

Narrating Suffering, Recovery, and Growth

Emotionally positive and emotionally negative events in life offer very different narrative challenges (Berntsen, Rubin, & Siegler, 2011). People may enjoy savoring positive events in life and accentuating the differences among them, as if to imply that happiness in life may come in many different flavors (Tomkins, 1979). But emotionally negative events demand more work. Experiences of failure, loss, sadness, fear, shame, and guilt beg for an explanation (Pals, 2006). They challenge the storyteller to explain why the event happened and what it says about the protagonist of the story and the protagonist's world. How people narrate negative events tells as much as anything else about narrative identity, revealing recurrent themes and conflicts and expressing characteristic styles of autobiographical reasoning.

There are many ways to narrate negative events (McAdams & Jones, 2017; Park, 2010). Perhaps the most common response is to discount the event in some way. The most extreme examples of discounting fall under the rubrics of repression, denial, and dissociation. Some stories are so bad that they simply cannot be told—cannot be told to others and, in some cases, cannot really be told to the self. Freeman (2011) argues that some traumatic and especially shameful experiences in life cannot be incorporated into narrative identity, because the narrator (and perhaps the narrator's audience as well) lacks the world assumptions, cognitive constructs, or experiential categories to make the story make sense. Bonanno (2004) has shown that many people experience surprisingly little angst and turmoil when stricken with harsh misfortunes in life. People often show *resilience* in the face of adversity, Bonanno maintains. Rather than ruminate over the bad things that happen in their lives, they put it all behind them and move forward.

In many cases, however, people cannot or choose not to discount negative life events. Instead, they try to make meaning out of the suffering they are currently experiencing, or experienced once upon a time. What is the best way to make narrative meaning out of suffering? Research suggests that people who emerge strengthened or sustained from negative life experiences often engage

in a two-step process of meaning making (King & Hicks, 2007; Lilgendahl & McAdams, 2011; Pals, 2006). In the first step, the person explores the negative experience in depth, thinking long and hard about what the experience feels or felt like, how it came to be, what it may lead to, and what role the negative event might play in his or her overall understanding of the self. In the second step, the person articulates and commits the self to a positive resolution of the event.

A number of studies of life stories show that exploring negative events in detail is associated with psychological maturity. For example, King and her colleagues conducted a series of intriguing studies wherein they ask people who have faced daunting life challenges (e.g., mothers of disabled children, women whose long-term marriages have ended in divorce, lesbians and gays who have come to terms with their sexuality) to tell stories about “what might have been” had their lives followed a more expected or conventional path (King & Hicks, 2007). Those narrators who are able to articulate detailed and thoughtful accounts of loss and struggle in their lives tend to score higher on independent indices of psychological maturity, such as Loevinger's (1976) metric of ego development. In addition, higher levels of exploratory processing and narrative meaning making are associated with gains in maturity in the near term. For example, King and Smith (2004) found that the extent to which gay and lesbian individuals explored what might have been had their lives followed a more conventional (heterosexual) course predicted higher levels of ego development at the time of their life-narrative accounts and increases in ego development 2 years later. Bauer and McAdams (2010) found that self-exploration in narrative accounts of life goals predicted increases in ego development over 3 years in a sample of college students.

If the first step in making narrative sense of negative events is exploring and elaborating on their nature and impact, the second involves constructing a positive resolution. When people are able to derive positive or redemptive meanings from negative life events, they may feel that they have fully worked through the event and attained a sense of narrative closure. Accordingly, nu-

merous studies have shown that deriving positive meanings from negative events is associated with life satisfaction and indicators of emotional well-being (Adler et al., 2015; Weston, Cox, Condon, & Jackson, 2016). For example, King and Hicks (2007) demonstrated that attaining a sense of closure regarding negative experiences from the past and/or lost possible selves predicts self-reported well-being. Dumas, Lawford, Tieu, and Pratt (2009) showed that young adults who narrated low-point events in redemptive terms, providing coherent positive resolutions to life problems, reported more positive parenting experiences at age 17 and showed higher levels of identity achievement and emotional adjustment at age 26. In a study of recovering alcoholics, Dunlop and Tracy (2013) found that the ability to create a redemptive narrative about alcohol addiction was associated with maintaining sobriety. Examining narrative accounts of 9/11 written 2 months after the terrorist attacks, Adler and Poulin (2009) found that Americans who derived redemptive meaning from the attacks, and who indicated greater levels of psychological closure in their accounts, showed higher levels of psychological well-being.

Adler (2012; Adler et al., 2008) has argued that psychotherapy provides a prime challenge for life storytelling. Therapists work with clients to restory their lives, often aiming to find more positive and growth-affirming ways to narrate and understand emotionally negative events. In one set of studies, Adler has asked former psychotherapy patients to tell the story of their therapy experiences. Those former patients who currently reported higher levels of psychological well-being and ego development tended to narrate heroic stories of therapy wherein they bravely battled their symptoms and problems, and emerged victorious in the end. In these stories, personal agency tended to trump the well-meaning efforts of the therapist. Moreover, agency emerged as the key narrative theme in a prospective study of psychotherapy patients, who provided brief narrative accounts of how therapy was developing before each session transpired, over the course of at least 12 therapy sessions (Adler, 2012). As coded in the succession of narrative accounts, increases in personal

agency preceded and predicted improvement in therapy. As psychotherapy patients told stories that increasingly emphasized their ability to control their world and make self-determined decisions, they showed corresponding decreases in independently assessed symptoms and increases in mental health.

Finding positive meaning in negative events is the central theme that runs through McAdams's (2013) conception of *the redemptive self*. In a series of well-replicated nomothetic and idiographic studies conducted over the past 20 years, McAdams and colleagues have shown that midlife American adults who score especially high on measures of mental health and *generativity*—suggesting a strong commitment to promoting the well-being of future generations and improving the world in which they live—tend to see their own lives as narratives of redemption (Jones & McAdams, 2013; McAdams, 2013; McAdams, Diamond, de St. Aubin, & Mansfield, 1997; McAdams & Guo, 2015; also see Walker & Frimer, 2007).

Compared to their less generative American counterparts, highly generative adults tend to construct life stories that feature redemption sequences, in which the protagonist is delivered from suffering to an enhanced status or state. In addition, highly generative American adults are more likely than their less generative peers to construct life stories in which the protagonist (1) enjoys a special advantage or blessing early in life, (2) expresses sensitivity to the suffering of others or societal injustice as a child, (3) establishes a clear and strong value system in adolescence that remains a source of unwavering conviction throughout the adult years, and (4) looks to achieve goals to benefit society in the future. Taken together, these five themes—early advantage, sensitivity to suffering of others, moral steadfastness, redemption sequences, and prosocial goals—comprise a general script or narrative prototype that many highly generative American adults employ to make sense of their own lives (McAdams & Guo, 2015). The same narrative prototype has shown positive associations with the dispositional traits of conscientiousness, agreeableness, and extraversion, and negative associations with neuroticism (Guo, Klevan, & McAdams,

2016). For many highly productive and caring midlife American adults, the redemptive self has proven to be an especially compelling narrative for living a good life.

The redemptive self is a life-story prototype that serves to support the generative efforts of midlife men and women. Their redemptive life narratives tell how generative adults seek to give back to society in gratitude for the early advantages and blessings they feel they have received. In every life, generativity is tough and frustrating work, as every parent or community volunteer knows. But if an adult constructs a narrative identity in which the protagonist's suffering in the short run often gives way to reward later on, he or she may be better able to sustain the conviction that seemingly thankless investments today will pay off for future generations. Redemptive life stories support the kind of life strivings that a highly generative man or woman in the midlife years is likely to set forth. They also confer a moral legitimacy to life. Through redemptive stories, adults legitimate their strivings and commitments to make the world a better place for generations to come, which in turn give direction and form to their daily behavior as parents, citizens, role models, and the like.

Culture: The Role of Master Narratives

The conception of the redemptive self (McAdams, 2013) brings to attention the role of culture in the construction of narrative identity. The kinds of life stories that highly generative American adults tend to tell reprise quintessentially *American* cultural themes—themes that carry a powerful moral cachet among Americans. The redemptive stories told by highly generative American adults recapture and couch in a contemporary psychological language especially cherished, as well as hotly contested, ideas in American cultural history and heritage—ideas that appear prominently in spiritual accounts of the 17th-century Puritans, Benjamin Franklin's celebrated 18th-century autobiography, slave narratives and Horatio Alger stories from the 19th century, and the literature of self-help and American entrepreneurship from more recent times (McAdams, 2013). Evolving from the Puritans to Ralph Waldo

Emerson to Oprah Winfrey, the redemptive self has morphed into many different story forms in the past 300 years as Americans have sought to author their lives as redemptive tales of atonement, emancipation, recovery, self-fulfillment, and upward social mobility. The stories speak of heroic individual protagonists—the *chosen people*—whose *manifest destiny* is to make a positive difference in a dangerous world, even when the world does not wish to be redeemed. The stories translate a deep and abiding script of what historians call *American exceptionalism* into the many contemporary narratives of success, recovery, development, liberation, and self-actualization that so pervade American talk, talk shows, therapy sessions, sermons, and commencement speeches. It is as if especially generative American adults, whose lives are dedicated to making the world a better place for future generations, are—for better or worse—the most ardent narrators of a general life story format as American as apple pie and Walt Disney.

The redemptive self is an example of what Hammack (2008) described as a master narrative of culture. Hammack defined a *master narrative* as “a cultural script that is readily accessible to members of a particular axis of identity, whether that be a nation, an ethnic group, or a gender” (p. 235). A master narrative conveys how a particular identity constituency has traditionally construed its own history and the expected life history of its individual members. As such, a master narrative conveys an ideological message that both validates the group's identity and sets forth what counts as a good and praiseworthy life for the individual. In the case of the redemptive self, the master narrative affirms the values of autonomy, freedom, empathy, optimism, resilience, steadfast conviction, hard work, upward striving, giving back to others, and the sense that some people (and indeed some groups or nations) are specially chosen to do good things in the world. Many midlife American adults are motivated to shape their life stories in accord with the redemptive self, for they aspire to live a life that exemplifies the values inherent in the master narrative. Any given society may have a range of different master narratives. In American society, therefore, the redemptive self is one especially salient story about

how to live a good life in America (though there are certainly others), one that seems to hold special appeal to many men and women in the midlife years.

Master narratives are particularly visible in cases of cultural assimilation. Members of Group A desire to become (or find that they *must* become) members of Group B, and they do so by appropriating the master narratives Group B holds dear. Adopting a sociological perspective, Chen (2008) described the cultural transitions that traditionally secular Taiwanese immigrants make when they come to California and join Taiwanese American churches. By becoming observant Christians, the immigrants become American, Chen argues. The churches provide a panoply of resources and activities—from Sunday afternoon dinners to English language classes—that help the immigrants acclimate to the new setting. They also provide a moral community within which new life narratives may be imagined and expressed. Chen (2008, p. 111, emphasis added) wrote, “Taiwanese immigrants narrate their religious conversions as freedom from traditional Taiwanese expectations that *prevent them from being who they really are*.” Appropriating a new master narrative, the immigrants come to see their lives as redemptive tales of liberation, stories of escaping what is now perceived to be the oppressive family duties of traditional Taiwanese life in order to discover their own unique, authentic selves, in the spirit of American icons such as Ralph Waldo Emerson and Oprah Winfrey.

Master narratives of culture may also come into clear focus in cases of cultural conflict. Hammack (2009, 2011) has paid special attention to how individual stories may sometimes reproduce those features of master narratives that perpetuate conflict between different groups. His case in point is the long-running conflict between the Israelis and the Palestinians. Hammack noted that the citizens of the state of Israel and the Palestinian people who were displaced by its founding hold to dramatically different master narratives regarding the meaning of recent historical events. For the Israelis, the establishment of the state of Israel in 1948 marked a redemptive conclusion to unparalleled suffering. Their master narrative tells

how 6 million innocent Jews were exterminated in the Holocaust of World War II, and how these resilient people rallied to establish their own promised land after the war. The master narrative commemorates the horror they endured and celebrates the subsequent triumph of a democratic and enlightened nation.

By contrast, Palestinians refer to the events of 1948 as *al-Nakba*, Arabic for “the catastrophe.” As many as 700,000 Arabs fled or were expelled from their homes during the first Arab–Israeli war. Hundreds of thousands of Palestinians were later displaced by the war of 1967, with some becoming refugees twice over. Their master narrative is about peace-loving people who were ruthlessly uprooted from their homeland. It is a *contamination story* (McAdams, 2013), tracking a sudden transformation from positive to negative, while holding to the desperate hope for a reversal. Through intensive interviews of Israeli and Palestinian teenagers, Hammack (2009, 2011) found a consistent tendency for the stories of Israeli youth to match the upward trajectory of their culture’s master narrative, and for the stories of Palestinian youth to show the same downward spiral that is conveyed in stories of “the catastrophe.”

In an important theoretical advance, McLean and Syed (2015) delineated five defining features of master narratives of culture. First, all master narratives exhibit *utility*. Individuals who identify with a particular cultural group look to master narratives to provide them with guidelines in life and useful information about the history, goals, values, and identities of the group. Second, master narratives are nearly *ubiquitous* within a given cultural context. Even if members of a group do not accept the master narrative, they are intimately familiar with the narrative’s outlines. At the same time, master narratives are typically *invisible*. McLean and Syed write, “Individuals do not have to work hard to learn how to be a good member of a culture.” Instead, “people can largely automatically and unconsciously adopt master narratives” (p. 327). The narratives do not typically become visible and explicit until a person violates the narrative’s norms or gains exposure to alternative narratives that call the master narrative

into question. Fourth, master narratives manifest a *compulsory nature*: “They have a moral component, an ideological message, which tells us how we are supposed to feel,” to think, and to be (p. 327). Finally, master narratives typically exhibit marked *rigidity*. They offer a well-defined structure within which to articulate a narrative identity, but the structure is not especially elastic, in part because its existence typically reinforces privileged positions in society.

Sociologically oriented narrative researchers have coined the term *counternarratives* to refer to the stories people tell and live, which offer resistance to dominant cultural narratives (Bamberg & Andrews, 2004). Counternarratives, then, run counter to master narratives. As such, counternarratives often champion values, aspirations, and movements that challenge mainstream conceptions of the good life. Narratives that run counter to the redemptive self, for example, might call into question American optimism regarding upward social mobility, or identify negative, even sinister, motives in stories about overcoming adversity and giving back to society. Counternarratives can be edgier still. They can promote alternative lifestyles and value systems that directly oppose the respectable mainstream; they can motivate political resistance and call for the replacement of the status quo; they can opt out completely and celebrate a life of hedonism, or anomie. They can be a call for rebellion, or a lone cry in the wilderness. They can give voice to stories that have never been heard before.

Counternarratives often arise from marginalized or stigmatized groups. For example, Saguy and Ward (2011) investigated stories that obese American women have begun to tell about their experiences with their bodies. They identified a nascent social movement about “coming out as fat” (p. 53). Borrowing tropes from the gay and lesbian culture, overweight women have begun to construct narratives that celebrate being overweight, describing their own personal journeys toward being fat, or delineating a process of personal discovery whereby they came to understand and fully appreciate their status as a fat person. Their counternarratives aim to transform a stigma into strength.

Lives in Full: From Nomothetic to Idiographic

In laying out the original agenda for a science of personality psychology, Allport (1937) identified a central tension between nomothetic and idiographic inquiry. Whereas the majority of empirical studies in personality sample large groups of individuals in order to test hypotheses and develop theories about persons in general, Allport believed that space should be set aside in the field for intensive examinations of individual cases in order to generate new hypotheses and examine patterns of psychological individuality in the whole person. Ever since Allport, a small but vocal contingent of personality psychologists has always strenuously argued for the idiographic approach (Schultz, 2005). In recent years, narrative theories, concepts, and methods have provided new tools for the psychological study of the single case.

One of the first formal applications of life-narrative theory to understanding the whole person may be found in Nasby and Read’s (1997) remarkable case study of Dodge Morgan. In 1986, at the age of 54, entrepreneur and adventurer Dodge Morgan sailed a small boat solo around the world in 150 days. Before embarking, Morgan agreed to an intensive psychological assessment. Before and after the voyage, he completed an extensive battery of psychological tests, including measures of personality traits, needs and motives, emotional predispositions and states, interpersonal adjustment, and cognitive aptitudes. During the voyage, he completed psychological measures of mood and cognitive abilities in dated, waterproof packets. He also kept a detailed log that contained not only information on the voyage but also his reflections and dreams. Nasby and Read drew on these sources, as well as Morgan’s memoirs and correspondence, to provide a rich and complex interpretation of one man’s self-defining life voyage. Their interpretation is a creative synthesis of trait theory and the life-story model of adult identity (McAdams, 1985).

Morgan’s responses to self-report personality questionnaires showed high scores on scales for autonomy, exhibition, endurance, achievement, dominance, and dislike of ambiguity. Conversely, he demonstrated mark-

edly low scores on scales assessing need for social recognition, harm avoidance, play, sentience, affiliation, change, and defence (defending oneself against blame or assault). Nasby and Read (1997) argued that Morgan's trait profile indicates high conscientiousness, as indexed by strong scores on achievement and endurance, and very low neuroticism. The importance of trait conscientiousness appears even in his responses to prompts from the TAT (Murray, 1938), which focus on themes of achievement, autonomy, and dominance. The trait profile frames well many of Morgan's emotional responses during the voyage and provides a useful dispositional sketch for the case.

Nasby and Read (1997) supplemented the trait profile with a consideration of motivation, context, and change in Morgan's life, as manifested in narrative. Looking to Morgan's memoir and daily ship logs, Nasby and Read argued that Morgan relied heavily on what Campbell (1949) described as the *myth of the hero* to provide structure and clarity to his personal development. Through his solo circumnavigation, Morgan is—quite literally—a man venturing alone into a great challenge: one in which he will either win or die in the pursuit of the ambitious goal. In keeping with the hero myth, Morgan's first episodic memory in life concerns competing in (and winning) races on the Fourth of July. The early scene is narrated in an active rather than reflective tone, foreshadowing a full narrative identity that will be marked by one adventure after another. Morgan inscribes his life narrative, furthermore, within the cultural expectations of maleness: The protagonist is independent, fearless, and nonconformist. Toward the end of the journey, however, themes of love and a longing for friendship begin to make their way into Morgan's narrative accounts. But they never take over the plot. The hero myth remains dominant from beginning to end, crowding out a more tender discourse of human communion. Nasby and Read (1997) argued that Morgan is both affirmed and confined by the classic hero myth.

The same kind of dual function—how the same narrative identity can both inspire and imprison an author—appears in McAdams's (2011) psychological analysis of the life and American presidency of George W.

Bush. Like Nasby and Read (1997), McAdams (2011) blended dispositional traits and life narrative in his psychological case study. And he focused, as did Nasby and Read (1997) in their analysis of Morgan's 150-day voyage, on a critical moment in the life of his subject: President Bush's decision, consummated in March 2003, to launch a preemptive military invasion of Iraq.

McAdams began his analysis by considering George W. Bush as a social actor. Going back as far as the letters his famous father wrote about his firstborn son at age 2, George W. Bush was described by all who knew him—friends and foes alike—as enthusiastic, cheerful, energetic, and socially dominant. Throughout his life, George W. Bush displayed the classic features of a supreme extravert. He was relentlessly optimistic and sociable on nearly every social stage he ever encountered, from his boyhood days in Midland, Texas, through his time at Andover, Yale, the Texas Air Guard, and Harvard Business School, and up to his adult years as a businessman, governor, and president. He was also very low on openness to experience. Indeed, historians' ratings of all the American presidents going back to George Washington show George W. Bush near the top on extraversion (with Bill Clinton and Theodore Roosevelt) and at rock bottom on openness to experience (Rubenzer & Faschinbauer, 2004). Consistent with nomothetic research on these dispositional traits, high extraversion and low openness predisposed President Bush to approach the problem of Iraq as a highly energized, optimistic, and confident actor on the world stage. His traits made it more likely that he would act in a swift and supremely self-assured manner. He would be bold and aggressive, and he would never doubt that the decision he made was the right one.

After the 9/11 attacks, the president found a straightforward way to channel his boundless energy and confidence into the achievement, as a motivated agent, of one of his most cherished life goals—to defeat his beloved father's greatest enemies. It is difficult to overestimate the visceral hatred that George W. Bush felt toward Saddam Hussein. The animus was largely driven by the Bush family's belief, well supported by evidence, that Hussein had ordered an assas-

sination attempt of the first President Bush in the early 1990s. By overthrowing Saddam Hussein, then, the second President Bush could protect America and her allies from weapons of mass destruction, he reasoned, while simultaneously accomplishing a personal motivational agenda. Invading Iraq to overthrow Hussein found ideological justification, moreover, in the peculiar brand of conservative values George W. Bush developed as an adult, which combined the evangelical spirit of compassionate conservatism with the neoconservative vision of fostering freedom around the world. Invading Iraq represented much more than merely defending America (and his father) against a terrible foe. In George W. Bush's mind, it was just as much a noble war of liberation.

The President's action traits and his agential goals and values ultimately dovetailed with the story he authored for his own life. George W. Bush struggled throughout his 20s and 30s to develop a satisfying and meaningful story for his life, a narrative identity that would provide him with a sense of unity and purpose. He finally succeeded sometime around his 40th birthday, after settling into a series of generative commitments in life, experiencing a religious transformation, and pledging to give up alcohol for good. The redemptive story he formulated for his life at midlife was a classic American tale of atonement and recovery through self-discipline (McAdams, 2013). Reflecting the time-honored conservative tendency to reclaim a glorious past, his redemptive story depicts a prodigal son who recaptures the sobriety, goodness, security, and freedom he had enjoyed long ago, once upon a time, in a remembered and imagined paradise named Midland, Texas. The construction of his redemptive life narrative—the process of making the story and the content of the story he made—follows closely the empirical findings from nomothetic research on political conservatism and life stories (McAdams & Albaugh, 2008; McAdams et al., 2008).

Consistent with research on generativity and the redemptive self (McAdams, 2013), George W. Bush's redemptive story for his life proved to be a valuable psychological resource. The story focused him on the generative life aspirations that ultimately landed him in the Texas governor's mansion and

the White House. But after the 9/11 attacks, George W. Bush made a critical authorial move: He began to *project his own redemptive story onto America*. If he could overcome the chaos of his young adulthood years and recover his own goodness and freedom through self-discipline (and God's help), so too would *America* (God's chosen nation) recover from the devastation of 9/11 and overcome a tyrant who had wrought chaos on his own people, and in the process export goodness and freedom to the world. As the author of a personal narrative identity that was to become, in the author's mind, the story of his nation, George W. Bush knew in his bones that the story must end happily. No matter how many setbacks the Iraq War would present, the author was convinced that the mission would ultimately be accomplished, victory would be assured, and freedom and goodness would be restored. He knew all this because that is how his own life story had worked out. As inspiring as his own redemptive story proved to be for Bush's personal struggles with identity, the very same story prevented him, as President, from considering alternative strategies in American foreign policy. In the end, George W. Bush became the victim of the same kind of story that had once liberated him, with fateful results for America, Iraq, and the world.

For better and for worse, stories have consequences.

Conclusion

Focusing their research on the concept of narrative identity, personality psychologists and other social scientists examine the content and structure of life stories, their developmental origins and their functions across the life course, their relations to traits and motivational constructs, and how people make narrative sense of suffering and setbacks, how stories determine and are determined by mental health and psychological maturity, and their contextualization in culture, class, gender, and the social ecology of everyday life. The concept of the life story has generated many different lines of nomothetic research in personality psychology and related disciplines, and it has begun to

revitalize idiographic inquiry and the study of the single case.

In the year 1900, Sigmund Freud published what is arguably the most famous book ever written on the interpretation of personal narratives. In *The Interpretation of Dreams*, Freud (1900/1953) argued that dream stories are the royal road to the unconscious. Freud surely promised too much, and he placed too much faith in but one kind of story people tell. But he had it right when he surmised that stories hold psychological truth. Over 100 years later, personality psychologists have taken on the task of exploring systematically the panoply of stories that people create, tell, and enact about their lives, from childhood through old age, in social interactions and in culture. The study of narrative identity is not the *only* road to understanding psychological individuality. But until recent years, it was the road less traveled. As more and more personality psychologists and other scientists are drawn down the narrative path, researchers will continue to develop new insights and build up systematic bodies of knowledge on how people make narrative sense of their lives, and how the stories they tell largely determine who they are and how they find meaning and purpose in the world.

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PART II

BIOLOGICAL FOUNDATIONS

CHAPTER 6

Temperament

Theory and Research

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Ancient History

Temperament is an ancient concept. As early as the fifth century B.C.E., Greek physicians believed that health depended on a harmonious blend of the four “humors.” Extending this view, Galen later proposed that predominance of one humor resulted in a characteristic emotional style or temperament that formed the core, respectively, of four basic personality types (indeed, the word *temperament* derives from the Latin “to blend,” so that differences in the blend of humors were equated with differences in temperament; Digman, 1994). The *sanguine* or cheerful, active temperament reflected an excess of blood; the *melancholic* or gloomy temperament reflected an excess of black bile; *choleric* or angry, violent types had an excess of yellow bile; and an excess of phlegm was associated with the *phlegmatic* or calm, passive temperament.

Two aspects of this ancient formulation remain alive in current theories of temperament: (1) Biological factors underlie observable characteristics, and (2) emotions are core and defining features of temperament. As is so often the case with personality-related constructs, Allport (1937) provided a definition that captures the essential features.

Temperament refers to the characteristic phenomena of an individual’s emotional nature, including his susceptibility to emotional stimulation, his customary strength and speed of response, the quality of his prevailing mood, and all peculiarities of fluctuation and intensity of mood; these phenomena being regarded as dependent on constitutional makeup and therefore largely hereditary in origin. (p. 54)

Researchers today investigate serotonin deficits, increased activity in the amygdala, and mesolimbic dopaminergic pathways rather than imbalances among the humors, but the recognition that behavior is, in part, a function of physical characteristics was a remarkable insight. Moreover, although debates on a precise definition of temperament and its distinction from personality remain (and we do not resolve them in this chapter), there is now widespread agreement (following Allport) that emotional experience and emotional regulation are intrinsic to these concepts (see Digman, 1994, for a brief history of the concept of temperament and further discussion of definitions).

A third aspect of the Greek model is humbling to admit. The Greek observation that there were four main temperaments maps remarkably well onto the four quadrants that emerge from crossing the two primary per-

sonality dimensions of the modern theorist Hans Eysenck, neuroticism (vs. emotional stability) and extraversion, which are found in all major models of temperament and personality. Specifically, the stable extravert is sanguine, the unstable extravert is choleric; the unstable introvert is melancholic, and the stable introvert is phlegmatic (Eysenck & Eysenck, 1975).

A Brief Modern History of Temperament Research

In addition to the notion that temperament reflects biologically based individual differences in emotional responding, modern temperament theories also have incorporated Allport's idea that these biological differences are innate and form the foundation upon which mature personality develops. Seminal in childhood temperament research, Thomas, Chess, and Birch's (1968; Thomas & Chess, 1977) nine-dimensional structure promoted the view that childhood behavior is structured, measurable, and systematically related to later personality development. Numerous spin-off measures spanned the developmental range from birth through adolescence. Most notably, Eysenck (1967) and Strelau (1983) offered early models of adult temperament derived from Pavlov's theory of central nervous system (CNS) properties. Not widely known in the United States, Strelau's work (Strelau & Zawadzki, 1995; Oniszczenko et al., 2003) has been quite influential among European temperament researchers, and both models spawned numerous learning-based experimental studies.

J. Gray (1982, 1987) also offered a biological model of temperament that overlapped notably with Eysenck's work. Based largely on pharmacological studies with animals, J. Gray's work strongly influenced theorizing about adult personality or temperament dimensions. J. Gray (Wilson, Barrett, & Gray, 1989) and others (most notably, Carver & White, 1994) developed self-report questionnaires to assess J. Gray's hypothesized dimensions, but the former's measures "bore only a partial resemblance" (Wilson, Gray, & Barrett, 1990, p. 1037) to the constructs they were designed to measure, and the lat-

ter's scales align closely with Eysenck's neuroticism and extraversion (e.g., Jorm et al., 1999) rather than with Gray's dimensions, which Gray viewed as 45 degrees rotated from Eysenck's (e.g., J. Gray, 1987). Thus, relatively little direct testing of J. Gray's initial model was conducted with people due largely to these difficulties in assessing the hypothesized neuropsychological systems. By contrast, Buss and Plomin (1975) articulated a temperament model that had relatively little theoretical impact but was widely used in research, owing to the EASI Temperament Survey, which they developed to measure their four proposed dimensions of emotionality, activity, sociability, and impulsivity.

In various ways, these early efforts were instrumental in beginning to link biological variables with temperament dimensions and their adult personality outgrowths, and they now are starting to bear fruit in the form of (1) better measurement models (e.g., De Clerq et al., 2014; Rothbart & Bates, 2006; Shiner, 2015), (2) a major revision of J. Gray's theory that is "biologically more accurate" (Revelle, 2008, p. 509), and (3) more sophisticated and complex theoretical models emerging in the developing fields of cognitive, affective, and personality neuroscience (e.g., Corr & McNaughton, 2012). The original version of this chapter in the second edition (Clark & Watson, 1999) contained a substantial section on biological models of temperament. However, because the literature on this topic has exploded in the 21 years since then, we cannot possibly do justice to the topic. Instead, we direct interested readers to three particularly relevant chapters elsewhere in this volume: DeYoung (Chapter 8), on the neurobiological basis of personality; Krueger and Johnson (Chapter 9), on behavioral genetics and personality; and de Moor (Chapter 10), on the molecular genetics of personality.

The Structural "Trait" Approach

In contrast to developmentalists and European temperament researchers, American personologists showed relatively little interest in studying temperament as a biological-

ly based concept through much of the 20th century. Rather, trait psychologists focused their attention on structural analyses, with the goal of creating comprehensive descriptive trait taxonomies, and tended to ignore the etiology of the identified dimensions. This structural emphasis led to the criticism that trait psychology offered only a sterile, static *description* of behavior, not a true *explanation* for it.

Mischel (1968) fanned the fires of criticism by suggesting that trait concepts accounted for relatively little variance in—and failed to provide even useful summary descriptions of—behavior, which ignited the long-standing “person–situation debate” (Epstein & O’Brien, 1985; Mischel & Peake, 1982) that still is reverberating (Funder, 2006; see also Furr & Funder, Chapter 31, this volume). Although diverse issues eventually were incorporated into this debate, the core controversy revolved around two central questions:

1. Are traits “real” in a basic psychological sense or do they simply reflect cognitive constructions that people impose on reality to increase predictability and control?
2. Are trait concepts useful predictors of important real-world criteria?

After nearly 20 years of theoretical and empirical debate, sufficient evidence accrued to satisfy most researchers that the answer to both questions is “yes”: Traits represent real entities and predict important real-world phenomena.

Convergence of Temperament and Structural Approaches

A key element in resolving the debate was the recognition that the major personality traits represent basic *psychobiological* dimensions of temperament (e.g., Eysenck, 1992, 1997; Tellegen, 1985; Watson & Clark, 1993). The emergence of this recognition reflected several factors, three of which we highlight here. First, beginning in the late 1980s, considerable research demonstrated that the vast majority of personality traits have a substantial genetic component,

indicating that genotypic explanations of behavior underlie phenotypic descriptions of traits, which helped to establish that traits are “real” and reflect true causal influences on behavior rather than being mere descriptive summaries. However, the connections between genes and their phenotypic expressions have proven to be vastly more complex than originally envisioned; we summarize these data in a later section.

Second, rapidly accumulating evidence in the 1980s and early 1990s established that major dimensions of personality—especially neuroticism and extraversion—were strongly associated with individual differences in affective experience (e.g., Meyer & Shack, 1989; Tellegen, 1985; Watson & Clark, 1984, 1992b, 1997). These data provided systematic links both to the rich literature on neurobiological bases of mood and emotion and to temperament research, as temperament has long been considered to have an emotional basis. Integration of research in the three fields of personality, mood and emotion, and temperament, added further to the evidence that traits were more than descriptive summaries of behavior.

Third, after decades of seemingly indifferent progress, structural research finally began to bear fruit, converging on a consensual phenotypic taxonomy of personality traits (see Markon, Krueger, & Watson, 2005), which we describe subsequently. This development enabled a more intensive focus on a relatively small number of consensually recognized traits, incorporating them into more complex and sophisticated conceptual schemes and generating more detailed, systematic hypotheses that helped to clarify the real-world correlates of these traits (e.g., Watson & Clark, 1984, 1993, 1997), the large majority of which have proved robustly replicable (Ozer & Benet-Martínez, 2006; Soto, 2019). Thus, the emergence of a temperament-based theoretical paradigm elevated trait psychology to the status of a more mature science that—for the first time—promised a comprehensive explanation of human individual differences in personality. Ironically, this goal actually seems further away now than it did 20 years ago, as research has increasingly revealed how much we do not yet understand.

A Structural Model for Studying Temperament

A major factor that facilitated the aforementioned convergence of most (though definitely not all; see Block, 1995) personologists on a consensual, phenotypic taxonomy was the recognition that personality traits are ordered hierarchically, so that there is no fundamental incompatibility between models emphasizing a few general “superfactors” and those that include a much larger number of narrower traits (see Markon et al., 2005). At the apex of this hierarchy are “the Big Two,”¹ originally dubbed simply “alpha” and “beta” (Digman, 1997), but later cogently interpreted as stability and plasticity (DeYoung, Peterson, & Higgins, 2002). At the next level, alpha (stability) decomposes into distinctive dimensions of negative emotionality (or affectivity or temperament; Watson & Clark, 1984) and disinhibition (vs. constraint; Watson & Clark, 1993), with beta (plasticity) at this level typically focused on positive emotionality (or affectivity or temperament; Watson & Clark, 1997), thereby reflecting the well-known Big Three model of personality (e.g., Eysenck & Eysenck, 1975; Gough, 1987; Tellegen, 1985). Disinhibition then splits into two dimensions: disagreeable disinhibition (i.e., low agreeableness [A] of the five-factor model; FFM) and unconscientious disinhibition (i.e., low conscientiousness [C]). Finally, at the five-factor level, beta/positive emotionality splits to form separate extraversion/positive emotionality and openness factors, which yields the familiar FFM (e.g., Digman, 1990; McCrae & Costa, 1987, 1997). Thus, the major higher order traditions within personality—including the Big Two, the Big Three, and the Big Five—all can be organized into a common multilevel structure, effectively addressing Revelle’s (2008) lament that, unlike intelligence, “unfortunately, . . . hierarchical models are not common in the non-cognitive domains of personality” (p. 520).

More recently, researchers have begun to explore the levels of personality below the Big Five, which each can be divided into several distinct, yet correlated, traits. For instance, the general trait of extraversion can be subdivided into two *aspects* variously called enthusiasm and assertiveness (De-

Young, Quilty, & Peterson, 2007) or communal and agentic extraversion (Watson, Ellickson-Larew, et al., 2019). Then come the better known and more specific *facets*, of which three, in the case of extraversion, show the greatest convergent validity (though there is not strong consensus on their labels): assertiveness/ascendancy, gregariousness/sociability/affiliation, and positive emotions/positive emotionality/positive temperament/energy/activity/liveliness (Costa & McCrae, 1992; Depue & Collins, 1999; Lee & Ashton, 2004; Soto & John, 2009, 2017; Watson & Clark, 1997; Watson, Nus, & Wu, 2019; Watson, Stasik, Ellickson-Larew, & Stanton, 2015). Facets are followed by even narrower traits, called *nuances*, which are essentially items or small groups of items called HICs (homogeneous item composites) (Möttus, Kandler, Bleidorn, Riemann, & McCrae, 2017; Möttus et al., 2018); and, finally, specific behaviors (Digman, 1997).

The “Big Three” as a Structural Framework for Temperament

Although all levels (at least down to that of facets) need to be considered in a comprehensive assessment of personality, we focus primarily on the broad, higher-order three-factor level for several interrelated reasons. First, the available data are most extensive at this level of the hierarchy, particularly for neuroticism and extraversion, which appear in every major structural model of personality. For instance, there is much more evidence regarding the genetic basis (Vukasović & Bratko, 2015) and biological substrates (e.g., DeYoung, 2010; Chapter 8, this volume) of extraversion and neuroticism than of other traits (although data on the level of the “Big Five” traits are increasing; see DeYoung, 2010).

Second, there currently is much better consensus regarding the three-factor level as reflecting dimensions of *temperament* compared to the broader construct of personality, which incorporates both more interpersonal and cognitive characteristics, as found in agreeableness and conscientiousness, respectively, at lower levels of the hierarchy. Moreover, researchers within the Big Three tradition—plus the overlapping reinforcement sensitivity theory of Jeffrey Gray

(1991) and its more recent revision (e.g., J. Gray & McNaughton, 2000)—have placed greater value on explicating underlying neurobiological substrates (e.g., Corr, 2008; Corr & McNaughton, 2012; J. Gray & McNaughton, 2000; Eysenck, 1992, 1997; Tellegen, 1985). In contrast, proponents of the Big Five have focused more on the phenotypic description of personality, although it must be acknowledged that this gap has narrowed substantially in recent years, as Big Five researchers have shown greater interest in the biological etiology of the dimensions (e.g., Briley & Tucker-Drob, 2012; Jang, Livesley, Angleitner, Reimann, & Vernon, 2002; Moore, Schermer, Paunonen, & Vernon, 2010; Riemann, Angleitner, & Strelau, 1997; Spengler, Gottschling, & Spinath, 2012).

Last, this model has long guided our thinking and led us to develop our own Big Three instrument, the General Temperament Survey (GTS; Clark & Watson, 1990). Consequently, we use these dimensions as our basic organizing framework; nonetheless, we consider data related to lower levels of the structure when relevant. Briefly, neuroticism/negative emotionality (N/NE) reflects individual differences in the extent to which a person perceives the world as threatening, problematic, and distressing. High scorers experience elevated levels of negative emotions and report a broad array of problems, whereas those low on the trait are calm, emotionally stable, and self-satisfied (Watson & Clark, 1984). Extraversion/positive emotionality (E/PE) involves an individual's willingness to engage the environment. High scorers (i.e., extraverts) approach life actively, with energy, enthusiasm, cheerfulness, and confidence; as part of this general approach tendency, they seek out and enjoy the company of others, and are facile and persuasive in interpersonal settings; in contrast, those low on the dimension (i.e., introverts) tend to be reserved and socially aloof, and they report lower levels of energy and confidence (Watson & Clark, 1993). Finally, disinhibition versus constraint (DvC) reflects individual differences in the tendency to behave in an undercontrolled versus overcontrolled manner. Disinhibited individuals are impulsive and somewhat reckless, and are oriented primarily toward the feelings and

sensations of the immediate moment; in contrast, constrained individuals plan carefully, avoid risk and danger, and are controlled more strongly by the longer-term implications of their behavior (see Watson & Clark, 1993).²

This model arose from the pioneering work of Eysenck (e.g., Eysenck, 1947, 1967, 1992, 1997; Eysenck & Eysenck, 1975). As noted earlier, Eysenck originally created a widely influential two-factor model consisting of the broad traits of *neuroticism* (vs. emotional stability) and *extraversion* (vs. introversion) which, when crossed, yielded the four Greek temperaments. Subsequent analyses of expanded pools of questionnaire items led to the identification of a third broad dimension that Eysenck labeled *psychoticism* (which, despite its name, is better viewed as a measure of psychopathy or disinhibition; see Digman, 1990; Watson & Clark, 1993). A scale assessing this third superfactor was first included in the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975).

Other theorists since have postulated very similar three-factor models. Tellegen (1985) proposed a scheme consisting of *negative emotionality* (cf. neuroticism), *positive emotionality* (cf. extraversion), and *constraint* (which has a strong negative correlation with psychoticism). We (Watson & Clark, 1993) subsequently articulated a highly similar model, with factors named *negative temperament*, *positive temperament*, and *disinhibition* (vs. constraint), respectively. Furthermore, in his reformulation of the California Psychological Inventory (CPI), Gough (1987) introduced three higher-order “vectors” of *self-realization*, *internality*, and *norm favoring*, which reflect the low ends of neuroticism, extraversion, and psychoticism, respectively.

These models define a single common structure. For example, Tellegen (1985) demonstrated a high degree of convergence between his factors and those of both Eysenck and Gough. Similarly, we have obtained strong correlations between our factors and those of Eysenck and Tellegen (Watson & Clark, 1993, 1997). Finally, Gough (1987) reported substantial correlations between his higher-order vectors and Eysenck's scales. To document this impor-

tant point further, we administered three purported Big Three instruments—the EPQ, the CPI, and our own GTS—to a sample of 250 University of Iowa undergraduates. We then subjected the nine higher-order scales from these instruments—three for each superfactor—to a principal factor analysis (squared multiple correlations in the diagonal).

As expected, three factors clearly emerged and, when rotated using varimax, clearly established that these instruments define a common three-dimensional structure (see Table 6.1). Each factor is strongly defined by a scale from each instrument and is identifiable easily as E/PE, N/NE, and DvC, respectively. Consistent with earlier studies in this area (e.g., Watson & Clark, 1993), the markers of the DvC dimension generally show the weakest level of convergence. In addition, the GTS and EPQ scales show the strongest convergence and consistently emerge as the best markers of the underlying dimensions, most likely because they were developed using factor analysis rather than the criterion keyed method used by Gough in developing the CPI.

Relating the Big Three and the Big Five

The Big Five model developed originally out of attempts to understand the natural language of trait descriptors (see John, Chap-

ter 2, this volume; Digman, 1990). Extensive structural analyses of these descriptors, which initially were based on other- rather than self-ratings, consistently revealed five broad factors: neuroticism (vs. emotional stability), extraversion (or surgency), conscientiousness (or dependability), agreeableness (vs. antagonism), and openness to experience (or imagination, intellect, culture, or open-mindedness). Moreover, this structure proved to be remarkably robust, with the same five factors emerging in questionnaire items as well as adjective descriptors (Goldberg, 1993; McCrae & John, 1992); self- as well as peer-ratings (e.g., Connelly & Ones, 2010), adults, adolescents, and children (Ahadi, Rothbart, & Ye, 1993; De Fruyt, De Bolle, McCrae, Terracciano, & Costa, 2009; Digman, 1990, 1994; De Clercq, De Fruyt, Van Leeuwen, & Mervielde, 2006), and across a wide range of languages and cultures (e.g., Ahadi et al., 1993; De Clercq et al., 2006; Jang, McCrae, Angleitner, Riemann, & Livesley, 1998; McCrae & Costa, 1997; McCrae & Terracciano, 2008).

As noted earlier, the Big Three and the Big Five models define nested trait structures. First, it is abundantly clear that the neuroticism and extraversion factors of the Big Five are essentially equivalent to the N/NE and E/PE dimensions, respectively, of the Big Three (e.g., Watson & Clark, 1992b, 1993; Watson, Kotov, & Gamez, 2006). Thus, these

TABLE 6.1. Varimax-Rotated Factor Loadings of the Higher-Order Scales from the EPQ, CPI, and GTS

Scale	Factor 1	Factor 2	Factor 3
EPQ Extraversion	.84	-.09	-.06
GTS Positive Temperament	.71	-.13	-.25
CPI Internality	-.73	.06	-.13
GTS Negative Temperament	-.09	.84	.09
EPQ Neuroticism	-.16	.81	.07
CPI Self-Realization	.02	-.66	-.16
GTS Disinhibition	.19	.20	.73
EPQ Psychoticism	-.05	.09	.64
CPI Norm-Favoring	.29	-.05	-.61

Note. $N = 250$. Loadings of .40 or greater are shown in **boldface**. EPQ, Eysenck Personality Questionnaire; CPI, California Psychological Inventory; GTS, General Temperament Survey.

taxonomic schemes share a common “Big Two” of N/NE and E/PE. Furthermore, the DvC dimension of the Big Three has been shown to be a complex combination of (low) conscientiousness and agreeableness; that is, disinhibited individuals tend to be impulsive, carefree, reckless (low conscientiousness), uncooperative, deceitful and manipulative (low agreeableness) (e.g., Digman, 1997; Eysenck, 1997); thus, the inelegant Markon et al. (2005) labels, disagreeable disinhibition and unconscientious disinhibition. In this regard, as we document subsequently, our GTS Disinhibition scale contains both Care-free Orientation and Antisocial Behavior subscales that correlate differentially with (low) conscientiousness and agreeableness, respectively. Finally, openness appears to be largely unrelated to the Big Three dimensions (Markon et al., 2005). Taken together, these data indicate that one can transform the Big Three into the Big Five by (1) decomposing the DvC dimension into component traits of conscientiousness and agreeableness, and (2) including the additional dimension of openness. Thus, although we use the Big Three as our primary structural framework, we can take advantage of the enormous amounts of available data using various Big Five measures.

Beyond Structural Validity

Development of a clear structural model is an important first step in the articulation of scientific concepts, but we argued earlier that trait models have transcended structuralism to provide authentic explanations for human behavior. In the following sections, we present a portion of these data as illustrative offerings. The first section draws largely from our own research and presents—in overview—a systematic array of correlates for each of the Big Three. Subsequent sections summarize (1) genetic evidence that supports the existence of these traits (but that also has raised vexing research questions), (2) factors that affect trait stability and change, and (3) relations with psychopathology.

In the first section, we begin by presenting relations between mood and temperament; thereafter, we largely avoid data on variables

whose correlations with temperament may be explained—directly or in large part—by a shared mood component (e.g., the voluminous literature on life and job satisfaction). We then turn to other correlates, such as social and lifestyle variables. This chapter is far from comprehensive, however, as research has increasingly documented the variety of ways in which personality/temperament is related to important life outcomes. Thus, although we cover some of their results, we recommend that readers interested in exploring this topic further consult both the review by Ozer and Benet-Martínez (2006) comprehensive review of personality’s consequential outcomes and Soto’s (2019) tour de force replication study.

Correlates of the Big Three Traits

Mood

As we mentioned earlier, a great deal of data link N/NE and E/PE with individual differences in affective experience, to the point that affectivity may be viewed as a core—if not *the* core—of these two dimensions. More specifically, mood also has been shown to have two major dimensions, commonly labeled negative affect (or negative activation) and positive affect (or positive activation), respectively (see Watson, 2000; Watson & Tellegen, 1985; Watson, Wiese, Vaidya & Tellegen, 1999). Negative affect (NA) is a general dimension of subjective distress, encompassing a number of specific negative emotional states, including fear, sadness, anger, guilt, contempt, and disgust. Positive affect (PA), by contrast, reflects the co-occurrence among a wide variety of positive mood states, including joy, interest, attentiveness, excitement, enthusiasm, and pride.

Despite the conceptual distinctiveness of these various specific negative (or positive) mood states, it is quite well-established that they substantially co-occur both within and across individuals to form general (i.e., higher order) affect dimensions (Diener, Smith, & Fujita, 1995; Watson, 2000; Watson & Clark, 1992a, 1992b; Watson et al., 1999). These two highly robust mood dimensions have been recovered from mood ratings of widely ranging terms, formats, and time

frames (e.g., from momentary mood to average mood over the past year) (Watson, 1988), as well as in diverse cultures and languages (e.g., Balatsky & Diener, 1993; Watson, Clark, & Tellegen, 1984). It is important to stress that despite their opposite-sounding labels, these dimensions are largely orthogonal; that is, they represent independent biopsychosocial dimensions that are influenced by different external variables (Clark & Watson, 1988, 1991) and distinct internal biological systems (Clark, Watson, & Leeka, 1989; Watson et al., 1999).

Individuals high in N/NE report higher levels of NA in virtually any situation, from baseline conditions to highly stressful circumstances (e.g., Watson & Clark, 1984). Conversely, high E/PE individuals are more likely to report higher PA levels across a wide range of situations (Watson & Clark, 1992b, 1997). Indeed, as stated earlier, the propensity to experience NA and PA more frequently and intensely are core features of the N/NE and E/PE dimensions, respectively (Tellegen, 1985; Watson & Clark, 1984, 1992b).

Not surprisingly, the voluminous literature on subjective well-being (SWB) also has established its relation to both (low) N/NE and (high) E/PE. Ozer and Benet-Martínez (2006, p. 404) provide an excellent summary of this literature, and we can do no better than to quote their straightforward conclusion in this regard: “In summary, SWB is strongly predicted by personality traits that are largely a function of temperament (i.e., extraversion and neuroticism).” These relations showed robust replication in Soto’s (2019) study. Associations with the related variables of family satisfaction (low N/NE), romantic satisfaction (high E/PE, low N/NE), occupational satisfaction and commitment (high E/PE, low N/NE), coping (high E/PE, low N/NE) and resilience (high E) were also found by Ozer and Benet-Martínez (2006) and replicated by Soto (2019), although the correlations were generally rather weak (around .20).

Although personality–mood relations have been well established in various ways by the studies cited earlier (and many others as well), we cannot resist the temptation to present additional data to document the point using yet another method. The data in

Table 6.2 are from four longitudinal studies of college students who completed mood and activity forms repeatedly over varying lengths of time. Mood ratings were obtained using the 20-item Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). Respondents rated the extent to which they had experienced each mood term (10 each for NA and PA) on a 5-point scale (*very slightly or not at all* to *very much*). The mood ratings in Table 6.2 represent respondents’ mood “today” (Samples 1 and 2), “over the past few days” (Sample 3), or “over the past week” (Sample 4). In each sample, the data for each participant were averaged across the entire rating period to yield overall mean NA and PA scores. The Big Three scores are from the GTS (Studies 1 and 3) or represent factor scores calculated from the GTS and EPQ combined (Sample 2) or from the GTS, EPQ, and CPI (Sample 4). The data in Table 6.3 demonstrate that, regardless of the time frame over which it is measured or the manner in which the Big Three scores are derived, NA is strongly and

TABLE 6.2. Correlations between the Big Three and Aggregated Mood Ratings in Four Studies

Sample	N/NE	E/PE	DvC
<u>Negative affect</u>			
1.	.41	–.02	.19
2.	.41	.05	.23
3.	.60	–.26	.18
4.	.54	–.10	.29
<u>Positive affect</u>			
1.	–.14	.35	–.03
2.	–.12	.44	–.09
3.	–.24	.49	–.06
4.	.01	.44	.12

Note. Correlations of .30 or greater are shown in **bold-face**. N/NE, neuroticism/negative emotionality; E/PE = extraversion/positive emotionality; DvC = disinhibition versus constraint. Sample 1 $N = 379$; mood measured daily for an average of 44 days (range = 30–55). Sample 2 $N = 136$; mood measured daily for an average of 48 days (range = 21–54). Sample 3 $N = 61$; mood measured over a minimum of 42 2-day periods (range = 39–45). Sample 4 $N = 115$; mood measured over an average of 13 weekly periods (range = 7–14). Temperament was measured using the GTS (Studies 1 and 3) or factor scores computed from the GTS, EPQ, and CPI (Studies 2 and 4).

TABLE 6.3. Correlations of Disinhibition and Its Subscales with Substance Use

Sample	DvC	CO	AB
<u>Alcohol</u>			
1.	.46	<u>.44</u>	.35
2.	.44	.40	.33
3.	.43	<u>.41</u>	.29
4.	.35	<u>.40</u>	.13
<u>Cigarettes</u>			
1.	.25	.24	.21
2.	.30	.26	.25
<u>Marijuana</u>			
1.	.40	.34	.34
2.	.36	.26	<u>.38</u>
<u>Psychedelics</u>			
1.	.32	.24	.31
2.	.25	.18	.27
<u>Any nonalcohol substance</u>			
3.	.24	.19	.27
<u>Substance use-related problems</u>			
1.	.36	.31	.35
2.	.38	.27	.34

Note. DvC, Disinhibition versus Constraint; CO, Care-free Orientation. AB, Antisocial Behavior. Sample 1 N = 638. Sample 2 N = 827. Sample 3 N = 197. See Watson and Clark (1993) for details regarding method, which were identical for Studies 1 and 2 and slightly modified for Sample 3. Sample 4 N = 115; see text for details. The larger of the two subscale correlations is in boldface; if the difference between them is significant, it is also underlined.

consistently related to N/NE, largely unrelated to E/PE, and slightly related to DvC. Conversely, PA is strongly and consistently related to E/PE and largely unrelated to either N/NE or DvC. Clearly and simply, N/NE and E/PE define the prototype for dimensions of temperament as individual differences in affectivity.

Social Behavior

Social engagement is a primary defining characteristic of the E/PE dimension. Indeed, it seems tautological to present data demon-

strating that extraverts have a higher level of social involvement than introverts. Rather, it is important to establish that social activity is associated with the PE component of E/PE. We have written extensively on this topic elsewhere (e.g., Watson & Clark, 1997), so we only summarize these data here. First, in a series of studies, indices of social behavior were shown first to be correlated with measures of state positive affect (e.g., Clark & Watson, 1988). Second, social behavior was shown to be as highly correlated with measures of trait positive affect (e.g., the PANAS PA scale) as with more “pure” measures of Extraversion (e.g., EPQ E scale). For example, the number of hours spent with friends (measured daily for approximately 6 weeks) was equally correlated ($\sim .30$) with measures of positive temperament and social dominance. Similarly, a 15-item scale of social activity completed weekly for 13 weeks correlated equally (again, $\sim .30$) with the PANAS PA scale and with EPQ E scale. In both cases, social activity was unrelated to either N/NE or DvC. More specific measures of social behavior, such as number of leadership roles, number of close friends or dating partners, and frequency of partying versus percentage of weekend nights spent alone, showed similar patterns (see Watson & Clark, 1997). Although these nonaggregated indices of social behavior showed somewhat lower correlations with both types of E/PE measures (approximately .20), they again were virtually uncorrelated with the other two Big Three dimensions. These types of data demonstrate that positive emotionality and social engagement are specific to, and integral parts of, the E/PE dimension.

Relatedly, the Ozer and Benet-Martínez (2006) meta-analysis examined correlations for a number of what they called interpersonal outcomes. They found—and Soto (2019) replicated—the following associations with E/PE: peer acceptance/friendship, dating variety, attractiveness, and peer status. Moreover, the following associations also were found and replicated: volunteerism and leadership (high E/PE), peer status for men with low N/NE, within-couple romantic satisfaction (A and C [DvC]); finally, romantic abuse and dissolution were both associated positively with N/NE. Again, most of these associations were modest.

Lifestyle: Daily Rhythms and Sleep

Biologically based diurnal and seasonal rhythms are observed in many important behaviors of plants and animals; human behavior is no exception. For example, there is strong and consistent diurnal variation in mood: PA—but not NA—shows a roughly sinusoidal curve that tracks with other bodily cycles, such as body temperature (Clark et al., 1989; Thayer, 1989; Watson, 2000; Watson et al., 1999). Given that mood is a core feature of temperament, it is plausible that individual differences in daily behavior might reflect underlying variations in temperament. Research examining variation in diurnal mood cycles due to temperament, however, has been quite inconsistent, suggesting that there is no simple relation between temperament and daily mood rhythms (e.g., Clark et al., 1989). However, to investigate whether temperament might influence other aspects of daily behavior, we had students in Sample 2 record the number of hours they slept each day, whereas students in Sample 4 kept a daily log of their rising and retiring times, from which we computed total hours of sleep. The Sample 4 students also completed a revised version (Smith, Reily, & Midkiff, 1989) of the Horne and Ostberg (1977) Morningness–Eveningness Questionnaire (MEQ).

There was no relation between hours of sleep and either N/NE or E/PE in either study; this “nonfinding” is consistent with the prior literature, which has found few simple or straightforward relations between diurnal rhythms and general affective temperament (E. Gray & Watson, 2002). In Sample 2, amount of sleep correlated modestly with DvC ($r = .27, p < .01$), with those high in disinhibition sleeping longer. In Sample 4, however, when actual rising and retiring times were recorded, so that we calculated students’ sleep time rather than having them estimate it themselves, this relation disappeared.

It is noteworthy, however, that although there was no clear relation with total sleep amount, there were significant associations between temperament and *when* students slept. First, disinhibited individuals both retired and arose later (r ’s = .33 and .36, respectively; $p < .001$). Moreover, this ef-

fect related significantly more to the DvC Carefree Orientation (low C) subscale (r ’s = .39 and .43, respectively) than to Antisocial Behavior (low A; r ’s = .19, p ’s < .05 and .14, nonsignificant). Similarly, disinhibited individuals displayed a more characteristic “night owl” orientation on the MEQ than did those low in disinhibition ($r = -.27$), with a much stronger relation observed for Carefree Orientation ($r = -.34$) than Antisocial Behavior ($r = -.08$). Similarly, E. Gray and Watson (2002, Table 5) found that DvC was associated significantly with later rising and retiring times in a 7-day sleep log, with a particularly strong effect for the Carefree Orientation subscale.

Conversely, individuals high in E/PE were more likely to be “morning larks” (MEQ $r = .34, p < .01$) and to record both earlier rising ($r = -.17, p < .07$) and retiring times ($r = -.21, p < .03$, respectively). Further analysis using the two GTS Positive Temperament subscales yielded interesting results. The 12-item Energy subscale reflects the more purely physical aspects of the dimension that likely are tied more directly to biological parameters (e.g., “Most days I have a lot of ‘pep’ or vigor” and “I can work hard, and for a long time, without feeling tired”). The Positive Affectivity subscale items, by contrast, are more laden with cognitive content (e.g., “I lead a very interesting life” and “I can make a game out of some things that others consider work”). The subscales are substantially related ($r = .57$), so strongly differential correlates are relatively rare; nevertheless, both earlier rising time (r ’s = $-.19$ vs. $-.06$) and MEQ scores (r ’s = .33 vs. .23) related significantly more to the Energy than to the Positive Affectivity subscale. (Curiously, however, retiring time was equally related to Energy and Positive Affectivity.) Although these relations are not strong, nor the differences large, they clearly suggest that sleep behavior is tied more closely to the physical and biological (vs. social and cognitive) aspects of positive temperament.

Lifestyle: Substance Use, Criminality, Sexuality, and Spirituality

We and others have documented the strong relation between DvC and substance use, as well as the striking *lack* of relation of sub-

stance use with both N/NE and E/PE. For example, in a large ($N = 901$) college student sample, alcohol use correlated .44 with DvC, $-.04$ with N/NE, and .05 with E/PE (Watson & Clark, 1993, Table 23.4). Correlations with use of marijuana, cigarettes, psychedelics, and caffeine pills ranged from .23 to .33 for DvC, but were all less than .10 for N/NE and E/PE.

Two additional large-sample replications of these data are reported in Table 6.3, along with data from two other samples. Samples 1 and 2 used a slightly modified version of the inventory described by Watson and Clark (1993); the substance-use variables from this inventory are aggregations of multiple items that assess both frequency and quantity of use. Sample 3 participants completed an abbreviated version of the survey in which all substances other than alcohol were assessed with single items. Sample 4 is the same Sample 4 whose prospective, longitudinal data are presented in Table 6.2. The alcohol-use variable is the percentage of days on which students reported drinking alcohol. Only correlations with DvC and its subscales, Carefree Orientation and Antisocial Behavior, are shown in Table 6.3, because all correlations with N/NE and E/PE hover around zero.

In the college student population, it appears that use of alcohol, which is quite widespread despite its general illegality in this age group (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994), is associated more strongly with a carefree than an antisocial lifestyle (in FFM terms, with low C more than low A). This relation emerges most clearly when the usage variable represents pure frequency of use (Sample 4). College students who “just want to have fun” turn to drink on many occasions. Similarly, cigarette use (which itself is correlated with alcohol use) is nonsignificantly more related to a carefree than to an antisocial lifestyle. By contrast, use of substances that are illegal regardless of age (e.g., marijuana, psychedelics, or “any nonalcohol substance” [Sample 3]), as well as substance use-related problems, are somewhat more indicative of an antisocial lifestyle. Although few of these differences were statistically significant, the consistency of the pattern is noteworthy. However, it is unclear whether this pat-

tern will generalize to samples that include a significant proportion of individuals with serious, chronic alcohol use, in which case stronger correlations with antisocial behavior might be expected. Relatedly, criminal behavior is consistently related to low conscientiousness and agreeableness (i.e., high DvC) (Ozer & Benet-Martínez, 2006; Soto, 2019).

Promiscuous sexual behavior also has been shown to be related to DvC (e.g., Watson & Clark, 1993; Zuckerman, Tushup, & Finner, 1976). For example, in the Watson and Clark (1993) dataset, sexual behavior (e.g., number of sex partners in the past year) was correlated with DvC ($r = .37$) but not with either N/NE or E/PE (r 's = $-.02$ and $-.01$, respectively). Additional data—again, only for DvC and its subscales—are reported in Table 6.4. Samples 1–3 are the same as those reported in Table 6.4; Sample 4 (Haig, 1997) is another large ($N = 408$) college sample that completed a modified

TABLE 6.4. Correlations of Disinhibition and Its Subscales with Sexual Behavior

Item/sample	DvC	CO	AB
Number of Sexual Partners in the Past Year			
1.	.30	.19	.34
2.	.30	.19	.31
4.	.22	.14	.20
Positive Attitudes toward Casual Sex ^a			
3.	.45	.28	.45
4.	.43	.26	.45
Variety of Sexual Partners (7-item scale)			
3.	.32	.20	.33
Risky Sexual Behavior (4-item scale)			
3.	.32	.22	.33

Note. DvC, Disinhibition versus Constraint; CO, Carefree Orientation; AB, Antisocial Behavior. Sample 1 $N = 638$. Sample 2 $N = 827$. Sample 3 $N = 197$. See Watson and Clark (1993) for details regarding method, which were identical for Studies 1 and 2 and slightly modified for Sample 3. Sample 4 (Haig, 1997), $N = 408$; see text for details. The larger of the two subscale correlations is in **boldface**; if the difference between them is significant, it is also underlined.

^aEight-item scale in Sample 3; three-item scale in Sample 4.

version of the behavioral inventory used by Watson and Clark (1993). Once again, the pattern is clear: Disinhibited individuals have more positive attitudes toward casual sex and, concomitantly, engage more freely in a variety of sexual behaviors, including those associated with some risk. Moreover, this appears to reflect an antisocial more than simply a carefree lifestyle, which is consistent with the inclusion of “promiscuous sexual behavior” among the criteria for psychopathy (Cleckley, 1964; Hare, 1991).

Watson and Clark (1993) also reported that “perceived spirituality” was related positively to E/PE and negatively to DvC. To examine this further, Samples 3 and 4 provided additional data on religious beliefs and behaviors, shown in Table 6.5. Scores from all Big Three factors are shown, because of the established relations of these behaviors to E/PE, as well as DvC. Replicating the Watson and Clark findings, all measures relating to religious behaviors or beliefs were related to both E/PE and DvC, with some

mild indication that nonreligiosity reflects a more antisocial than simply a carefree lifestyle. That religious people should be more behaviorally constrained comes as no great surprise, although it might be interesting to test the generalizability of these relations in cultures with a less puritanical streak than the United States. The extent to which the relation with E/PE may be due to the social aspects of religious behavior is unknown, and is an issue worth further investigation.

Relatedly, it is worth mentioning that in their meta-analysis of Big Five-related outcomes, Ozer and Benet-Martínez (2006) examined correlates of spirituality and virtues. They reported several findings that are consistent with the previous results: MacDonald (2000) described five components of spirituality, three of which related to temperament (and the other two to openness). Religiousness and perceptions and attitudes regarding spirituality were related to A and C (i.e., DvC in Big Three terms), whereas “existential well-being was strongly predicted by

TABLE 6.5. Correlations of the Big Three and DvC Subscales with Selected Lifestyle Variables

Variable (no. of items)	Big Three			DvC	
	N/NE	E/PE	DvC	CO	AB
Sample 3					
Religious behavior (10)	-.03	.14	-.32	-.28	-.27
Conservative religious beliefs (11)	-.01	.23	-.15	-.12	-.13
Sample 4					
Religious service attendance (1)	.06	.15	-.19	-.12	<u>-.22</u>
Importance of religion (1)	.02	.17	-.23	-.15	<u>-.25</u>
Reckless driving (4)	-.02	.01	.40	.26	<u>.36</u>
Thrill-seeking behaviors (17)	-.14	.24	.24	.15	.17
Sample 5					
High school GPA	.01	.03	-.22	<u>-.25</u>	-.13
College GPA	.06	-.02	-.27	<u>-.30</u>	-.17
Sample 6					
High school GPA	.02	.01	-.24	<u>-.27</u>	-.10
College GPA	.03	.04	-.42	<u>-.41</u>	-.30

Note. DvC, Disinhibition versus Constraint; CO, Carefree Orientation; AB, Antisocial Behavior; GPA, grade point average. Sample 3 $N = 197$. See Watson and Clark (1993) for details regarding method, which were slightly modified for this study. Correlations $\geq .15$, $p < .05$; $r \geq .19$, $p < .01$. Sample 4 (Haig, 1997), $N = 408$; see text for details. Correlations $\geq .10$, $p < .05$; $r \geq .13$, $p < .01$. Sample 5 $N = 716$ for high school GPA; $N = 831$ for college GPA. Sample 6 (E. Gray & Watson, 2002), $N = 300$. The larger of the two DvC subscale correlations is in **boldface**; if the difference between them is significant, it is also underlined.

extraversion and low neuroticism” (Ozer & Benet-Martínez, p. 405). Additionally, Ozer and Benet-Martínez (2006) reported relations between temperament-related traits and certain categories of virtue, specifically, compassion with A, gratitude with E and A, forgiveness with A, inspiration with E, and humor with low N and A. Notably, all of these relations proved to be robust in Soto’s (2019) replication study.

Work and Achievement

At the other end of the spectrum, a number of work- and achievement-related behaviors also have been shown to have associations with temperament (e.g., Barrick & Mount, 1991; Lodi-Smith & Roberts, 2007; Sackett & Walmsley, 2014). For example, in Barrick and Mount’s (1991) meta-analysis, C emerged as a significant predictor of all job performance criteria for all occupational groups, whereas E/PE was a valid predictor for two occupations involving substantial social interaction. Watson and Clark (1993) reported that DvC scores were a stronger predictor of first-year college grades than were standard achievement test (SAT) scores, even after controlling for the latter or for high school grades (the best overall predictor). To determine whether academic performance related differentially to the DvC subscales, we replicated this study in two large samples. The results, presented at the bottom of Table 6.5, indicate that college performance is unrelated to either N/NE or E/PE, but is predicted well by DvC, especially by the Carefree Orientation scale. Thus, again not surprisingly, poor grades early in college are more likely to be obtained by those who lack discipline and prefer to live day to day rather than planning carefully for the future. The lower relation with anti-social behavior suggests that some students high on this dimension actually may succeed in “beating the system,” whereas others do not.

Putting all of these data together, we obtain a picture that is consistent with theoretical models positing that the DvC dimension is related more to the style of affective regulation rather than the overall affective level (which clearly is more the case with N/NE and E/PE). Disinhibited individuals ex-

perience greater reinforcement from positive stimuli and simultaneously are capable of diverting attention away from negative stimuli. This leads them to focus more strongly on the rewards than the risks of behavior and thus to engage in a wide range of pleasurable behaviors. Nonetheless, they are not immune to the negative consequences of these behaviors, and so also report a greater number of behavior-related problems. The end result is a zero balance in terms of overall affective level (i.e., no strong correlation of either DvC or these various behaviors with N/NE or E/PE), but a broader range of affective experience.

Genetic and Environmental Contributions to the Big Three Traits

We have postulated that the major traits of personality represent basic biobehavioral dimensions of temperament. We now consider data supporting this assertion. That temperament is biologically based implies that observed individual differences are substantially heritable and that they are—at least in latent form—present at birth (e.g., Buss & Plomin, 1975; Digman, 1994); that is, although biological parameters may be changed by life experiences (cf. stress reactions), our basic biological makeup is innate. Therefore, one crucial line of evidence concerns the possible hereditary basis of these traits.

After decades of neglect, researchers began systematically exploring the genetic basis of personality approximately 45 years ago, starting with the seminal contribution of Loehlin and Nichols (1976). Interest in this topic accelerated in the latter half of the 1980s (e.g., Plomin & Daniels, 1987; Tellegen et al., 1988) and has continued unabated ever since. Consequently, we now have sufficient data to permit several basic conclusions. First, as mentioned previously, it is quite clear that all of the major dimensions—indeed, virtually every trait that has ever been examined—has a substantial genetic component. In a previous version of this chapter, we cited a number of studies that helped to establish this fact, but now there have been so many such studies that we can refer to a meta-analysis. Based on 45 studies, Vukasović and Bratko (2015)

reported an average heritability of .39, with a higher level (.47) in twin studies than in those that used adoption or family study methods (.22). This is because the latter are not well-suited to modeling nonadditive genetic variance (Plomin, Corley, Caspi, Fulker, & DeFries, 1998), which gives rise to “emergenetic” traits—those influenced by a configuration, rather than a simple sum, of polymorphic genes (Lykken, McGue, Tellegen, & Bouchard, 1992). See Krueger and Johnson (Chapter 9, this volume) for a fuller discussion of this issue.

As stated earlier, the data are particularly extensive for N/NE and E/PE, and it is noteworthy that Vukasović and Bratko (2015) had sufficient studies using Eysenck’s measures (Eysenck, 1964; Eysenck & Eysenck, 1975), Tellegen’s Multidimensional Personality Questionnaire (MPQ; see Tellegen et al., 1998) and the FFM to determine that the personality model/measure used was not a significant moderator of heritability estimates for either trait. Use of the CPI (Loehlin & Gough, 1990), the Minnesota Multiphasic Personality Inventory (MMPI; Beer, Arnold, & Loehlin, 1998), and Cloninger’s Temperament and Character Inventory (Keller, Coventry, Heath, & Martin, 2005) yielded virtually identical findings; see also Loehlin, McCrae, Costa, and John (1998) for a study examining multiple measures in the same sample.

The data for DvC also have been quite consistent, with the exception of one unusually low heritability estimate (.18) for the CPI Norm-Favoring vector scale (Loehlin & Gough, 1990). However, the data are inconsistent regarding the extent to which the genetic variance is additive versus nonadditive (see Keller et al., 2005). Nevertheless, it is noteworthy that nonadditive dominance effects are found much more frequently for E/PE than for the other major dimensions (Eysenck, 1990; McGue, Bacon, & Lykken, 1993; but see Loehlin et al., 1998, who also found them for N). Finally, it is interesting to note that—paralleling the structure of phenotypic personality traits—the factor structure that emerges from genetic studies is hierarchical (Krueger & Johnson, Chapter 9, this volume).

Second, the data overwhelmingly suggest that a common rearing environment (i.e.,

the effects of living together in the same household) exerts virtually no effect on personality (e.g., Beer et al., 1998; Bouchard & Loehlin, 2001; Eid, Reimann, Angleitner, & Borkenau, 2003; Eysenck, 1990; Finkel & McGue, 1997; Luciano, Wainwright, Wright, & Martin, 2006; Eysenck, 1990; Goldsmith, Buss, & Emery, 1997; Jang et al., 2002; Loehlin et al., 1998; Plomin & Daniels, 1987; Tellegen et al., 1988). This finding was unanticipated and initially was met with some skepticism, but it has emerged so consistently that it now must be acknowledged as a necessary component in any model of personality development. Indeed, virtually the only supportive evidence comes from analyses of the E/PE factor: At least three studies have reported significant shared environment effects for E/PE (Beer et al., 1998; Goldsmith et al., 1997; Tellegen et al., 1988). Loehlin et al. (1998) also found shared environment effects for A and C on personality inventories but not trait or adjective rating scales. However, this positive evidence must be weighed against a much larger number of studies that have found no effects due to the common rearing environment (e.g., Eysenck, 1990; Finkel & McGue, 1997; Jang et al., 1998). Thus, we largely concur with Beer et al.’s (1998) conclusion that “shared familial environmental variation is an unimportant source of individual differences in personality and interests” (p. 818).

In contrast, researchers consistently have reported substantial effects due to the unshared environment (i.e., idiosyncratic environmental stimuli experienced by a single individual but not by his or her biological relatives). Given that the shared environment has little to no effect, the most commonplace finding is that the variance not attributable to genes is almost entirely attributable to unique aspects of the environment (see Bouchard & Loehlin, 2001; Loehlin et al., 1998; Plomin & Daniels, 1987; Tellegen et al., 1988). However, this almost certainly represents a substantial overestimate of “true” unshared environmental influence. The well-recognized problem is that the traditional method of estimating the unshared environment confounds (1) true environmental variance, (2) gene–environment interactions, and (3) measurement error (e.g.,

Bouchard & Loehlin, 2001; Eysenck, 1990; Riemann et al., 1997; Tellegen et al., 1988). In this regard, it is noteworthy that Riemann et al. (1997) were able to separate out the first two effects from the last by conducting combined analyses of self- and peer ratings. Using this expanded approach, they found that nearly 70% of the systematic variance in both N/NE and E/PE was due to genetic factors, with only roughly 30% attributable to the unshared environment and gene-environment interactions. The latter takes on particular importance in the case of temperament when conceptualized as a set of biologically based propensities to respond to the environment in certain ways; that is, it is largely through gene-environment interactions that each individual's unique personality develops.

Researchers also have examined how genetic and environmental influences may vary as a function of demographic variables such as sex and age. We previously reported that the data regarding sex were markedly inconsistent and, given that Vukasović and Bratko (2015) did not find support for gender as a moderator of personality heritability in their meta-analysis, we presume that the inconsistencies reflect unsystematic sample variance in the early heritability studies, which tended to have smaller samples than those collected later.

The evidence regarding age is much more systematic, as several studies now have found that heritability estimates for both N/NE and E/PE are significantly lower in older respondents (McCartney, Harris, & Bernieri, 1990; McGue et al., 1993; Pedersen, 1993; Viken, Rose, Kaprio, & Koskenvuo, 1994). The causes of these age-related declines have not yet been clearly established, but it appears that they may differ across these two dimensions. Specifically, McGue et al. (1993) found that the lower value for N/NE was due to a true decline in heritability, whereas that for E/PE was attributable to the increased influence of the unshared environment (coupled with a stable genetic component).

Finally, the recent explosion of genetics research has yielded valuable data regarding the interesting issue of assortative mating, that is, whether or not people partner with individuals who are phenotypically (and,

therefore, genotypically) similar to themselves. In other words, do “Birds of a feather flock together” or do “Opposites attract”? Assortative mating is of keen interest to behavior geneticists because if it occurs, people actually will be more genetically similar to their first-degree relatives than the 50% that traditionally is assumed in the classic models. Generally speaking, however, there appears to be little or no assortative mating on the Big Three dimensions (e.g., Beer et al., 1998; Eysenck, 1990; Finkel & McGue, 1997; Watson et al., 2004). Based on a review of earlier literature, Eysenck (1990, p. 252) concluded that “mating is essentially random for personality differences,” and in a recent comprehensive review, Luo (2017) supports this conclusion, stating “similarity correlations on personality variables tend to be positive though with weak magnitude rarely above .30” (p. 3 of online PDF). It is unclear, however, whether this is because temperament is irrelevant in mating or because both axioms are true to some extent and their effects cancel out.

In contrast to the temperament data, Luo (2017) presented evidence supporting strong similarity coefficients between partners for more attitudinal aspects of personality, age and socioeconomic status, particularly educational level, and moderate similarities for values, abilities and intelligence, psychopathology, habits and lifestyles (e.g., alcohol and caffeine consumption, smoking, exercise, diet), physical and physiological characteristics (e.g., height/weight/shape, blood pressure, attractiveness, and health in general), but further analyses of these variables is beyond our scope.

Finally, with the mapping of the human genome and the development of techniques that permit widescale study of individuals' genes, new types of research such as linkage, candidate gene association, and genomewide association studies, plus molecular genetics and polygenic analyses, have opened up new avenues for studying personality-gene relations. Dashing naive hopes that single genes would map cleanly onto specific personality traits, a major finding of these studies is that the pathways from genes to the behaviors that collectively constitute personality are mind-bogglingly complex. Although specific genes that map onto higher-order traits have

been identified, effect sizes typically are very low (e.g., $< .05$), and failure to replicate higher values found in particular studies is more common than not (Sanchez-Roige, Gray, MacKillop, Chen, & Palmer, 2018). Some researchers have examined personality scales' facets and found that gene-trait relations differ across facets (e.g., Sanchez-Roige et al., 2018), which raises the question of whether there is an optimal level of the personality trait hierarchy for studying these associations. One possibility is that increasing levels of specificity will continue to find differential gene-trait relations, resulting in considerable complexity. However, at some point, the decreased reliability of more and more specific trait nuances will introduce new complications into research on gene-trait relations.

The Temporal Stability of Personality

The Genetic and Environmental Basis of Stability

A discussion of the stability of personality over time may seem superfluous in light of our earlier review of heritability data. Indeed, a popular misconception is that because we are born with a full complement of genes, their influence necessarily must be stable and invariant throughout the lifespan which, in turn, implies that there should be a direct, positive correlation between the heritability of a trait and its temporal stability (for discussions, see Pedersen, 1993; Viken et al., 1994). In actuality, however, genes can be a source of both stability and change in personality (Kandler, 2012). Indeed, age-specific genes (e.g., a gene that influences temperament during adolescence but is quiescent during adulthood) generally can be expected to lead to instability in individual differences over time (McGue et al., 1993; Pedersen, 1993). Conversely, unchanging aspects of the environment (e.g., a long-term career or marriage) may well play an important role in maintaining the stability of temperament. Consequently, there is no necessary correlation between stability and heritability.

That said, we also must acknowledge that available data suggest that the popular view is reasonably accurate after all: Genes do appear to be the major source of observed

stability in temperament, whereas environmental factors are primarily responsible for change (Kandler, 2012; McGue et al., 1993; Pedersen, 1993; Viken et al., 1994). For instance, McGue et al. (1993) estimated the heritability of the stable component to be .71, .89, and .89 for N/NE, E/PE, and DvC, respectively. Note that although these values demonstrate that genetic factors are overwhelmingly responsible for phenotypic stability, they also indicate that the unshared environment has a nontrivial influence on the observed continuity of temperament. Conversely, McGue et al. found that although the unshared environment was primarily responsible for observed changes on these traits, genetic factors also played a moderate role in the instability of N/NE and DvC, and a more modest role in producing changes on E/PE. They suggested these genetic sources of instability may be linked to the observed declines in heritability that were discussed earlier. For example, age-specific genes may exert a significant influence on N/NE in adolescence but then decline in importance during adulthood, leading to both lower heritabilities and phenotypic instability in N/NE over time.

These data establish that genes are primarily responsible for stability, but they do not address the issue of stability itself. How stable are the major dimensions of temperament over time? In discussing this issue, it is useful to distinguish three different types of stability: *mean-level stability*, *rank-order stability*, and *structural stability* (see Pedersen, 1993).

Mean-Level Stability

Mean-level stability concerns whether average levels of a trait change systematically with age. For example, do people generally become more cautious and constrained as they grow older? Reviews of these data have yielded several clear conclusions (Caspi, Roberts, & Shiner, 2005; Roberts, Walton, & Viechtbauer, 2006; Vaidya, Gray, Haig, & Watson, 2002; Watson & Humrichouse, 2006).

First, trait levels of N/NE show a significant decline with age, the bulk of which occurs in adolescence and early adulthood; nevertheless, decreases continue to be seen

later in life (Roberts et al., 2006). Similarly, DvC scores also decline with age, decreasing during both young adulthood and middle age (Roberts et al., 2006). In addition, Roberts et al.'s meta-analysis indicated that the A- and C-related aspects of the trait show differential patterns over time. Specifically, C increased substantially between ages 22 and 40, and showed much more change overall; in contrast, A exhibited less overall change and displayed the largest increases later in life (Roberts et al., 2006, Tables 6 and 7).

Finally, the findings regarding E/PE have been much more inconsistent (Roberts et al., 2006; Vaidya et al., 2002). However, Roberts, Robins, Trzesniewski and Caspi (2003) found that the data were more consistent at the specific trait level: Measures of dominance tended to increase from adolescence through early middle age, whereas levels of sociability increased during adolescence, then declined starting in young adulthood. In a related vein, Roberts et al. (2006) found that social dominance scores increased consistently throughout young adulthood and stabilized thereafter. In contrast, social vitality levels tended to be highly stable throughout most of the lifespan before showing a modest decline late in life.

Taken together, the available data indicate that mean-level changes are both meaningful and highly systematic across the lifespan. Indeed, Caspi et al. (2005) concluded that they reflect a *maturity principle*, arguing that these mean-level shifts “point to increasing psychological maturity over development, from adolescence to middle age” (p. 468). We must note, however, that virtually all of the relevant longitudinal evidence comes from participant self-ratings. Moreover, in an analysis of a relatively large newlywed sample, Watson and Humrichouse (2006) found that spouse-rated personality displayed a very different pattern over a 2-year interval, showing significant decreases in C, A, O, and E/PE over time. Interestingly, spouse ratings also showed evidence of a “honeymoon halo effect,” such that they tended to be more positive than self-ratings at time 1, but 2 years later tended to be more negative. It should be noted, however, that Oltmanns, Jackson, and Oltmanns (2020) reported stronger convergence between self-

versus informant-rated change in a sample of older adults. Taken together, these results highlight the value of collecting multimethod data in adult personality development studies.

Rank-Order Stability

Data on the extent to which individuals maintain their relative position on trait continua over time are quite consistent and yield several clear conclusions. First, stability correlations for personality traits are moderate to strong in magnitude, even when assessed in childhood and adolescence (Caspi et al., 2005; Roberts & DelVecchio, 2000). Thus, the stability of personality is not simply a characteristic of adulthood, but emerges early in life.

Second, stability correlations decline in magnitude as the time interval increases (Caspi et al., 2005; Roberts & DelVecchio, 2000; Watson, 2004). This consistent pattern has helped to establish the existence of true change in personality, given that change is more and more likely to occur with increasing retest intervals (Watson, 2004). It must be emphasized, however, that stability correlations never approach .00 and remain at least moderate in magnitude, even across several decades (Fraley & Roberts, 2004).

Third, stability correlations for personality increase systematically with age (Caspi et al., 2005; Kandler, 2012; Roberts & DelVecchio, 2000). Older models of trait development assumed that most personality change occurred prior to the age of 30, after which stability correlations should be uniformly high (for a discussion, see Roberts & DelVecchio, 2000). However, the meta-analytic findings of Roberts and DelVecchio revealed that stability coefficients for personality continue to increase well into middle age.

Fourth, the available evidence indicates that rank-order stability coefficients essentially are invariant across methods (Caspi et al., 2005; Roberts & DelVecchio, 2000; Watson & Humrichouse, 2006). Most notably, in their meta-analytic review of the literature, Roberts and DelVecchio (2000, Table 4) obtained virtually identical population estimates of overall trait stability across self-report ($p = .52$) and observer-rated ($p = .48$) data.

Structural Stability

This type of stability reflects the extent to which correlations among phenotypic dimensions of temperament are invariant across the lifespan. An extensive body of evidence—based on measures of both the Big Three and the Big Five—has established that essentially identical structures can be identified in children, high school student, college student, normal adult, and older adult samples (e.g., Costa & McCrae, 1992; Digman, 1990; Eysenck & Eysenck, 1975; Kohnstamm, Halverson, Mervielde, & Avilla, 1998; Mackinnon et al., 1995; Measelle, John, Ablow, Cowan, & Cowan, 2005). Thus, personality structure shows impressive stability from adolescence through old age.

Fewer data exist for pre-high school ages, but the available evidence indicates that structures closely paralleling the Big Three and the Big Five emerge at an early age. For instance, Digman (1997) and associates replicated the Big Five structure in a series of studies in which teachers rated the characteristics of elementary schoolchildren. Similarly, analyses of the Children's Behavior Questionnaire (CBQ; Rothbart, Ahadi, Hershey, & Fisher, 2001; Rothbart, Ahadi, & Hershey, 1994), a parent-report instrument that assesses temperament in children ages 3–8 years, consistently have identified three higher-order factors that closely resemble the Big Three (Ahadi et al., 1993; Goldsmith et al., 1997; Rothbart, Ahadi, & Hershey, 1994; Rothbart et al., 1994). Shiner and Caspi's (2003) review of the childhood/adolescent personality literature identified four robust higher-order factors (N/NE, E/PE, A, and C).

It is notable that these data are based not on self- but on other ratings; that is, the same structure emerges regardless of whether raters are the individuals themselves, teachers, or parents. A meta-analysis of the structure of the Schedule for Nonadaptive and Adaptive Personality (Clark, Simms, Wu, & Casillas, 2014) that included not only self- and peer-rated data but also several different forms of the measure found that neither format nor rater had an appreciable effect on its traits' structure (Nuzum, Ready, & Clark, 2019). Coupled with data demonstrating the broad cross-cultural robustness of personal-

ity trait models (e.g., Ahadi et al., 1993; De Clercq et al., 2006; Jang et al., 1998), the evidence provides strong support for McCrae and Costa's (1997) claim that "personality structure is a human universal" (p. 514).

Temperament and Psychopathology

A prominent theme of this chapter is that the emergence of a theoretical model of temperament has led to widespread progress in the field. Like any good theory, this model not only explains a range of existing data but also suggests avenues for further exploration; moreover, it has the power to change in fundamental ways how certain phenomena are conceptualized. Psychopathology is one domain that the temperament-based paradigm of personality has transformed. For decades, research in personality and psychopathology developed independently, with little cross-fertilization. Eventually, however, investigators in each of these fields began to take notice of the work in the other, to note parallelisms between findings, and to ask how personality and psychopathology might be interrelated: Does personality act as a vulnerability factor for the development of psychopathology? Is personality changed by the experience of mental disorder? Does personality affect the way in which psychopathology is manifested? Widiger, Verhul, and van den Brink (1999) ably explored many of these questions and noted, for example, that "personality and psychopathology at times fail to be distinct conditions" (p. 351; see also Tackett & Mullins-Sweatt [Chapter 35] and Widiger & Oltmanns [Chapter 36], this volume).

The first subfield to embrace this view was personality—it is no longer being debated whether adaptive and nonadaptive personality fall along a continuous distribution (vs. personality pathology being categorically distinct from normal-range personality). This proved to be only a first step in a larger sea change. Clark (2005) reviewed the extensive literature relating personality and psychopathology, and found that the correlations of normal-range personality with personality pathology were no greater nor more extensive than its correlations with other forms of psychopathology. Given "the similarity in the magnitude of

correlations between personality and disorders on the two DSM axes of disorders, indicating that personality traits do not have a ‘privileged’ relation with Axis II personality disorders,” Clark (2005) concluded that it was “reasonable to pursue the possibility of a general model to explain personality–psychopathology relations rather than separate models to explain relations between personality and each of the two axes” (pp. 510–511) and, accordingly, proposed an integrating hierarchical framework in which “adult personality traits emerge from three biobehavioral dimensions . . . and they share these genetic diatheses with later developing disorders” (p. 511), both clinical syndromes, such as major depression, anxiety disorder, and substance use disorders and personality pathology (PP).³

In this model, for example, the well-established associations between N/NE and a wide range of psychopathology (see Kotov, Gamez, Schmidt, & Watson’s, 2010, meta-analysis) result from a shared underlying temperament dimension of N/NE, certainly as a genetic diathesis, and perhaps also reflecting early environmental factors. Moreover, multiple types of evidence have established that N/NE is the primary component of a broad dimension of “internalizing” pathology—encompassing, for example, mood, anxiety, eating, trauma-related, and obsessive–compulsive (OC) spectrum disorders—that has emerged repeatedly in large-scale studies of *comorbidity* (more precisely, *co-occurrence*, but the former term is more typically used) among common mental disorders (see Kotov et al., 2017, for a comprehensive review and synthesis of this literature). Similarly, the temperament dimension E/PE underlies both the corresponding personality trait and various types of psychopathology, particularly depressive spectrum disorders, many anxiety disorders, OCD, PTSD, anhedonia (e.g., in schizophrenia/schizotypy), narcissism, and mania (Horan, Blanchard, Clark, & Green, 2008; Kotov et al., 2010; Watson et al., 2020; Watson & Naragon-Gainey, 2010).

In turn, the DvC personality factor has been linked with a second broad “externalizing” dimension of psychopathology, encompassing substance use disorders, antisocial behavior, and various aspects of PP,

that emerges in the aforementioned comorbidity studies (Kotov et al., 2017; Krueger & Markon, 2006; Krueger, Hicks, Patrick, Carlson, Iacono, & McGue, 2002). Evidence also links this dimension (as well as N/NE) with attention-deficit/hyperactivity disorder (ADHD) and so-called “borderline” PP (e.g., Nigg et al., 2002; Nigg, Silk, Stavro, & Miller, 2005). In Clark’s (2005) model, a DvC temperament dimension again underlies both the personality trait and related mental disorders. Moreover, temperamental N/NE is posited to account for the moderate correlation between the internalizing and externalizing factors (e.g., Kendler, Prescott, Myers, & Neale, 2003). Finally, we (Watson, Clark, & Chmielewski, 2008) and others (Tackett, Silberschmidt, Krueger, & Sponheim, 2008) have proposed a sixth broad factor (i.e., beyond the FFM) of “oddity” or “peculiarity” that integrates schizotypal PP and potentially other schizophrenia spectrum disorders into an encompassing hierarchical model of personality and psychopathology. Indeed, “thought disorder” is a third higher-order dimension of psychopathology (along with internalizing and externalizing) that emerges in disorder comorbidity analyses when sufficient exemplars are included (e.g., Caspi et al., 2014; Forbes et al., 2017; Kotov et al., 2010). Thus, accumulating evidence increasingly appears to support the view that we proffered in the original edition of this chapter: It is more parsimonious to consider temperament dimensions as underlying both personality traits and various mental disorders than to view personality and psychopathology as separate domains that stand in some relation to each other.

Adopting this view of temperament in relation to psychopathology has far-ranging implications. First, it explains the extensive comorbidity among psychological disorders—which has been a major challenge to the current categorical system of diagnosis (e.g., Andrews, Slade, & Issakidis, 2002; Bijl, Ravelli, & van Zessen, 1998; Clark, Watson, & Reynolds, 1995; Grant et al., 2004; Kessler, Chiu, Demler, Merikangas, & Walters, 2005; Teesson, Slade, & Mills, 2009)—as being due in large part to shared underlying temperaments (Clark, 2005, 2007); that is, persons with temper-

amentally high levels of N/NE are at increased risk for developing a broad range of internalizing, externalizing, and “odd” or “peculiar” disorders, so the likelihood that they will develop more than one disorder is increased as well. Similarly, individuals’ temperamental level of DvC affects the probability of their developing one or more “externalizing” disorders, such as substance use disorders, ADHD, psychopathy/antisociality, and other forms of PP. Furthermore, this view facilitates the generation of hypotheses regarding other comorbidities both within and between clinical syndromes and PP, respectively. For example, if the comorbidity patterns of different types of eating disorders with other clinical syndromes and PP reflect common underlying temperament diatheses, the fact that patients with bulimia nervosa are higher in DvC than those with anorexia nervosa (Cassin & Von Ranson, 2005) would lead to the prediction that bulimia patients have a higher rate of comorbid antisociality, which is, in fact, the case (Sanzone, Levitt, & Sasone, 2005).

In turn, this approach raises the question of how best to conceptualize diagnoses. Clearly, it is untenable to argue that the DSM disorders represent distinct independent entities in the way that chicken pox is independent of measles. Given what appears to be a universal penchant for categorization, it is unlikely that the current diagnostic taxonomy will be replaced with a purely dimensional system in the immediate future. However, it is not improbable that temperament dimensions might provide the basis for a systematic reorganization of diagnoses, using the robust factors of internalizing, externalizing and oddity as the foundation for a new taxonomy. In fact, such a proposal was considered seriously by the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013) Task Force but not implemented owing to concerns that the field is not ready for such a major “paradigm shift” either psychologically or empirically; that is, that more research is needed to provide a sufficiently detailed dimensional taxonomy for actual clinical use.

Diagnostic severity is the second major challenge to categorical systems of diagnosis

that is addressed by adopting a dimensional, temperament-based approach. Under the current system, a certain threshold of severity must be passed for an individual to receive any given diagnosis. However, in many domains of psychopathology, subclinical cases have been shown not only to exist with high prevalence but, more importantly, to represent a serious public health problem in terms of personal suffering, increased psychosocial dysfunction, and economic consequences such as unemployment, increased sick days, and lower productivity (e.g., Judd et al., 2000). Thus, the distinction between above-threshold and subclinical cases appears to represent an arbitrary rather than a true natural boundary between disorder and nondisorder. This observed lack of a distinctive boundary is predicted from a dimensional temperament perspective.

As we did with in the section on correlates of the Big Three, we take this opportunity to present findings from our own research to illustrate links between these dimensions and psychopathology. Table 6.6 presents correlations of N/NE, E/PE, and DvC, plus its subscales, with various forms of psychopathology assessed both via self-report and interview. The data are from the Improving the Measurement of Personality Project (IMPP). The sample, procedures, and measures are described in more detail in Clark et al. (2015, 2020), except that the sample size for these data is approximately 300 each (exact numbers vary due to small amounts of missing data) of (1) “high-risk” community adults (HRCs), screened in for scoring above the cutoff point on the Iowa Personality Disorder Screen (Langbehn et al., 1999) and (2) 300 psychiatric outpatients. Mean age was 45.6 years ($SD = 13.4$; range = 18–84), 56.5% women, 78.1% White, with Black/African Americans as the largest minority group. The modal participant had some post-high school education (45.7%), with the modal HRC participant being married or living with a partner (47.7%) and employed (43.7%), and the modal patient being single, never married (42.0%), and disabled (37.7%). Approximately one-fourth of the HRC participants reported having received some kind of mental health treatment in the past.

TABLE 6.6. Correlations of the General Temperament Survey Big Three and DvC Subscales with Psychopathology Variables

Variable	Big Three			DvC	
	N/NE	E/PE	DvC	CO	AB
Personality inventory for DSM-5 trait domains					
Negative affectivity	.76^{a,b}	-.20	.32	.25	.28
Detachment	.45	-.51 ^{a,b}	.19	.12	.17
Disinhibition	.50	-.17	.63^{a,b}	.57^b	.48
Antagonism	.18	.23	.54	.34	.60^{a,b}
Psychoticism	.44^a	-.01	.39	.25	.39
Interview-rated alternative model for personality disorder trait domains					
Negative affectivity	.52^{a,b}	-.21	.17	.16	.12
Detachment	.24	-.38 ^{a,b}	.10	.07	.07
Disinhibition	.22	.01	.48^{a,b}	.36	.42
Antagonism	.14	.17	.48^b	.26^b	.54^{a,b}
Psychoticism	.10	-.03	.12*	.09	.12 ^a
Self- (IDAS-II) and interview- (M.I.N.I.) rated symptom dimensions					
IDAS-II Internalizing factor	.62^{a,b}	-.31 ^b	.28	.22	.22
IDAS-II Oddity factor	.32 ^a	.20	.14	.06	.16
M.I.N.I. Internalizing	.53^a	-.20	.17	.13	.12
M.I.N.I. Mania/OCD	.41^a	-.09	.21	.13	.20
M.I.N.I. Substance use	.08	.03	.31 ^{a,b}	.28^b	.28^b
M.I.N.I. Eating pathology	.13 ^a	-.02	.05	.06	.06
Self- and Interview- (LIFE-RIFT) rated life satisfaction and functioning dimensions					
Quality-of-Life Composite	-.58 ^{a,b}	.53^b	-.36 ^b	-.29 ^b	-.29 ^b
WHO-DAS 2.0 Composite	.35 ^a	-.27	.13	.13	.08
LR Life Satisfaction	.25	-.38 ^a	.17	.16	.10
LR Level of Dysfunction	.26	-.35 ^a	.16	.12	.11
LR Total Score	.29	-.41 ^a	.19	.16	.12

Note. N/NE, neuroticism/negative emotionality; E/PE, extraversion/positive emotionality; DvC, Disinhibition versus Constraint; CO, Carefree Orientation; AB, Antisocial Behavior; IDAS-II, Expanded Version of the Inventory for Depression and Anxiety Symptoms (Watson et al., 2012); M.I.N.I., Mini-International Neuropsychiatric Interview (Sheehan et al., 1998; adapted for DSM-5 with the permission of the author); LIFE-RIFT, Longitudinal Interval Follow-Up Evaluation-Range of Impaired Functioning Tool (Leon et al., 1999); WHO-DAS 2.0, World Health Organization Disability Assessment Schedule (World Health Organization, 2010); LR, LIFE-RIFT. *N*'s range from 600 to 605. Correlations > .40 are in **boldface**. Nonsignificant correlations ($p > .05$) are in *italics*.

^aHighest correlation (absolute value $\pm .01$) in each row.

^bHighest correlation (absolute value $\pm .01$) in each column within each section.

Personality Pathology

Participants were assessed for personality pathology using both a self-report questionnaire, the Personality Disorder Inventory for DSM-5 (Krueger, Derringer, Markon, Watson, & Skodol, 2012), and an interview, the Structured Interview for DSM-IV/5 Personality (SIDP-IV/5; Pfohl, Blum, & Zimmerman, 1997). After completing the SIDP-IV/5, trained interviewers used the responses to rate the 25 facets of the alternative model of personality disorder (AMPD) in Section III of DSM-5 (DSM-5-III). Scores for the five AMPD domains were calculated using three facets that best characterize the core characteristics of each, as recommended on the website of the American Psychiatric Association (see www.psychiatry.org/library/psychiatrists/practice/dsm/apa_dsm5_the-personality-inventory-for-dsm-5-full-version-adult.pdf). Specifically, the three facet scores were each standardized, then averaged to yield the five domain scores, so they contributed equally to the domain scores.

As can be seen in the top portion of Table 6.6, each of the “Big Three” domains has a clear AMPD counterpart: N/NE relates most strongly to negative affectivity, E/PE to low detachment, and DvC to disinhibition and, to a lesser extent, antagonism. To be sure, there are some substantial “off-diagonal” correlations, especially with the PID-5, which are largely due to strong intercorrelations among the PID-5 domain scales (mean correlation [M_r] = .45). Also, correlations with the PID-5 are stronger than those with the interview ratings due to shared method variance. When the two subscales of DvC are correlated with the AMPD domains, PID-5 Disinhibition and Antagonism show a clear convergent/discriminant pattern with Carefree Orientation and Antisocial Behavior, respectively, whereas in the interview ratings, Antisocial Behavior correlates more strongly with both of these AMPD domains than does Carefree Orientation. The reasons for this are not clear, but given that the interview questions “pull” for personality pathology, the raters may have interpreted all indications of externalizing behavior as reflecting the more pathological behavior that is represented in the Antisocial

Behavior subscale items. Nevertheless, the data indicate that, except for psychoticism, the primary dimensions of personality pathology can be mapped systematically onto the Big Three temperament domains and its components.

Psychological Symptoms

IMPP participants also completed (1) the Expanded Version of the Inventory of Depression and Anxiety Symptoms (IDAS-II; Watson et al., 2012), which assesses a wide range of symptoms in the domains of mood and anxiety disorders (e.g., major depressive and bipolar disorders, panic disorder, social anxiety disorder), OCD, and PTSD and (2) the Mini-International Neuropsychiatric Interview (M.I.N.I.; Sheehan et al., 1998; adapted for DSM-5 with the permission of the author), which assesses symptoms of 15 common psychological disorders, including those assessed by the IDAS-II and also alcohol and substance use disorders, and psychotic symptoms.

For ease of presentation, we factor-analyzed the IDAS-II scales and extracted two factors that represented the broad dimensions of (1) internalizing, characterized primarily by symptoms of depressive and anxiety disorders (e.g., depressed mood, panic symptoms, insomnia), as well as intrusive cognitions regarding traumatic experience, and (2) “oddity,” characterized by various types of obsessions and compulsions (e.g., cleaning, checking), euphoric mood and behaviors associated with bipolar disorder, claustrophobia, and avoidance of reminders of traumatic experience.

Factor analysis of the M.I.N.I. yielded two factors and two doublets. The first factor was a very broad dimension that comprised mostly internalizing symptoms (e.g., symptoms of all mood and anxiety disorders assessed plus PTSD), as well as symptoms of psychosis. The second factor resembled the IDAS-II “oddity” factor, except that it also included fear-related symptoms (e.g., symptoms of panic, agoraphobia). The doublets were bulimia and binge-eating disorder, and alcohol and substance use disorders, respectively. Therefore, rather than creating factor scores, we simply created four composites, aggregating the four sets of symptoms after

standardizing them to the same metric, and correlated them with the temperament scales.

The results of these temperament-symptom analyses are shown in the middle section of Table 6.6. Both the IDAS-II internalizing and oddity factors correlated with N/NE, with the former having a notably stronger correlation (r 's = .62 and .32, respectively), consistent with N/NE often being considered the core of the internalizing dimension. Internalizing also correlated negatively ($r = -.31$) with E/PE, which reflects the negative relation of this factor to depressive symptomatology and also symptoms of social anxiety (Clark, Watson, & Mineka, 1994; Watson, Gamez, & Simms, 2005). The DvC dimension and its subscales correlated positively but modestly (r 's ranged from .22 to .28) with internalizing and weakly to nonsignificantly with oddity. Similarly, the M.I.N.I. internalizing composite correlated strongly with N/NE ($r = .53$), modestly negatively ($r = -.20$) with E/PE, and weakly with DvC and its subscales. In contrast, the substance use composite correlated moderately with DvC and both of its subscales ($r = .28$ to .31), reflecting the established relation between DvC and externalizing symptoms. Finally, eating pathology correlated significantly, though weakly, only with N/NE.

Dysfunction

Functioning represents a final area of relevance to psychopathology that relates to temperament. In essence, dysfunction or disability is a consequence of pathology and takes many forms—from dissatisfaction with one's quality of life to difficulties with basic functioning (e.g., self-care, activities of daily living) and with more complex activities, such as occupational, social and interpersonal functioning. IMPP participants completed a number of measures of life (dis)satisfaction/quality of life, which we aggregated into an overall composite. They also completed the World Health Organization's Disability Assessment Schedule 2.0 (WHO-DAS 2.0; World Health Organization, 2010), which assesses functioning across the basic to more complex spectrum; it provides a total score, as well as a number of more

specific domain scores. Finally, they were interviewed with the Range of Impaired Functioning Tool (LIFE-RIFT; Leon et al., 1999), which is used to rate level of (dys)functioning in work (including school and household tasks), multiple types of interpersonal relationships, and leisure functioning, which then can be aggregated into an overall (dys)functioning score. The interviewee also provides an overall life (dis)satisfaction rating, and the two scores are combined to form a total dysfunction score.

The bottom section of Table 6.6 shows correlations of the Big Three plus DvC subscale scores with each of these indices of (dys)function. Interestingly, the self-reported quality-of-life composite was moderately to strongly correlated with all temperament dimensions—strongly negatively and positively, respectively, with N/NE and E/PE ($r = -.58$ and .53, respectively), but also moderately negatively with DvC and both its subscales (r 's = $-.29$ to $-.36$); that is, all aspects of temperament are related to how satisfied we generally are with our lives. Likewise, the WHO-DAS 2.0 composite score correlated significantly, though less strongly, with every temperament scale score, from moderately with N/NE to moderately with (low) E/PE (r 's = .35 and $-.27$, respectively), to more weakly with DvC, slightly more strongly with Carefree Orientation than with Antisocial Behavior.

The overall rating of life dissatisfaction on the LIFE-RIFT correlated most strongly—moderately negatively ($r = -.38$)—with E/PE, more modestly with N/NE ($r = .25$), and weakly but significantly with DvC, again more with Carefree Orientation than with Antisocial Behavior. Interviewer ratings of dysfunction had a highly similar correlational pattern, as did the combination of all ratings. Interestingly, the latter's negative correlation with E/PE was slightly stronger than that of each of the two separate ratings, indicating that self-reported dissatisfaction and objectively scored dysfunction are related additively to one's positive temperament.

Thus, the three basic temperaments relate systematically to all three domains of psychopathology—maladaptive traits, psychological symptoms, and life dissatisfaction and dysfunction—more strongly when both temperament and psychopathology are

assessed via self-report, but in many cases moderately to strongly even when the rating of a psychopathological domain is based on semistructured interviews.

In summary, the temperament-based model of personality that has emerged from the study of trait psychology is a powerful tool that has been fruitful in integrating diverse findings regarding personality structure and processes, the neurobiology of personality, diverse lifestyle variables, and psychopathology, including its associated dysfunction. No doubt the full specification of this model will be extraordinarily complex. Nonetheless, we are confident that the broad outlines of a temperament-based paradigm are clear and robust, and that explicating the nature and scope of these temperamental systems will continue to carry us well into the 21st century.

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NOTES

1. Some authors (e.g., Musek, 2007; Rushton & Irwing, 2008) have argued for the existence of a “Big One” or general factor of personality, whereas others (e.g., Davies, Connelly, Ones, & Birkland, 2015; de Vries, 2011) have argued that it is a non-substantive, statistical artifact; no consensus has been reached on the issue in the field.

2. It is important to acknowledge here that Block (e.g., Block & Block, 2006) earlier used the terms *undercontrolled* and *overcontrolled* to characterize the contrasting poles of his construct *ego control*, which overlaps with both E and DvC.

3. We use the term *personality pathology* rather than the more common *personality disorder* to emphasize that personality pathology is a domain in which continuous trait dimensions are a primary component, not one composed of distinct categorical disorders.

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CHAPTER 7

Personality in Animals

What Can We Learn from a Species-Comparative Approach?

Alexander Weiss

Whether looking at people or animals, two observations have been made by psychologists, biologists, and lay observers. First, individuals differ consistently in how they behave and react toward, and think about, the world around them. Second, not all these differences are independent of one another: Individuals who are high (or low) on some traits tend to be high (or low) on other traits. In more formal language, individuals can be characterized by stable individual differences in personality traits, and these traits have a structure to them.

Scientific studies of human personality can be traced back at least to the work of Sir Francis Galton (1884) who lived from 1822 to 1911. For a long time, this work was predominantly descriptive (see also John, Chapter 2, this volume). Researchers, for example, would identify and categorize personality traits, whether by studying the natural language of populations (Allport & Odbert, 1936) or by analyzing data derived from questionnaires, naturally occurring behaviors, and behavioral tests (Cattell, 1946). The descriptive flavor of this early research was, and continues to be, criticized by some authors (e.g., Block, 1995; Eysenck, 1992; Uher, 2013). However, gathering de-

tailed, descriptive data is a crucial first step in any scientific discipline (Chamberlin, 1890/1965). In fact, that description should come before theory has been recognized for a long time in the field of animal behavior (Tinbergen, 1959, 1963), and this recognition likely contributed to the emergence of animal personality research in that field.

This chapter examines how the study of personality in nonhuman animals contributes to our understanding of personality in general and of human personality in particular. For one, animal research has helped elucidate the evolutionary bases of personality variation and structure by the method of exclusion (Platt, 1964). In other words, this research has shown that some proposed evolutionary explanations for personality are not likely to be true. In addition, personality research on animals contributes to our understanding of the neuroanatomical bases of personality variation, informs the debate about the origins and magnitude of age differences in personality, and addresses why the personalities of some people predispose them to be happier than others. Readers of this chapter who are familiar with Gosling's (2001) review of the literature will thus see that research in animal personality

is addressing questions that Gosling, and no doubt others, described as being particularly amenable to studies of nonhuman animals.

The Historical Development of Animal Personality Research

The scientific study of animal personality can be traced to Charles Darwin and to major figures in psychology, including Ivan Pavlov, Robert Yerkes, and Donald Hebb. However, until the 1970s, animal personality research by comparative psychologists was sporadic (Weiss & Gartner, 2016; Whitman & Washburn, 2017).

The burst of research into animal personality that followed came largely from within behavioral ecology, an offshoot of the study of animal behavior in biology. Researchers in this area seek to answer questions about the proximate (physiological, environmental, and developmental) and ultimate (functional and evolutionary) causes of animal behavior (Tinbergen, 1963). A central tenet of behavioral ecology is that species evolve to behave optimally under environmental conditions and that behaviors can be mathematically modeled (Parker & Maynard Smith, 1990). For example, a behavioral ecologist may devise a model to determine the optimal group size for a population. The model's parameters might include greater vigilance against predators (a benefit) and greater competition for resources (a cost). These models can then be tested in various populations.

The behavioral ecologists' approach has been successful at explaining all manner of behaviors in animals and in humans (Krebs & Davies, 1997). However, like humans, not all animals within a species behave as predicted by models. As described elsewhere (e.g., Réale, Reader, Sol, McDougall, & Dingemanse, 2007), for a long time, behavioral ecologists' models relegated variation around the optimum behavior (i.e., individual differences) to the error term. According to Réale and his colleagues, the situation changed with the publication of a study on stickleback fish by Huntingford (1976). The fish in that study displayed individual differences in behavior that were consistent across different stages of their breeding cycle and in the presence of different intruders. More-

over, fish that displayed more aggression in the behavioral tests were more likely to explore new environments. This discovery of consistent individual differences led biologists to try to understand why animals do not always exhibit the "optimal" behavior given a set of circumstances (e.g., Wilson, Clark, Coleman, & Dearstyne, 1994) and resulted in a rapid growth in animal personality research.

Reliability and Validity

As in the study of human personality, there needs to be evidence that the measures of personality under study are reliable and valid. This is true regardless of whether the measures are ostensibly objective measures, such as behavioral observations, or ostensibly subjective measures, such as ratings. Establishing the construct validity of measures in animals is also important, because doing so establishes whether a measure assesses the same construct in different species. It also enables researchers to determine whether species similarities and differences are in line with what one would expect given the natural history of the species.

Reliability

Animal personality traits are stable over time. The stability of animal personality traits has been demonstrated in three meta-analyses. The first meta-analysis (Bell, Hankison, & Laskowski, 2009) involved 114 studies of a wide range of species and trait measures classified as belonging to one of 13 categories: migration, mate preference, activity, affiliation, parental, courtship, antipredator, foraging, exploratory, aggression, habitat, mating, and "other." The authors of this meta-analysis found a *mean repeatability*—a type of intraclass correlation coefficient (Boake, 1989; Nakagawa & Schielzeth, 2010)—of .37 across studies. The second meta-analysis was based on estimates of retest reliability from eight studies of nonhuman primates, and found a mean retest reliability of .58 across personality dimensions such as confidence and excitability (Freeman & Gosling, 2010). The third meta-analysis, using a variety of stability

estimates, was based on 31 studies of dogs, and found a mean stability correlation of .43 for traits classified as belonging to one of six personality dimensions, namely activity, sociability, aggression, submissiveness, responsiveness to training, and fearfulness/reactivity (Fratkin, Sinn, Patall, & Gosling, 2013).

Animal personality studies based on behavioral observations or ratings often assess interjudge agreement reliability among the observers or raters. Reviews of the literature on multiple taxa (Freeman & Gosling, 2010; Gartner, 2014; Gartner & Weiss, 2013; Gosling, 2001; Jones & Gosling, 2005) all find interrater or interobserver reliability estimates comparable to those for established measures of human personality, such as the Revised NEO Personality Inventory (Costa & McCrae, 1992).

Studies that examine a broad range of traits have also found that, for a given species, data reduction techniques tend to yield the same personality dimensions, regardless of the method used to collect the personality data (i.e., rating instruments or behavioral observations). For example, studies of chimpanzees show that different rating instruments (Dutton, 2008; Dutton, Clark, & Dickins, 1997; Freeman et al., 2013; King & Figueredo, 1997) and behavioral measures (Koski, 2011b; Massen, Antonides, Arnold, Bionda, & Koski, 2013; van Hooff, 1970) identify the same dimensions or subsets of these dimensions. Similar results have been found in rating-based studies of brown capuchin monkeys that rely on different questionnaires developed on the basis of different principles (Morton, Lee, Buchanan-Smith, et al., 2013; Uher, Addessi, & Visalberghi, 2013). Rating-based studies (Stevenson-Hinde & Zunz, 1978; Weiss, Adams, Widdig, & Gerald, 2011) and observation-based studies (Brent et al., 2014) of rhesus macaques also yield similar sets of dimensions (see Weiss, 2017, for other examples). In short, for a given species, all the different types of personality instruments appear to measure the same set of constructs.

Validity

Attempts to establish the validity of ratings of personality have met with success in

nonhuman primates (Freeman & Gosling, 2010), felids, the taxonomic group that includes cats (Gartner & Weiss, 2013), dogs and other household pets (Gartner, 2014; Jones & Gosling, 2005), and other species (Gosling, 2001). Much of the evidence for validity has been based on studies examining relationships between individual behaviors and ratings of single personality items or personality dimensions. However, recent studies have found associations between animal personality measures, based on either ratings or behaviors, and what would be referred to as “consequential outcomes” (Ozer & Benet-Martínez, 2006) or “life outcomes” (Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007) in studies of humans. In Barbary macaques and barnacle geese, for example, personality traits are related to achieving high rank (e.g., Konečná, Weiss, Lhota, & Wallner, 2012; Kurvers et al., 2009). Moreover, personality traits are related to whether dogs can be successfully trained to for certain “jobs,” such as being a detector dog (e.g., Harvey et al., 2016; Maejima et al., 2007; Sinn, Gosling, & Hilliard, 2010). There are even links between primate personality and cognitive performance measures analogous to “scholastic aptitude” (e.g., Altschul, Wallace, Sonnweber, Tomonaga, & Weiss, 2017; Altschul, Weiss, & Terrace, 2016; Carter, Marshall, Heinsohn, & Cowlishaw, 2014; Hopper et al., 2014; Morton, Lee, & Buchanan-Smith, 2013). For example, chimpanzees that were rated as higher in conscientiousness and openness 3 years earlier performed better on a touchscreen learning task, and higher openness predicted engaging in the learning task even when no reinforcers were delivered (Altschul et al., 2017).

In addition to the aforementioned attempts to validate personality ratings, some researchers have used validity studies to challenge assumptions about measures of personality, such as behavioral tests or behavioral observations. For example, Carter, Marshall, Heinsohn, and Cowlishaw (2012b) examined two purported behavioral measures of boldness (a novel object test and responses to a stuffed snake) in wild chacma baboons. They found that these measures were related to each other only weakly and probably defined separate constructs. As a consequence of these and related findings,

behavioral ecologists now show a greater appreciation of the need to examine the construct validity of behavioral measures (Araya-Ajoy & Dingemanse, 2014; Carter, Feeney, Marshall, Cowlshaw, & Heinsohn, 2012).

Finally, it is important to show that personality measures are sensitive to expected species differences—an issue that has not yet been discussed much (see, however, Uher et al., 2013, p. 429). For example, among hyenas, females are physically stronger than males and dominate them. Given this sex role reversal in power relations among hyenas compared to humans, it makes sense that female hyenas are higher on assertiveness than males (Gosling, 1998), and lower on neuroticism (Gosling & John, 1999). From a measurement perspective, these findings provide evidence for what might be called the “comparative validity” of the personality measures.

Evolutionary Explanations for Personality Differences

Biologists and psychologists have advanced several evolutionary explanations to explain the presence of persistent, heritable variation in behavior (for reviews, see, e.g., Dingemanse & Wolf, 2010; Penke, Denissen, & Miller, 2007). Although there is not enough space in this chapter to cover all of these proposed explanations, it is worth discussing those that have received the most attention or support.

The default (or null) hypothesis is that personality variation reflects the accumulation of mutations that do not influence survival or reproduction (i.e., they are “neutral” in terms of selection; Kimura, 1968, 1983, 1986). This hypothesis was advanced by evolutionary psychologists whose main focus was on describing cognitive modules that, they argued, were human universals (Tooby & Cosmides, 1990). However, considerable evidence has come to light that personality is associated with health (Strickhouser, Zell, & Krizan, 2017) and reproductive success (Alvergne, Jokela, & Lummaa, 2010; Eaves, Martin, Heath, Hewitt, & Neale, 1990; Jokela, Alvergne, Pollet, & Lummaa, 2011) in humans. Likewise, evidence in nonhuman

animals shows that personality traits are associated with survival and reproductive success (see, e.g., Smith & Blumstein, 2008, for a review). As such, personality variation in both humans and animals can probably not be attributed to neutral selection.

A second possibility is that balancing selection maintains variation in personality. This possibility is supported by studies of birds, lizards, insects, small mammals, and ungulates, which find that whether and in what direction a personality trait is associated with survival and reproduction varies across environments, time, and/or developmental stages (for reviews, see Dingemanse & Réale, 2013; Dingemanse & Wolf, 2010). For example, Dingemanse, Both, Drent, and Tinbergen (2004) captured wild great tits and measured how often and how rapidly they explored a novel laboratory environment. They then released the birds into the wild and followed them over three winters: Availability of the birds’ preferred food during the first winter was poor, availability of the birds’ preferred food during the second winter was good, and availability of the birds’ preferred food during the third winter was poor. For male birds, exploration in the laboratory was associated with lower survival rates during winters when food was scarce but higher survival rates during the winter when food was abundant; for female birds, the pattern was in the opposite direction.

In another study, Nicolaus, Tinbergen, Ubels, Both, and Dingemanse (2016) found that the association between exploration and fitness in great tits varied as a function of population density: Faster explorers were favored when the population density was low; slower explorers were favored when the population density was high. Critically, although birds changed their behavior as a function of population density, it was in the opposite direction as one would expect if doing so was to maximize fitness: Birds became faster explorers when the population density was high and slower explorers when the population density was low.

A third possibility is that personality variation is maintained by trade-offs related to differences in life-history strategy, a continuum that was originally used to characterize species or populations (MacArthur & Wilson, 1963). At one end of this continuum

are species or populations with a “fast” life-history strategy. Individuals belonging to these species or populations breed early and often, but at the expense of longevity and offspring survival. At the other end of this continuum are species or populations with a “slow” life-history strategy. Individuals belonging to these species or populations breed later and less frequently but have longer lives and more surviving offspring. Life-history strategy has been extended to describe differences between individuals within species and populations (Réale et al., 2010). Because different life-history strategies have similar fitness payoffs (MacArthur & Wilson, 1963), the variation of any personality trait associated with life history should be maintained (Biro & Stamps, 2008; Wolf, van Doorn, Leimar, & Weissing, 2007). Consistent with the life-history strategy perspective, Réale, Martin, Coltman, Poissant, and Festa-Bianchet (2009) tested whether two personality traits (boldness and docility) in bighorn sheep were genetically correlated, and whether genetic tendencies for these traits were associated with survival and reproductive success. *Boldness* was defined as the tendency to enter a baited trap, and *docility* was defined as reactions to being handled by humans. Boldness and docility were associated with life-history trade-offs, heritable, and had a negative genetic correlation with each other. Moreover, the predicted genetic values of boldness and docility were related to a longer lifespan and late-life reproductive success.

A fourth possibility is that personality variation is maintained because of genetically or environmentally mediated correlations between traits (Sih, Bell, Johnson, & Ziemba, 2004). These correlations can occur within contexts, such as the case of brown capuchin monkeys: Individuals high on a personality dimension labeled “assertiveness” tend to be more aggressive, dominant, and independent, but less fearful and cautious (see Table 6 in Morton, Lee, Buchanan-Smith, et al., 2013, for all of the loadings). These correlations can also occur across contexts, for example, in stickleback fish in which more aggressive individuals were more likely to explore a new environment (Huntingford, 1976). In both cases, because the traits are correlated, being at

the optimum level of one trait (assertiveness in monkeys and aggressiveness in fish) is incompatible with being at the optimum level of the other trait (cautiousness in monkeys and the tendency to explore new environments in fish).

It is unlikely that any one of these possible evolutionary mechanisms, or others that are not discussed here, is solely responsible for maintaining personality variation. However, the identification of these mechanisms in several species testifies to how animal personality research can solve problems related to personality evolution. There is more to say about the maintenance of personality variation, but that involves comparing species, a topic that I address later in this chapter. Until then, I describe the search for the physiological bases of animal personality.

Physiological Underpinnings of Animal Personality Differences

With respect to identifying the physiological bases of animal personality, some of the most convincing work comes from selection studies and studies of animal coping styles. Animal breeders have long known that breeding (selecting) for *physical* traits can lead to changes in *behavioral* traits, and vice versa. In a classic study, Dmitry Belyaev bred foxes for tameness for over 40 years (Trut, Oskina, & Kharlamova, 2009). In several respects, the tame foxes behaved more like domesticated dogs than their wild counterparts; they also differed from wild foxes in their rate of development and neuroendocrine profiles (Trut et al., 2009). Specifically, compared to wild foxes, tame foxes retained youthful features but reached sexual maturity earlier and showed higher levels of reproductive hormones (Trut et al., 2009). Moreover, during development, foxes display a reduction in their exploratory behavior and an increase in glucocorticoids, both of which mark the end of their sensitive socialization period; these changes occurred later in tame foxes than in wild foxes (Trut et al., 2009). It thus seems foxes bred to thrive in captivity had an extended adolescent period, perhaps because they were not selected to survive in a more competitive and stressful environment (the wild).

Another selection study compared birds (great tits) selected to be fast or slow explorers of novel environments (van Oers, Buchanan, Thomas, & Drent, 2011). Fast explorers had better immune functioning and lower testosterone levels than slow explorers. The latter findings surprised van Oers and his colleagues, because fast explorers are more aggressive. However, this difference may mean that, like Belyaev's domesticated foxes, birds selected for lower levels of a trait related to aggression reached sexual maturity more rapidly.

In the animal personality literature, *coping style*¹ refers to a suite of behavioral and physiological tendencies related to how individuals react to stressors (Koolhaas et al., 1999). At one end of this spectrum are *proactive* individuals. At the other end of this spectrum are *reactive* individuals. In behavioral tests, proactive individuals were found to attack more quickly and were more likely to engage in defensive behavior (Koolhaas et al., 1999, Table 2). Animals with a proactive coping style also differ with respect to their hypothalamic–pituitary–adrenal axis activity and reactivity, and their parasympathetic reactivity, both of which are low relative to animals with a reactive coping style (Koolhaas et al., 1999, Table 3). Finally, the sympathetic and testosterone reactivity of individuals with a proactive coping style are high compared to individuals who have a reactive coping style (Koolhaas et al., 1999, Table 3).

Differences in neurophysiology have also been identified as proximate explanations for personality variation. A magnetic resonance imaging study of 74 chimpanzees revealed that the percentage of grey matter in the brain, but not the asymmetry of the brain's subgenual cingulate cortex region, was associated with lower dominance and higher conscientiousness (Blatchley & Hopkins, 2010). Personality measures in that study were derived by questionnaire ratings: Dominance was made up of traits related to boldness, fearlessness, assertiveness, and aggressiveness; conscientiousness was made up of traits related to self-control, predictability, and emotional stability (Weiss, King, & Hopkins, 2007).

A later magnetic resonance imaging study of 107 chimpanzees by Latzman, Hecht,

Freeman, Schapiro, and Hopkins (2015) revealed associations between personality and other brain regions: The volume and asymmetry of the frontal region of the brain's grey matter were associated with higher dominance and extraversion, the latter being related to sociability, activity, and other traits that make up its human counterpart (Freeman et al., 2013). Latzman and his colleagues (2015) also found associations between frontal grey matter volume and higher openness, a personality dimension related to exploratory behavior and curiosity (Freeman et al., 2013), and between frontal grey matter asymmetry and higher reactivity/unpredictability, a personality dimension related to low conscientiousness (Freeman et al., 2013).

Evolutionary Explanations for Human Personality Variation

The findings reviewed earlier suggest that there is promise in the use of animals to understand the evolutionary and physiological underpinnings of personality variation. Turning again to questions about the evolution of personality, researchers have conducted many studies on the association between human personality and health, survival, and reproductive success (see Lewis & Buss, Chapter 1, this volume). However, researchers have been considerably less successful in answering questions related to human personality evolution than they have been in answering questions about animal personality evolution. Fortunately, studies that compare species provide some of the best tests of some of these hypotheses about the evolution of human personality, and so can help move the study of human personality evolution forward.

The comparative method involves conducting natural experiments by comparing species with different evolutionary histories (see Gosling & Graybeal, 2007, for an overview). To see how one tests evolutionary hypotheses in comparative studies, consider the case of studying two species. These species can either be closely related to one another (e.g., humans and chimpanzees) or distantly related to one another (e.g., chimpanzees and brown capuchin monkeys). In

addition, the species that one compares can either have faced similar challenges in their evolutionary history (e.g., both species live in large groups) or different challenges (e.g., one species lives in an environment in which there are many predators, and the other species lives in an environment in which predators are absent).

There are two comparisons that allow for strong tests about the evolution of personality. The first is the comparison between closely related species that faced different challenges. Here, if the species differ in, for example, the personality dimensions that they possess, the parsimonious explanation is that the personality differences evolved recently in response to the challenges. On the other hand, if these species possess the same set of personality dimensions, the parsimonious explanation is that these personality dimensions were present in the common ancestor of both species.

The second is the comparison between distantly related species that faced similar challenges. Here, if the species are similar to one another, for example, if both possess the same set of personality dimensions, the most parsimonious explanation is that these personality dimensions are an evolutionary product of those challenges. This method has been used to test hypotheses about personality structure, associations between personality traits and other variables, and whether certain features of species led to differences in mean levels of traits.

Structure

To test hypotheses concerning the evolution of personality structure, researchers have been gathering data on one of several animal personality questionnaires and/or on naturally occurring behaviors (Freeman & Gosling, 2010). These researchers then use factor analysis or principal components analysis to identify personality dimensions in the species. The dimensions identified are typically a combination of (1) those that are human-like (e.g., orangutan neuroticism; Weiss, King, & Perkins, 2006), (2) those that resemble human personality facets (e.g., rhesus macaque anxiety; Weiss et al., 2011), (3) those that combine two or more human dimensions (e.g., brown capuchin monkey

sociability; Morton, Lee, Buchanan-Smith, et al., 2013), (4) those found in multiple primate and primate species, but not in humans (e.g., dominance; Freeman & Gosling, 2010; Gosling & John, 1999), and (5) those specific to a species or taxonomic group (e.g., “opportunistic” in Assamese macaques; Adams et al., 2015).

The way in which animal studies help make sense of personality can be illustrated by describing how they inform hypotheses about the origins of the five-factor model. To begin, consider extraversion and agreeableness. Compared to other primates, humans are intensely social and altruistic (Kurzban, Burton-Chellew, & West, 2015). It is therefore not surprising that some researchers (e.g., Ashton & Lee, 2007; Nettle, 2006) hypothesize that the evolutionary bases of extraversion and agreeableness can be traced to those features of humans. However, personality variation in social traits has been identified in species ranging from the highly social chimpanzee (King & Figueredo, 1997) to the semisolitary orangutans (Weiss, et al., 2006), and to the solitary East Pacific red octopus (Mather & Anderson, 1993). These findings are contrary to the predictions that would be derived from theories based on human sociality and altruism.

There are also problems with tying social traits or their structure to *kin selection*, the tendency of individuals to help related individuals at a cost (Hamilton, 1964). For one, even across primate species, we see great variety in social and mating systems (Crook & Gartlan, 1966), level of paternal care (Fernandez-Duque, Vaggia, & Mendoza, 2009), and other ecological characteristics (Galán-Acedo, Arroyo-Rodríguez, Andresen, & Arasa-Gisbert, 2019). Still, factor-analytic studies of personality in primates (Gold & Maple, 1994; King & Figueredo, 1997; Konečná et al., 2008) have demonstrated that distinct dimensions of extraversion and agreeableness exist in chimpanzees (a species with a promiscuous mating system), as well as in Western lowland gorillas and in Hanuman langurs (both species in which one male monopolizes access to multiple females). Mountain gorillas, curiously, appear to possess a single dimension, namely, sociability, combining traits related to extraversion and agreeableness (Eckardt et al.,

2015). Distinct extraversion and agreeableness dimensions therefore emerge in species that differ with respect to how much information males have about the offspring they are related to, and so these dimensions probably emerged long before modern humans.

Explanations based on *reciprocal altruism*, the tendency to help unrelated individuals because if you do, they are more likely to help you in the future (Trivers, 1971), are beset with similar problems. For one, reciprocal altruism is less likely to evolve in species in which individuals do not regularly encounter one another or species in which individuals would be unable to recognize one another (Trivers, 1971). Nonetheless, separate agreeableness and extraversion dimensions have been found in orangutans (Weiss et al., 2006), but not in brown capuchin monkeys (Morton, Lee, Buchanan-Smith, et al., 2013) or mountain gorillas (Eckardt et al., 2015), the latter two both being social primate species. These findings are not consistent with what one would predict if the evolutionary bases of interpersonal personality dimensions in humans (e.g., extraversion, agreeableness, or honesty–humility) are evolutionary products of reciprocal altruism. An alternative explanation emerged from a study of six macaque species, in which Adams et al. (2015) found that the personality dimensions defined by traits related to assertiveness, social confidence, and aggression differ as a function of the degree to which the species were despotic versus tolerant (see Thierry, 2000, for definitions).

Evolutionary accounts of openness to experience and of conscientiousness also do not appear to withstand this kind of scrutiny. Proposed benefits of openness have included greater creativity, and thus being more attractive to the opposite sex; the proposed costs have included proneness to unusual beliefs and psychotic disorders (Nettle, 2006). However, studies of nonhuman primates suggest that openness evolved independently in several primate lines and possibly for other reasons. For example, there is evidence that openness evolved in species that get some of their food from places that are hard to reach or when effort and ingenuity give access to additional food resources (see, e.g., Adams et al., 2015; Konečná et al., 2008, 2012).

For conscientiousness, one evolutionary explanation that has been advanced is that it enables costly signaling (Buss, 2009) or reflects a balance between delayed mating and longevity (Nettle, 2006). One might therefore predict that conscientiousness should be widespread in the animal kingdom. Yet despite the finding that variation in two aspects of conscientiousness appear to be widespread in the animal kingdom (Delgado & Sulloway, 2017), as was noted in Gosling and John's (1999) review, in animals, personality dimensions such as conscientiousness are rare.

So what selective pressures may have led to the evolution of conscientiousness in our species and those other animals that appear to possess it? Studies of nonhuman primates and other animals suggest that species with a conscientiousness dimension, such as chimpanzees (King & Figueredo, 1997), bonobos (Weiss et al., 2015), brown capuchin monkeys (Morton, Lee, Buchanan-Smith, et al., 2013), and Asian elephants (Seltmann, Helle, Adams, Mar, & Lahdenperä, 2018) tend to have larger brains. Moreover, a study of 36 species, including primates and nonprimates, that adjusted for phylogeny found that greater self-control (which is central to conscientiousness) was associated with a larger absolute brain size and a more varied diet (MacLean et al., 2014). However, the finding that a conscientiousness dimension is absent in the large-brained orangutan (Weiss et al., 2006) but present in the small-brained common marmoset (Iwanicki & Lehmann, 2015; Koski et al., 2017; but see Inoue-Murayama, Yokoyama, Yamanashi, & Weiss, 2018) suggests that brain size may only partly be responsible. For example, the finding of conscientiousness in common marmosets may mean that the need for helpers to rear young (Burkart, Hrdy, & Van Schaick, 2009) may also favor the evolution of dimensions resembling human conscientiousness. Thus, Altschul et al.'s (2018) finding that conscientiousness was not related to mortality in captive chimpanzees should also not be surprising.

In contrast to the previous examples, evolutionary explanations for neuroticism often draw on the animal literature. This may be because traits associated with neuroticism differ from the more visible aspects

of human personality, because dimensions such as neuroticism are found in many species (Gosling & John, 1999), or because it is difficult to come up with a way in which high neuroticism is “beneficial” to humans. For example, Nettle (2006) hypothesized that costs related to higher neuroticism, including poorer health and being at risk of psychological disorders, are offset by increased vigilance. Focusing on the African apes, this explanation is consistent with neuroticism being present in chimpanzees (King & Figueredo, 1997), but not bonobos (Weiss et al., 2015) or mountain gorillas (Eckardt et al., 2015), as the latter two are believed to have evolved in predictable, resource-rich environments. Studies of humans have found further support for this hypothesis in that a part of neuroticism related to worry and feelings of vulnerability is related to better physical health outcomes, including longevity (Gale et al., 2017; Weiss et al., 2019), and that these relationships appear to exist at the level of the genome (Hill et al., 2019). On the other hand, this explanation is not supported by the finding that neuroticism is present in western lowland gorillas (Gold & Maple, 1994), which also live in a predictable, resource-rich environment. It thus appears that the proposed benefits of neuroticism only partly outweigh its costs, and that further study is needed.

Development

In addition to answering questions relating to the maintenance of variation and/or the evolution of personality dimensions, comparative research has enabled researchers to test whether biological factors (McCrae & Costa, 2003) or investing in sociocultural roles (Roberts & Jackson, 2009) are the drivers of personality development. The logic here is that the roles that are hypothesized to influence personality development, such as beginning full-time employment, are absent or very different in other species. In one of these studies, King, Weiss, and Sisco (2008) compared chimpanzees to humans. In another study, Weiss and King (2015) compared chimpanzees to orangutans. The authors of these studies took into account and adjusted for the different rates of development between the great ape

species and the humans. They found that the direction and magnitude of personality age differences were mostly comparable across species, which appears inconsistent with a social roles explanation of personality development (King et al., 2008; Weiss & King, 2015). Moreover, two findings from these studies suggest that personality development is a product of natural selection. First, orangutans declined in agreeableness, suggesting that age-related increases in human and chimpanzee agreeableness may be an adaptation for living among unrelated conspecifics, which orangutans do not do (Weiss & King, 2015). Second, in contrast to humans, orangutans, and female chimpanzees, age-related declines in extraversion leveled off among male chimpanzees (King et al., 2008; Weiss & King, 2015), which may reflect an adaptation for heightened aggression in chimpanzee males (Wrangham, Wilson, & Muller, 2006).

Personality, Happiness, and Health

Human personality dimensions are associated with psychological and physical health. The study of animal personality provides insight into the mechanisms and evolutionary bases that underlie these associations.

In one case, the comparative approach has revealed why people who are lower in neuroticism and higher in extraversion, and, to a lesser degree, higher in the other three human personality dimensions, tend to be happier (DeNeve & Cooper, 1998; Steel, Schmidt, & Shultz, 2008). These findings grew from a study by King and Landau (2003), who created a four-item questionnaire that allowed raters closely familiar with the animals to assess a construct akin to subjective well-being in chimpanzees. King and Landau's analyses indicated that the four items defined a single factor, the interrater and retest reliabilities were high, and the factor was related to higher dominance, extraversion, and conscientiousness. Similar relationships have been found in other studies of personality ratings in nonhuman primates (Robinson et al., 2016; Weiss et al., 2009, 2011) and felids (Gartner, Powell, & Weiss, 2016).

King and Landau's (2003) findings were an initial indication that associations be-

tween personality and subjective well-being predated the emergence of humans and human societies. This study thus led to a search for explanations that would hold across humans, chimpanzees, and possibly other primates. One possible explanation put forward was that common genes were responsible for some aspects of personality (the dominance dimension in this case) and subjective well-being. This notion was initially supported by a quantitative genetic study of chimpanzees (Weiss, King, & Enns, 2002) and later by quantitative genetic studies of personality and subjective well-being in humans and orangutans (see Weiss & Luciano, 2015, for a review). A recent genomewide association study yielded results consistent with these earlier studies (Weiss et al., 2016). In brief, a common set of genes that give rise to individual differences in both personality and subjective well-being may have existed prior to human evolution.

Studies of personality in other species are also informative for those who seek to address why people with certain personalities tend to suffer from poorer physical health (Deary, Weiss, & Batty, 2010; Strickhouser, et al., 2017). Many mechanisms have been proposed, but those that predominate in the literature posit that human behaviors, such as dietary choices, substance use, and physical activity, are responsible (Deary et al., 2010). Studies of nonhuman animals, however, suggest that the mediation models favored in much of the human literature may provide only a partial picture of how personality translates into health. For example, a meta-analysis of studies comparing multiple species revealed that species with higher boldness and higher exploration (i.e., traits that roughly correspond to low neuroticism and high openness, respectively) live longer (Smith & Blumstein, 2008).

Studies of personality and health by comparative psychologists have largely, but not exclusively, been of nonhuman primates. These studies include two that investigated associations between personality and mortality. The first was an 18-year follow-up of zoo-housed western lowland gorillas: higher extraversion was related to mortality, but neuroticism, agreeableness, and dominance were not (Weiss, Gartner, Gold, & Stoiniski, 2013). The second was a study of chim-

panzees housed in zoos, research centers, and a sanctuary. Mortality was assessed 7 to 24 years later. Among males, longevity was related to higher agreeableness; among females, however, openness was related to longer life, but this relationship was tenuous; neither dominance, extraversion, conscientiousness nor neuroticism were related to longevity (Altschul et al., 2018).

Further studies investigated health outcomes other than mortality. The authors of one such study found that lower aggressiveness, lower “mellowness,” and higher excitability were related to morbidity in golden snub-nosed monkeys, and that sociability was related to higher morbidity in younger monkeys but lower morbidity in older monkeys (Jin, Su, Tao, Guo, & Yu, 2013). A study that examined associations between personality ratings and veterinary records revealed that rhesus macaques higher in confidence and anxiety were less likely to be injured; there appeared to be no association between these personality dimensions and illness or between injury and the four remaining dimensions, those being activity, openness, friendliness, and dominance (Robinson et al., 2018). Finally, experimental studies have demonstrated that in rhesus macaques, some common factor or factors underlie personality traits related to sociability and immune system robustness, and that these effects tend to show up in unstable social environments (see review by Capitanio, 2011).

These and similar findings (see Mehta & Gosling, 2008, for a review), and especially findings in captive animals whose diets are managed, whose health is monitored, and who receive treatment for health conditions that arise, suggest that studies of human personality and health may benefit from searching for mechanisms that can explain these associations in humans and nonhumans. Differences may be informative, too. For example, the study by Altschul et al. (2018) that did not find an association between conscientiousness and longevity in chimpanzees was based on captive samples. This means the diets of these chimpanzee subjects were controlled, they received regular health checks, and preventative measures and interventions were administered. All of this strongly supports the view that the relationship between conscientiousness and bet-

ter health in humans is mediated by individual health behaviors (Altschul et al., 2018).

In summary, the findings reviewed in this section suggest that studies of personality in animals have revealed weaknesses of some proposed evolutionary and mechanistic explanations of human personality. Studies of animal personality have also pointed to promising alternative explanations. In terms of furthering our understanding of personality, then, the need to study personality in animals can be likened to the suggestion that we study WEIRD (Westernized, educated, industrialized, rich, and democratic) humans (Henrich, Heine, & Norenzayan, 2010).

Future Directions

The evidence that personality can be measured reliably in animals, and that these measures are capturing real differences among individuals, both within and between species, is hard to dispute. Likewise, the studies described in this chapter show how animal personality research has informed our understanding of human personality, with regard to its proximate causes and consequences, and its evolutionary bases. The research described thus far represents only a small part of the extensive literature on animal personality research conducted by behavioral ecologists, comparative psychologists, and personality psychologists. Further progress could be made by research that answers the growing calls for an integration of these still-distinct research strands (Carter, Feeney, et al., 2012; Koski, 2011a; Nettle & Penke, 2010; Weiss & Adams, 2013).

One set of studies could examine associations between the domains and facets of the five-factor model and behavioral measures such as boldness, exploratory behavior, and so forth (Réale, et al., 2007), using a multitrait-multimethod framework (Campbell & Fiske, 1959). Although animal researchers have examined how personality dimensions assessed by ratings are related to specific behavioral observations (e.g., Pederson, King, & Landau, 2005) and behavioral tests (e.g., Carter, Marshall, Heinsohn, & Cowlshaw, 2012a), no comparable human

work has been done. Such studies could improve the measures and clarify what constructs are being measured by behavioral ecologists.

Future research is also needed on a wider range of species to fill in what one might describe as “phylogenetic gaps.” Next to nothing is known about personality in a vast array of primate and nonprimate species. Carefully selecting which species to study and use of phylogenetic analyses (Nunn, 2011) could lead to new findings.

Finally, there is evidence that human personality structure may differ in societies that more closely resemble those of our early human ancestors (Gurven, Von Rueden, Massenkoff, Kaplan, & Lero Vie, 2013). Likewise, there is evidence that the personality structure of chimpanzees and bonobos in captive environments may differ from their wild counterparts (Garai, Weiss, Arnau, & Furuichi, 2016; Weiss et al., 2017). However, because of differences in how personality was measured in both sets of studies, it is too early to conclude whether these differences reflect environmental influences or evolved differences brought about, for example, by self-domestication (Hare, Wobber, & Wrangham, 2012). Studies using the same personality measures in both captive and wild environments would help to resolve this question.

Conclusions

I hope that this chapter has shown the usefulness of studying animal personality, whether by behavioral ecologists or comparative psychologists, without giving the impression that it is the only way to learn about personality. Although an integrative research agenda would be useful for answering some questions, the diverse personality research ecosystem on display in this volume will ensure that other questions are not ignored, and perhaps are answered, too.

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NOTES

1. Coping styles as discussed here are not the same as those in the work on coping in the human personality literature (see Carver & Connor-Smith, 2010).

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CHAPTER 8

The Neurobiology of Personality

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Personality neuroscience is a rapidly growing field that attempts to identify the neurobiological underpinnings of psychological individual differences (Allen & DeYoung, 2017; DeYoung, 2010). Decades of research have shown that both nature and nurture, genetic and environmental forces, shape personality. Regardless of the exact proportion of distal causes that are genetic versus environmental, however, the proximal causes of personality are necessarily biological, located in the brain that generates behavior and experience. When the environment has a lasting effect on personality, it must do so by influencing the brain. Personality neuroscience is thus the approach by which we may come to understand the physical mechanisms responsible for personality. We describe in this chapter the major methods of research in personality neuroscience, provide an overview of what has been learned so far, and offer some recommendations for researchers interested in pursuing research in this field.

Methods in Personality Neuroscience

Interest in the biological mechanisms of personality is long-standing, dating back at least to ancient Rome and Galen's humoral

theory, in which personality characteristics were attributed to the preponderance of bodily substances such as phlegm and bile (Kagan, 1994). Effective scientific research on this topic, however, is relatively recent due to the need for technologies to measure the brain. Eysenck (1967) can reasonably be considered the father of modern personality neuroscience, developing theories of the neural basis of the personality traits extraversion and neuroticism and publishing the first overview of the field, but even Eysenck was quite limited by the technologies of his time. He relied on relatively nonspecific biological constructs, such as "cortical arousal," that could be measured by early electroencephalography (EEG) systems, and it was not until the emergence of functional magnetic resonance imaging (fMRI) in the 1990s and its widespread adoption in the 2000s that personality neuroscience began to generate a substantial body of evidence. Available technology is a crucial determinant of science, and there are currently at least five important categories of biological assessment used in personality neuroscience.

1. *Neuroimaging techniques.* The most prominent of these is MRI, which creates images of the brain based on the magnetic

properties of different tissue types. These can be either high-resolution images of brain structure or lower resolution images of brain function. Functional imaging with fMRI is possible because blood flow and oxygen use increase with neural activity, so that the blood-oxygen-level dependent (BOLD) signal indicates which regions of the brain are active at a given time. One limitation of fMRI is that it assesses relative rather than absolute levels of neural activation; activation during one experimental condition must be contrasted with activation during another to get a meaningful signal.

In addition to activation, fMRI can also be used to assess *functional connectivity*—patterns of temporal synchrony between different parts of the brain. Brain regions that show similar temporal patterns of activation and deactivation during some portion of a scan are deemed to be functionally connected. This analysis does not require a contrast; hence, it is often applied to data collected during periods of rest in the scanner. Patterns of spontaneous functional connectivity during rest closely resemble networks that are activated by specific tasks (Laird et al., 2011; Smith et al., 2009), a discovery that has enabled mapping of the major networks of the brain (Choi, Yeo, & Buckner, 2012; Yeo et al., 2011).

MRI is so widely used in part because it is noninvasive. This is in contrast to neuroimaging techniques such as positron emission tomography (PET) or single-photon emission computed tomography (SPECT) that require injection of radioactive material before scanning. The risk inherent in these techniques has meant they are less used in personality neuroscience, but they have the advantage of allowing measurement of receptors or transporters of particular neurotransmitters. All of these neuroimaging techniques are valuable for their impressive spatial resolution.

2. *Electrophysiological techniques.* Electroencephalography (EEG) measures the brain's electrical activity through the skull using electrodes on the scalp. It can assess neural activity by the millisecond, which is much higher temporal resolution than what is currently available from fMRI or other neuroimaging techniques, but it suffers from greatly reduced spatial resolution. Other

electrophysiological techniques, such as electrocardiography and assessment of electrodermal activity, use peripheral nervous system activity to draw inferences about neural processes related to emotion and motivation.

3. *Assays of endogenous psychoactive substances.* Measurements of substances such as hormones or neurotransmitter metabolites in blood, saliva, urine, or spinal fluid can be used to implicate specific neurobiological systems in personality.

4. *Psychopharmacological manipulation.* Psychoactive chemicals can be used as drugs to probe neurotransmitter systems involved in personality traits. Effects of administering a drug (vs. a placebo) can be assessed through effects on behavior or on biological parameters measured through one of the three categories of assessment already described. If the effects of the pharmacological manipulation are moderated by a trait, this suggests that variation in the trait is related to variation in the neural system targeted by the drug.

5. *Molecular genetics.* The study of variation in DNA can be considered neuroscience when it focuses on genes expressed in the brain. Molecular genetics has been in a rapid state of flux as a field. Much early work on personality relied on candidate gene studies, targeting variation in specific genes that seemed likely to be linked to personality. Unfortunately, results have been largely inconsistent, and most candidate gene studies have failed to replicate. Such failures do not indicate a lack of genetic influences on personality, as all personality traits are substantially heritable (Johnson & Krueger, 2004; Loehlin, McCrae, Costa, & John, 1998; Riemann, Angewitner, & Strelau, 1997). Rather, they indicate that complex traits are massively polygenic, influenced by many thousands of variations in the genome, most of which have only miniscule effects on a given trait (Munafò & Flint, 2011). Because of these challenges, we largely avoid citing candidate gene studies.

These diverse methods allow research on the neural correlates of personality traits. An important caveat is that such research

does not translate directly into knowledge of causal mechanisms, because we are limited by the inability to manipulate personality traits experimentally. Even the most experimental results of these methods, such as the effects of psychopharmacological manipulation compared to placebo, can be linked to personality typically only through moderation; that is, personality traits may be correlated with the magnitude of the effect of the manipulation. One must remember that such correlational findings can support hypotheses derived from mechanistic causal theories, but they do not provide direct evidence of causal pathways. If one finds the size of some brain structure to be correlated with a trait, for example, one does not know whether variation in the size of that structure is a cause of variation in the trait or a consequence of variation in some other mechanisms that generate the trait.

Another important caveat about personality neuroscience research is that much of it has been statistically underpowered. Neuroimaging, especially, tends to be very expensive, making it difficult to collect the large samples necessary for adequately powered research on individual differences. Nonetheless, underpowered research may be worse than no research at all, because low power increases the proportion of significant results that are false positives. Recent years have seen increasing sample sizes in personality neuroscience, a good sign for the future of the field. In our review, we attempt to focus on larger and more rigorous studies whenever possible, and to note when studies have problematically small samples. (For more in-depth discussions of methodological issues in personality neuroscience, see Allen & DeYoung, 2017; Yarkoni, 2015.)

Causal Implications of the Personality Hierarchy

Personality traits are probabilistic descriptions of relatively stable patterns of emotion, motivation, cognition, and behavior (DeYoung, 2015; Fleeson & Gallagher, 2009). Traits can be arranged hierarchically, based on their patterns of covariance, typically identified through factor analysis. Traits at higher levels of the hierarchy reflect the

tendency of traits at lower levels to co-occur within individuals. The most well-studied level of the hierarchy contains the so-called “Big Five”—extraversion, neuroticism, openness/intellect, conscientiousness, and agreeableness—which are the best validated broad dimensions of covariation among personality traits (John, Naumann, & Soto, 2008; Markon, Krueger, & Watson, 2005). They also constitute the most widely used taxonomy for categorizing other traits, making them useful for the purpose of reviewing a diverse research literature. Where possible, we describe studies in terms of the Big Five, even if they used questionnaires that did not employ standard Big Five labels.

At the bottom of the trait hierarchy are relatively narrow traits, often called *facets*. No consensus exists regarding the number and identity of facets subsumed beneath each of the Big Five. However, evidence from both genetic and standard factor analysis suggests another level of the hierarchy between the facets and the Big Five (Jang et al., 2002; DeYoung, Quilty, & Peterson, 2007), at which each of the Big Five can be divided into exactly two *aspects*, representing the most important distinction for discriminant validity within each of the Big Five. In our review, we focus primarily on the Big Five, but we sometimes find it useful to consider the aspect-level traits as well, when they show divergent associations with neural parameters.

Although the Big Five were originally conceived as independent dimensions and the highest level of the trait hierarchy, they are in fact regularly intercorrelated, in a pattern that reveals the existence of two higher-order factors or *metatraits*, known as *stability* (the shared variance of conscientiousness, agreeableness, and low neuroticism) and *plasticity* (extraversion and openness/intellect). We have developed the hypothesis that the metatraits are influenced by global levels of serotonin and dopamine respectively (DeYoung, 2006, 2013), but we do not dwell on that hypothesis in this review, because most of the evidence comes from studies of the Big Five considered separately and so is described within the sections below for each of the Big Five. (One important exception is a recent pharmacological manipulation study [$N = 441$], which directly confirmed that se-

rotonin function is associated with stability; Wright et al. [2019].)

We have now mentioned four levels of the trait hierarchy. In descending order, they are metatraits, the Big Five, aspects, and facets. What are the causal implications of this hierarchical structure? Perhaps most importantly, factor analysis cannot indicate the nature or number of the forces that cause traits to covary. The existence of a single statistical factor does not indicate the existence of a single cause. It merely indicates that some force or set of forces, of any number, causes the lower-level traits within that factor to covary. In other words, factors are merely descriptive entities; they are not explanatory. The most plausible models linking personality to brain function indicate that the variance of any one trait dimension is likely to be caused by multiple neural parameters (Allen & DeYoung, 2017; Yarkoni, 2015; Zuckerman, 2005). Nonetheless, the hierarchy does suggest one useful principle: that at any given level, some forces affect each trait specifically, but other forces affect all traits that are grouped together at the next higher level. For example, the forces influencing extraversion cause its two aspects, assertiveness and enthusiasm, to covary, but other forces exist that differentiate the two aspects. Each level of the hierarchy is likely to have its own set of neural correlates.

Another important caveat is that the trait hierarchy, as typically represented, is an oversimplification, because traits do not have simple structure, especially below the level of the Big Five. In other words, aspects and facets covary with each other in ways not indicated by the standard hierarchical diagrams. For example, although extraversion and agreeableness are unrelated, lower-level traits within extraversion show a complex pattern of positive and negative associations with lower-level traits within agreeableness (DeYoung, Weisberg, Quilty, & Peterson, 2013). Thus, in addition to the fact that a single trait is likely to have multiple causes, even more causal connections exist than are suggested by our standard hierarchical models of traits. The neurobiology of personality is extremely complex, and we are just beginning to scratch the surface of it.

Nonetheless, we believe that progress can be made, especially by drawing on theories

of the psychological functions that unify personality traits (e.g., Dennisen & Penke, 2008; DeYoung, 2015; Nettle, 2006). If a psychological function can be identified underlying a trait, then we can rely on existing knowledge of brain function to identify candidate brain systems that contribute to that psychological function and, hence, are likely to be involved in the trait in question. Early attempts at personality neuroscience tended to focus on particular brain regions or single neurotransmitters. Neuroscience research, in general, has been moving away from a focus on individual regions of the brain to a focus on networks of interacting regions that cooperate to carry out various functions. Due to limitations of space, we restrict our review of existing knowledge in personality neuroscience to an overview of the most compelling findings, which typically are not only those that are especially methodologically rigorous but also those that link traits to theoretically relevant brain systems (for a more comprehensive review, see Allen & DeYoung, 2017). Table 8.1 provides an overview of most of the neural correlates discussed in the chapter.

Extraversion

Current theories of the neural basis of extraversion stem largely from the work of Depue and Collins (1999), who linked it to dopamine and the brain's reward system. They were inspired by the work of Gray (1973; Pickering & Gray, 1999), a student of Eysenck, who developed an influential approach to personality neuroscience called reinforcement sensitivity theory, which attempted to connect personality to the neural processes that govern reward and punishment. Gray referred to the reward system as the behavioral approach system (BAS). Although Gray originally speculated that the trait most closely reflecting BAS sensitivity might be impulsivity, subsequent research indicates that extraversion is a better candidate, and that questionnaires explicitly designed to assess BAS sensitivity are typically most closely aligned with extraversion (Pickering, 2004; Quilty, DeYoung, Oakman, & Bagby, 2014; Wacker, Mueller, Hennig, & Stemmler, 2012; Zelenski & Larsen, 1999).

TABLE 8.1. Likely Neural Correlates of the Big Five and Their 10 Aspects

	Neurotransmitters and hormones	Brain structures and regions	Large-scale brain networks
Extraversion	Dopamine (value system)	Substantia nigra and ventral tegmental area Nucleus accumbens Medial orbitofrontal cortex Amygdala	Reward or valuation network
Assertiveness	—	—	—
Enthusiasm	Endogenous opiates	—	—
Neuroticism	Serotonin Cortisol	Amygdala Hypothalamus Insula Medial prefrontal cortex and anterior cingulate cortex Dorsolateral prefrontal cortex	Fight–flight–freeze system Hypothalamic–pituitary–adrenal axis
Withdrawal	—	Hippocampus	Behavioral inhibition system
Volatility	—	—	—
Openness/intellect	Dopamine (salience system)	Substantia nigra and ventral tegmental area	Default network
Intellect	—	Dorsolateral prefrontal cortex	Frontoparietal control network
Openness to experience	—	Reduced coherence in frontal white matter	—
Conscientiousness	Serotonin	Dorsolateral prefrontal cortex Insula Lateral orbitofrontal cortex	Ventral attention network Salience network
Industriousness	—	—	—
Orderliness	—	—	—
Agreeableness	—	—	—
Compassion	—	Insula	Default network
Politeness	Serotonin Testosterone	—	—

Note. This list is not intended to be exhaustive.

Both behavioral and neural research have provided evidence that the core psychological function underlying extraversion is sensitivity to reward (DeYoung, 2015; Smillie, 2013; Wacker & Smillie, 2015). People high in extraversion are highly sociable because they find social interactions more rewarding than do people low in extraversion; they are assertive and driven because they are more motivated to pursue rewards; and they experience more positive emotions because they find more experiences rewarding.

The brain's reward or valuation network comprises the regions of the midbrain (just

above the brainstem) that contain the cell bodies of dopaminergic neurons (known as the substantia nigra and the ventral tegmental area) and also the various regions to which those dopaminergic neurons project axons that release dopamine. The latter regions include subcortical nuclei (nucleus accumbens and caudate nucleus), the anterior cingulate cortex (ACC), and the medial orbitofrontal cortex (OFC; sometimes labeled ventromedial prefrontal cortex). Although not often considered in relation to reward, the amygdala is also important for this network, because it is involved in processing

the emotional salience of rewarding as well as threatening stimuli (Stillman, Van Bavel, & Cunningham, 2015). fMRI studies have found neural activity in response to rewarding or pleasant stimuli to be associated with extraversion in all of these regions; however, almost all of these have used samples smaller than 20, rendering their evidentiary value quite low. One somewhat larger study ($N = 52$), which increased reliability by focusing only on brain regions that responded consistently to monetary gains or losses in a retest over 2.5 years later, found that extraversion predicted activity in the nucleus accumbens during anticipation of gaining \$5 (Wu, Samanez-Larkin, Katovich, & Knutson, 2014).

The best supported finding in personality neuroscience is probably the association of extraversion with dopamine. At least nine studies have indicated that the effects of manipulating dopamine pharmacologically are moderated by extraversion (Chavanon, Wacker, & Stemmler, 2013; Depue, Luciana, Arbisi, Collins, & Leon, 1994; Mueller et al., 2014; Rammsayer, 1998; Rammsayer, Netter, & Vogel, 1993; Wacker, Chavanon, & Stemmler, 2006; Wacker, Mueller, Pizzagalli, Hennig, & Stemmler, 2013; Wacker & Stemmler, 2006). One study showed that participants high in extraversion were more sensitive to the rewarding properties of a dopamine agonist (a drug that increases dopaminergic function) than those low in extraversion, such that they responded more energetically and experienced greater positive affect in response to stimuli that had previously been paired with the drug experience, relative to unpaired stimuli and relative to introverts (Depue & Fu, 2013).

The association of extraversion with dopamine has also been supported more indirectly through a line of EEG research on an electrical waveform known as the *reward positivity* (confusingly, this waveform is more commonly known as “feedback-related negativity,” but Proudfit [2015] has convincingly demonstrated that it is really a positive-going waveform related to reward). The reward positivity appears 200–350 milliseconds after receiving feedback about an outcome and reflects dopaminergic signaling in the dorsal ACC (Hauser et al., 2014). It spikes in response to better-than-expected

outcomes and declines below baseline in response to worse-than-expected outcomes, a pattern that is also evident in the firing of many dopaminergic neurons in other species (DeYoung, 2013; Sambrook & Goslin, 2015). Studies of both adults and children indicate that extraversion predicts the amplitude of the reward positivity (Bress & Hajcak, 2013; Cooper, Duke, Pickering, & Smillie, 2014; Kujawa et al., 2015; Lange, Leue, & Beauducel, 2012; Smillie, Cooper, & Pickering, 2011; Smillie et al., 2019).

Dopamine directly produces desire or “wanting” rather than pleasure or “liking” of rewards (Berridge, Robinson, & Aldridge, 2009). Its release causes learning about what is desirable and motivates behavioral pursuit of rewards. However, people high in extraversion also report increased enjoyment of rewards, reflected in their higher levels of positive emotionality. Pleasure in response to reward is governed by a neurotransmitter system involving endogenous opiates. The dopaminergic and opiate systems interact closely, especially in the nucleus accumbens (Peciña, Smith, & Berridge, 2006). When dopaminergic drugs, such as amphetamine, produce pleasure, this is due to the release of opiates, and when opiate-mediated enjoyment of rewards (e.g., food) increases desire for those rewards, this is because the dopaminergic system has been activated (Berridge et al., 2009; Jayaram-Lindström, Wennberg, Hurd, & Franck, 2004). Nonetheless, these are two distinct neurotransmitter systems, which may help to explain the difference between the two aspects of extraversion: assertiveness and enthusiasm. Assertiveness (also called “agentic extraversion”) appears to be more purely tied to variation in desire rather than enjoyment given that it does not include descriptions of positive emotionality and was more strongly associated with dopamine in some pharmacological studies than was enthusiasm (Mueller et al., 2014; Wacker et al., 2012). Enthusiasm, which encompasses positive emotionality as well as sociability, may reflect variation in opiates as well as dopamine, although evidence for this link is scarce. One study showed that social closeness, a good indicator of enthusiasm, moderated sensitivity to an opiate manipulation (Depue & Morrone-Strupinsky, 2005; DeYoung et al., 2013).

The primary cortical component of the reward system is the medial OFC (mOFC), a region involved in monitoring the reward value of stimuli through integration of hedonic and sensory information (Berridge & Kringelbach, 2008). Several structural MRI studies have detected positive associations of extraversion with volume of mOFC (Cremers et al., 2011; DeYoung et al., 2010; Omura, Constable, & Canli, 2005), though other large studies have failed to replicate this result (Bjørnebekk et al., 2013; Liu et al., 2013; Riccelli et al., 2017), and one found the effect in women but an opposite effect in men (Li et al., 2014). Two additional studies that successfully replicated the effect are notable because, unlike the other studies cited, they tested associations with the mOFC as an *a priori* region of interest, thus increasing power dramatically by avoiding testing the whole brain (Grodin & White, 2015; Urošević, Collins, Muetzel, Lim, & Luciana, 2012). (Tests across the whole brain require correcting significance levels for a great many individual statistical tests.) Additionally, Urošević et al. found that baseline mOFC volume predicted increases in extraversion over a 2-year period in adolescence. Some evidence from functional imaging also implicates the mOFC in extraversion, with one study finding that extraversion predicted greater functional connectivity between mOFC and other brain regions when making decisions about rewards, and another showing a correlation between extraversion and glucose metabolism in mOFC while at rest (Civai, Hawes, DeYoung, & Rustichini, 2016; Volkow et al., 2011).

A few structural and functional studies suggest that the amygdala might be implicated in extraversion, presumably because of its involvement in the salience of rewarding stimuli. Two studies indicated associations between amygdalar volume and extraversion, though one of these was in the left amygdala and the other was in the right (Cremers et al., 2011; Lewis et al., 2014), whereas another found no association (Cherbuin et al., 2008). A study of functional connectivity found that extraversion was correlated with connectivity between the amygdala and other regions of the reward network (Aghajani et al., 2013).

Neuroticism

Neuroticism describes the tendency to experience all forms of negative emotion— anxiety, stress, depression, anger, irritability, insecurity, panic, and so forth. Widespread agreement exists that neuroticism reflects variation in the biological systems governing defensive responses to threat, punishment, and uncertainty (Allen & DeYoung, 2017; Shackman et al., 2016). In Gray's reinforcement sensitivity theory, neuroticism was hypothesized to reflect the joint sensitivity of the two major defensive systems, the behavioral inhibition system (BIS) and the fight-flight-freeze system (FFFS; Gray & McNaughton, 2000). The BIS controls response to threats in the form of conflicts between goals, most often approach–avoidance conflicts (e.g., wanting to approach a potential mate, but also wanting to avoid rejection). When conflict or uncertainty is detected, the BIS increases passive avoidance, involving heightened anxiety, increased vigilance and rumination, and inhibition of approach behavior. The FFFS, in contrast, is sensitive to situations in which one's only motivation is to escape or eliminate a threat, and it triggers active defensive responses, such as panicked flight or defensive anger. At the core of the BIS, neuroanatomically, are medial temporal lobe structures, including the hippocampus and amygdala, whereas at the core of the FFFS are structures in the midbrain and brainstem, including the hypothalamus and periaqueductal grey (though the amygdala is involved in the FFFS as well, and the two systems interact closely). Research on the neural correlates of neuroticism largely confirms these associations, while also implicating several cortical regions that regulate the subcortical structures associated with the BIS and FFFS.

Neuroticism is the largest risk factor for most mental disorders and hence has received more neuroscientific attention than other Big Five traits (Lahey, 2009). The brain structure most frequently linked to neuroticism is the amygdala, an almond-shaped cluster of nuclei located subcortically. The amygdala orchestrates vigilance in response to relevant information, including reallocation of attention and arousal of the sympathetic nervous system. (We use

the term *amygdala* to refer to the “extended amygdala,” which also includes the neighboring bed nucleus of the stria terminalis, which appears to be particularly important for maintaining vigilance in response to prolonged or uncertain threat [Shackman et al., 2016].)

A number of (fMRI studies in adults indicate that neuroticism is positively associated with amygdala activation during a range of tasks involving threatening, uncertain, or ambiguous stimuli (Everaerd, Klumpers, Wingen, Tendolkar, & Fernández, 2015; Hyde, Gorka, Manuck, & Hariri, 2011; Schuyler et al., 2014; Somerville, Whalen, & Kelley, 2010). Other studies have not detected the link between amygdala activation and neuroticism (Servaas et al., 2013), and it is possible that the relation between amygdalar function and neuroticism is contingent on other variables. For example, in one fMRI study, neuroticism was associated with an increase in amygdalar response to fearful faces, but only during an acute stress induction (Everaerd et al., 2015). This is consistent with findings that individuals high in neuroticism are especially prone to negative affect under stressful conditions (Shackman et al., 2016). In another fMRI study, neuroticism was negatively associated with the rate of decline in amygdalar activation following presentation of an aversive stimulus, rather than with the initial level of amygdalar activation (Schuyler et al., 2014). Others have found that the relation is moderated by social support (Hyde et al., 2011), or is restricted to a specific region of the amygdala (Somerville et al., 2010). Clearly, further research in large samples is necessary. One large study of youth ($N = 875$) found that neuroticism was associated positively with cerebral blood flow in the amygdala while at rest (Kaczurkin et al., 2016).

In structural MRI, several studies of adults indicate positive associations between neuroticism and amygdalar volume (Barrós-Loscertales et al., 2006; Iidaka et al., 2006; Koelsch, Skouras, & Jentschke, 2013), but others have indicated no association (Cherbuin et al., 2008; DeYoung et al., 2010; Fuentes et al., 2012; Liu et al., 2013). Perhaps the most likely explanation of this inconsistency is that the true effect size is small, requiring very large samples to yield

consistent findings. In a study of over 1,000 people, neuroticism was weakly, but positively, correlated with the volume of both amygdala and hippocampus, $r \approx .1$ (Holmes et al., 2012). To detect a correlation of .1 with 80% power requires a sample of 783.

The hippocampus abuts and influences the amygdala and is particularly implicated in conflict detection and anxiety (Gray & McNaughton, 2000). In a meta-analysis, neuroticism was positively associated with hippocampal activation during fear learning—that is, learning to predict punishments from environmental cues (Servaas et al., 2013). Several PET studies have also found a link between resting-state hippocampal activity and neuroticism (Gray & McNaughton, 2000; Sutin, Beason-Held, Dotson, Resnick, & Costa, 2010). The link between the hippocampus and neuroticism was even supported by a PET study of 238 rhesus monkeys, in which anxious temperament predicted metabolic activity in the hippocampus (Oler et al., 2010). The greater hippocampal volume and activation associated with neuroticism may increase the detection of uncertainty and potential goal conflicts (Gray & McNaughton, 2000).

One important target of amygdalar output is the hypothalamus, which forms the top of the hypothalamic–pituitary–adrenal (HPA) axis that controls the body’s response to stress. The HPA response begins with the release of corticotropin-releasing hormone (CRH) from the paraventricular nucleus of the hypothalamus and ends with the release of the stress hormone cortisol from the adrenal glands. In both adults and children, neuroticism is positively associated with cortisol levels (Garcia-Banda et al., 2014; Gerritsen et al., 2009; G. Miller, Cohen, Rabin, Skoner, & Doyle, 1999; Nater, Hoppman, & Klumb, 2010; Polk, Cohen, Doyle, Skoner, & Kirschbaum, 2005; Schmidt, Fox, Rubin, Sternberg, & Gold, 1997; Tyrka et al., 2010; but see K. Miller et al., 2016, for a large study that found an association with extraversion and not neuroticism). The chronic stress associated with neuroticism may be responsible for some of its more diffuse neural correlates, because an overabundance of cortisol potentiates excitotoxic cell death in neurons. In other words, stress can damage the brain. This may explain why neuroti-

cism is negatively related to global measures of brain volume (Bjørnebekk et al., 2013; Jackson, Balota, & Head, 2011; Knutson, Momenan, Rawlings, Fong, & Hommer, 2001; Liu et al., 2013).

Various cortical regions regulate the subcortical defensive systems we described earlier, and several of these have been linked to neuroticism. One of these is the insula, or insular cortex, a part of the frontal lobe hidden behind the temporal lobe. The insula acts as a hub integrating interoceptive, emotional, and cognitive information (Chang, Yarkoni, Khaw, & Sanfey, 2012). Neuroticism has been found to predict greater blood flow to the insula at rest (Kaczurkin et al., 2016), and also insular activity in anticipation of losing \$5 (Wu et al., 2014).

Another cortical region linked to neuroticism and emotion regulation is in medial prefrontal cortex (mPFC) and adjacent ACC (Etkin, Egner, & Kalisch, 2011). The study with over 1,000 participants we cited earlier reported that neuroticism was associated with lower cortical thickness in this region (Holmes et al., 2012). Smaller studies, yet still with hundreds of participants, have produced mixed results for this region (Bjørnebekk et al., 2012; Riccelli et al., 2017), but this is exactly what one should expect if the effect size ($r = .1$) estimated by Holmes et al. (2012) is accurate. Other studies have found that neuroticism is associated with both structural and functional connectivity between mPFC and amygdala (Cremers et al., 2010; Davey et al., 2015; Jalbrzikowski et al., 2017). The ability of this region of cortex to influence the amygdala may be crucial for the regulation of negative affect.

A third region of the PFC linked to neuroticism is the dorsolateral prefrontal cortex (dlPFC), which appears to play a role in top-down regulation of negative affect in response to cues of potential threat. Under conditions of uncertain threat, lower levels of dlPFC–amygdala functional connectivity have been associated with higher neuroticism in children and anxious temperament in rhesus monkeys (Birn et al., 2014), suggesting that the influence of this circuit on neuroticism is evolutionarily conserved. A large study of brain-damaged patients showed that lesions to the dlPFC (as opposed to other regions) were associated with

increased neuroticism, further supporting this region's regulatory role (Forbes et al., 2014).

All of the systems implicated in neuroticism are modulated by serotonin, and recent fMRI studies show that potent serotonin agonists, such as psilocybin and 3,4-methylenedioxy-methamphetamine (MDMA) (which reduce or completely abolish subjective ratings of anxiety and fear), attenuate amygdalar reactivity to negative stimuli during the period of acute drug effects (Bedi, Phan, Angstadt, & De Wit, 2009; Kraehenmann et al., 2015, 2016). Several lines of evidence implicate variation in serotonergic function in neuroticism. Selective serotonin reuptake inhibitors (SSRIs), which increase serotonergic function by blocking its removal from synapses, are commonly used to treat anxiety and depression, and SSRI-induced reductions in symptoms of these disorders are mediated by declines in neuroticism over the course of treatment (Du, Bakish, Ravindran, & Hrdina, 2002; Quilty, Meusel, & Bagby, 2008; Tang et al., 2009). Further, a recent meta-analysis shows that neuroticism is the personality trait that changes most following SSRI treatment (Roberts et al., 2017). PET studies (albeit in small samples) have found neuroticism to be associated with variation in serotonin receptor or transporter binding (Frokjaer et al., 2008; Takano et al., 2007; Tauscher et al., 2001). One study using a pharmacological probe to assess participants' typical level of serotonergic function revealed that it was negatively associated with a standard questionnaire measure of neuroticism (Flory, Manuck, Matthews, & Muldoon, 2004). Interestingly, this study also assessed mood daily for a week and found that lower serotonergic function was associated with the absence of positive mood from day to day rather than the presence of negative mood.

Despite these converging lines of evidence, the link between serotonin and neuroticism appears complex, and much uncertainty remains. SSRIs are not effective in a substantial percentage of depressive patients, and a week-long course of SSRIs has been demonstrated to *increase*, rather than decrease, neural reactivity to emotionally negative stimuli in people high in neuroticism (Di

Simplicio, Norbury, Reinecke, & Harmer, 2014). Similarly, direct administration of serotonin to the hippocampus increases anxiety in studies of nonhuman animals, and some forms of depression may even be associated with elevated rather than reduced serotonin function (Andrews, Bharwani, Lee, Fox, & Thomson, 2015; Dale et al., 2016; Gray & McNaughton, 2000). One possibility is that different facets of neuroticism are influenced differently by serotonin. The two major aspects of neuroticism are *withdrawal* (encompassing anxiety, depression, and insecurity) and *volatility* (encompassing anger, irritability, and emotional lability). A recent review suggested that SSRIs might have more influence on facets of neuroticism reflecting volatility (particularly angry hostility) than on those reflecting withdrawal (Ilieva, 2015). Similarly, a recent clinical trial in a sample of individuals scoring high on hostility found that 2 months of SSRI treatment significantly reduced anger and irritability (Kamarck et al., 2009).

Openness/Intellect

Openness/intellect (O/I) encompasses a broad domain of traits reflecting forms of cognitive exploration, including imagination, curiosity, creativity, aesthetic and intellectual interests, and unconventionality (DeYoung, 2015; DeYoung, Grazioplene, & Peterson, 2012). Individuals high in O/I exhibit heightened preference and ability to engage with complex information and are more likely to become absorbed in both inward and outward experience. Even more than for the other Big Five dimensions, the distinction between the two aspects of O/I (evident in its compound label) appears to be crucial for studying its neural correlates. *Intellect* reflects engagement with abstract or semantic information through reasoning, whereas *openness to experience* reflects engagement with sensory information through perception, art, and fantasy (DeYoung, 2015; DeYoung et al., 2007). (We use “openness” and “intellect” to refer to the aspects, while reserving “O/I” for the Big Five dimension.) Intellect predicts creative achievement in the sciences, whereas openness predicts creative achievement in

the arts (Kaufman et al., 2016). Importantly, O/I is the only Big Five trait substantially associated with performance tests of intelligence (IQ), and this association is driven by variance unique to Intellect (DeYoung, Quilty, Peterson, & Gray, 2014). The unique variance of openness, on the other hand, is associated with positive schizotypy (magical thinking, unusual thoughts and experiences) and hence appears to be a risk factor for psychosis (Chmielewski, Bagby, Markon, Ring, & Ryder, 2014; DeYoung et al., 2012; DeYoung, Carey, Krueger, & Ross, 2016).

In contrast to extraversion and neuroticism, many of the traits encompassed by O/I have no obvious analogue in nonhuman animals; no other species creates representational art or philosophy, for example. However, curiosity appears to provide a motivational core to the trait, also seen in other species, and curiosity is clearly linked to dopamine (Panksepp, 1998). Several lines of indirect evidence support the theory that O/I is linked to individual differences in dopamine function (DeYoung, 2013). Whereas extraversion is linked to dopaminergic signaling that encodes the value of stimuli, research in other mammals suggests that curiosity (indexed by exploratory behavior) is linked to a distinct type of dopaminergic neurons that encode salience rather than value. These neurons increase their firing rate to stimuli that are both better and worse than expected and appear to promote information gathering and processing, particularly via dopaminergic projections to the dlPFC (Bromberg-Martin, Matsumoto, & Hikosaka, 2010). O/I has been associated behaviorally with reduced latent inhibition (an automatic process whereby stimuli previously deemed irrelevant are blocked from awareness), and dopamine decreases latent inhibition, suggesting that those high in O/I might have a dopaminergically driven tendency to find more information salient (Peterson, Smith, & Carson, 2002).

A recent study tested a hypothesis explicitly derived from the dopamine theory of O/I (Passamoniti et al., 2015). In fMRI during rest, as well as while participants smelled pleasant odors and viewed images of food, O/I was correlated with functional connectivity between the small region of the mid-brain where dopaminergic neurons originate

and regions of dlPFC. Extraversion, in contrast, was associated with connectivity between the dopaminergic region and the nucleus accumbens and caudate nucleus (and only during rest). Because the dlPFC plays an important role in voluntary attention, this finding suggests more dopaminergically driven attention to sensory stimuli in people high in O/I and may help to explain their heightened curiosity and pleasure in sensory experience.

Much of the dlPFC is part of a broader neural network known as the *cognitive control* or *frontoparietal network*, which appears to be crucial for intelligence and working memory (Jung & Haier, 2007; Vincent, Kahn, Snyder, Raichle, & Buckner, 2008). *Working memory* is the voluntary maintenance and manipulation of information in short-term memory and appears to be the most important cognitive function contributing to intelligence (Conway, Kane, & Engle, 2003). This network is likely to be crucial for intellect, and one fMRI study found that intellect (but not openness) predicted neural activity in regions of this network during a working memory task (DeYoung, Shamosh, Green, Braver, & Gray, 2009). Specifically, these were regions of PFC in which neural activity was associated with accurate working memory performance, which was also correlated with intellect but not openness.

Whereas the frontoparietal network is likely to be most relevant to intellect specifically, another of the brain's major networks is likely to be important for O/I more broadly. This is the so-called "default network," which was discovered fortuitously as a set of regions that were more active during rest than during various cognitive tasks (including working memory tasks). Later, however, certain tasks (e.g., episodic memory tasks) were shown to activate this network reliably (Andrews-Hanna, Smallwood, & Spreng, 2014). Its functions have been described in terms of "self-generated thought," and many of them involve imagination or simulation in one form or another. Imagining the past, the future, or any hypothetical scenario requires the default network, making it a promising candidate as a substrate of O/I (DeYoung, 2015). In a recent functional connectivity study, Beaty et al. (2016) explicitly tested this hypothesis in two independent samples

and showed that efficiency of information processing among the core regions of the default network was positively associated with O/I.

The majority of reasonably large structural MRI studies have found no association between O/I and measures of regional volume, cortical area, or cortical thickness (Bjørnebekk et al., 2012; DeYoung et al., 2010; Liu et al., 2013). However, in the largest such study to date ($N = 507$), Riccelli et al. (2017) detected a number of associations between O/I and cortical morphometry. O/I was associated with decreased cortical thickness (but increased surface area) in the postcentral sulcus of the parietal lobe, which is similar to the findings of a longitudinal study reporting that volume loss in a similar parietal region was linked to increases in O/I (Taki et al., 2013). This parietal region appears to be part of the frontoparietal network implicated in working memory, as do several of the other regions where Riccelli et al. (2017) found associations of cortical morphometry with O/I, in the dlPFC and cingulate cortex. Several other associations were detected in the occipital lobe, which is largely responsible for vision; this seems congruent with the heightened sensory awareness associated with openness.

Evidence for a neural correlate specific to openness rather than intellect is emerging from studies of white-matter structure. *White matter* (WM) refers to the bundles of axons that connect different parts of the brain, and the coherence of these bundles or tracts can be assessed using a form of MRI called diffusion tensor imaging (DTI). Several DTI studies have examined the association of O/I with WM coherence with apparently conflicting results. One found a positive association of O/I with WM coherence in the frontal lobes (Xu & Potenza, 2012), another found no association (Bjørnebekk et al., 2013), and yet another found a negative association (Jung, Grazioplene, Caprihan, Chavez, & Haier, 2010). What distinguished the third of these from the other two is that Jung et al. controlled for IQ, which is positively correlated with WM coherence throughout much of the brain (Chiang et al., 2009; Grazioplene Chavez, Rustichini, & DeYoung, 2016; Penke et al., 2012). Because O/I is associated with IQ,

failure to control for IQ may produce misleading results. Further, studies of schizophrenia spectrum disorders indicate that psychosis risk is negatively associated with frontal WM coherence (Canu, Agosta, & Filippi, 2015). Taken together, these findings suggest that intellect (which is linked to intelligence) and openness (which is linked to psychosis risk) are likely to show differential associations with WM coherence. A study examining intellect and openness separately (and controlling for IQ) found that only openness was associated with reduced frontal WM coherence (Grazioplene et al., 2016). The functional consequences of WM coherence is not well understood. Tests of creativity have also been linked to reduced frontal WM coherence (Jung et al., 2010), suggesting that lower WM coherence, like openness itself, might be associated with benefits as well as risks. The human capacity for cognitive exploration is extremely complex and sophisticated, rendering it unsurprising that O/I would have a complex and extensive set of neural correlates.

Conscientiousness

Conscientiousness reflects the tendency to be hardworking, organized, self-disciplined, and orderly. These traits require prioritizing nonimmediate goals, following rules, avoiding distractions, and suppressing disruptive impulses. Impulsivity is sometimes considered the opposite of conscientiousness, but there are several kinds of impulsivity, and some are more closely related to conscientiousness than others (DeYoung & Rueter, 2016; Whiteside & Lynam, 2001). Nonetheless, for our purposes in this chapter, we consider research on impulsivity together with conscientiousness.

Conscientiousness is phylogenetically recent. Of numerous species studied, only our nearest evolutionary neighbors, bonobos and chimpanzees, display a major trait dimension analogous to conscientiousness (Gosling & John, 1999; Weiss et al., 2015), and human beings greatly outstrip even these two species in the ability to guide behavior toward complex future goals. This ability is thought to have arisen primarily through the hominid evolutionary expansion of the pre-

frontal cortex, which enables complex planning and problem solving (Bunge & Zelazo, 2006; E. Miller & Cohen, 2001). A number of structural MRI studies have found positive associations of conscientiousness with the volume of regions in dlPFC (Bjørnebekk et al., 2013; DeYoung et al., 2010; Kapogiannis, Sutin, Davatzikos, Costa, & Resnick, 2013; Riccelli et al., 2017; but see Liu et al., 2013, for a failure to replicate). Similarly, a large study of brain-damaged patients showed that focal lesions of the dlPFC were associated with lower conscientiousness (Forbes et al., 2014).

The association of conscientiousness with dlPFC creates a puzzle, because conscientiousness is unrelated, or even slightly negatively related, to working memory and intelligence, which are commonly linked to dlPFC (DeYoung et al., 2009, 2014; DeYoung, 2011). However, another major functional network, in addition to the frontoparietal network, has a node in dlPFC (Yeo et al., 2011), and one study ($N = 218$) indicated that functional connectivity in this network is positively associated with conscientiousness (Rueter, Abram, MacDonald, Rustichini, & DeYoung, 2018). This network combines two networks previously described as *ventral attention* or *salience*, and appears crucial for determining the priority of goals and reorienting attention away from distractors and toward goal-relevant stimuli (Fox, Corbetta, Snyder, Vincent, & Raichle, 2006; Uddin, 2015). As mapped by Yeo et al. (2011), this *goal priority network* (Rueter et al., 2018) includes regions in the right inferior frontal gyrus, anterior insula, temporoparietal junction, the middle frontal gyrus (in dlPFC), and dorsal ACC and adjacent medial frontal cortex.

A number of studies have linked conscientiousness, or related traits such as effortful control and impulsivity, to the structure of the insula, with most reporting that a smaller insula (by metrics such as cortical thickness or grey matter volume) was associated with higher levels of conscientiousness (Churchwell & Yurgelun-Todd, 2013; Liu et al., 2013; Nouchi et al., 2016; Riccelli et al., 2017). In an fMRI study of response inhibition, impulsivity was negatively associated, on trials when inhibition was required, with neural activity in the anterior insula and lat-

eral frontal cortex (Farr, Hu, Zhang, & Li, 2012). On the same trials, impulsivity was also associated with less functional connectivity between right anterior insula and regions of the PFC and visual cortex. One reasonable interpretation of these findings is that the insula is involved in the generation of potentially distracting impulses, whereas regions of lateral PFC are involved in restraining those impulses.

Potentially in keeping with this interpretation, a DTI study of white matter in 556 older adults found that conscientiousness was positively associated with WM coherence in the uncinate fasciculus, a WM tract connecting the insula to frontal regions (Lewis et al., 2016). Conscientiousness may depend in part on the efficiency with which regions of PFC can influence the insula. Notably, the association between WM coherence and conscientiousness in this study was attributable to variance shared with agreeableness and low neuroticism—that is, to the metatrait stability. Given that the behavioral correlates of stability typically involve self-control and restraint versus impulsivity, it would not be surprising if some of the neural correlates of conscientiousness are linked to the top-down control of emotional or aggressive impulses more generally associated with stability (DeYoung, 2015; Hirsh, DeYoung, & Peterson, 2009).

Not all brain regions linked to conscientiousness are part of the goal priority network. One additional region that has been linked repeatedly to conscientiousness is the lateral OFC (Cheetham et al., 2017; Jackson et al., 2011; Matsuo et al., 2009; Nouchi et al., 2016). The lateral OFC appears to be important for encoding the contrasting values of different outcomes, a function of clear importance for the ability to prioritize different goals that seems to be central to conscientiousness (Rudebeck & Murray, 2011).

Finally, conscientiousness, like neuroticism, may be linked to serotonin. In a pharmacological study, Manuck et al. (1998) found that conscientiousness was positively associated with serotonergic function in men. A similar study failed to replicate this effect, but its sample was only half as large (Brummett et al., 2008). In a PET study (Zientek et al., 2016), serotonin transporter availability was correlated with effortful

control in dlPFC, OFC, and dorsal ACC, all regions that have been implicated in conscientiousness.

Agreeableness

Agreeableness encompasses a variety of traits linked to cooperation and altruism. As a social species, humans must coordinate their goals with those of others, and this coordination is enabled by neural systems that process and respond to social information. Yet there is obvious variation in the degree that individuals are motivated or able to coordinate with others, rather than ignoring or exploiting them, and this variation is reflected in agreeableness. The two aspects of agreeableness are *politeness*, which encompasses tendencies to follow social rules and avoid aggressive or exploitative behavior, and *compassion*, which encompasses empathy, sympathy, and kindness (DeYoung et al., 2007). Individual differences in agreeableness, therefore, seem likely to reflect variation in neural systems that orchestrate aggression, inhibitory control, representation of the mental states of others (also called *mentalizing* or *theory of mind*), and caring for others emotionally. One study found that agreeableness positively predicted performance on a theory-of-mind test (Nettle & Liddle, 2008), and another indicated that this association was specific to facets reflecting compassion and lack of aggression; facets reflecting honesty and unwillingness to manipulate others were negatively associated with performance on the test (Allen, Rueter, Abram, Brown, & DeYoung, 2017).

Much of the personality neuroscience research relevant to agreeableness comes from the study of empathy, and most measures of trait empathy are indicators of compassion (DeYoung et al., 2007, 2016), including the Empathic Concern subscale (and potentially the Perspective Taking subscale) of the Interpersonal Reactivity Index (IRI; Davis, 1983), the Balanced Emotional Empathy Scale (Mehrabian & Epstein, 1972), and the Empathy Quotient (Baron-Cohen & Wheelwright, 2004). Research using fMRI suggests two general processes involved in empathy, one involving the ability to simulate and understand the mental states of

others (mentalizing), and the other involving feeling emotion in response to others' emotion, which often involves "mirroring"—neural activation that occurs while observing another person, in the same networks that would be active if the observer were having an experience similar to that of the observed person. Mentalizing involves the default network, primarily, whereas mirroring for emotion involves the insula and regions of midcingulate cortex, primarily (Andrews-Hanna et al., 2014; Kanske, Böckler, Trautwein, & Singer, 2015; Lamm, Decety, & Singer, 2011). Several structural MRI studies have found empathy to be positively associated with cortical thickness or volume of the insula (Mutschler, Reinbold, Wankerl, Seifritz, & Ball, 2013; Patil et al., 2018; Sassa et al., 2012; Valk et al., 2016; but see Takeuchi, Taki, Sassa, et al., 2014, for a failure to replicate), and one study of agreeableness indicated that volume of the insula and other regions implicated in empathy was specifically related to compassion but not politeness (Hou et al., 2017).

One reasonably large study of resting functional connectivity found positive associations between empathy and connectivity among several regions of the default network (Takeuchi, Taki, Nouchi, et al., 2014). In an even larger sample (over 500 younger adults) that included the participants in the connectivity study we just mentioned, empathy was negatively correlated with grey matter volume in several regions, including many of the default network regions that demonstrated associations between functional connectivity and empathy, and also with a large area of dlPFC (Takeuchi, Taki, Sassa, et al., 2014). Interestingly, a similar negative correlation of volume (and also thickness, in this case) of the dlPFC with agreeableness was found in the largest study yet to examine all of the Big Five in relation to cortical morphometry (Riccelli et al., 2017). Finally, one study suggested that functional connectivity in the default network was linked not only to theory of mind, but also to compassion (Allen et al., 2017).

One fMRI study linked agreeableness to altruism at the neural level by contrasting neural activity in the reward system when participants learned that a charity received a monetary payment versus when they re-

ceived a monetary payment themselves (Hubbard, Harbaugh, Srivastava, Degras, & Mayr, 2016). This difference was significantly correlated with agreeableness, indicating part of the biological mechanism through which people high in agreeableness value good done for others.

Agreeableness is negatively associated with levels of the hormone testosterone, which has been linked to aggression and competition. Testosterone appears to be specifically linked to low politeness, based on research relating testosterone to individual differences in interpersonal behavior and aggression (DeYoung et al., 2013; Montoya, Terburg, Box, & Van Honk, 2012; Turan, Guo, Boggiano, & Bedgood, 2014). More complexly, a study of 216 individuals between ages 6 and 22 years found that, independent of age and sex, testosterone levels, aggression, and the covariance of amygdala volume and cortical thickness in the medial PFC were all mutually interrelated (Nguyen et al., 2016). Such a complex finding needs replication, of course, but the overlap with the substrates of neuroticism in the amygdala and medial PFC is notable and may speak to the connection between aggression and failure to suppress angry or hostile impulses. Testosterone may suppress that inhibitory control.

Finally, some research suggests that serotonin affects agreeableness (in addition to neuroticism and conscientiousness)—though probably with more influence on politeness (vs. aggression) than on compassion. One very small clinical trial in youth ($N = 12$) found that 6 weeks of SSRI treatment produced significant reductions in impulsive aggression (Armenteros & Lewis, 2002). Another study found that serotonergic functioning in young boys with disruptive behavioral disorders was negatively associated with adolescent aggression and antisocial behavior measured 7 years later (Halperin et al., 2006). Studies examining assays of serotonin in blood or cerebrospinal fluid have also suggested a negative association between serotonin and traits that reflect low agreeableness (Hanna, Yuwiler, & Coates, 1995; Kruesi et al., 1990; Moul Dobson-Stone, Brennan, Hawes, & Dadds, 2013; Van Goozen et al., 1999). An interview-based measure of life history of aggression

was negatively associated with serotonin function in men but not in women (Manuck et al., 1998), whereas a 2-month trial on an SSRI significantly reduced aggression in women but not in men (Kamarck et al., 2009).

Future Directions

In this chapter, we have presented a relatively brief overview of the state of personality neuroscience, using the Big Five as an organizing framework. Brevity may have contributed to giving the impression of more coherence than actually exists in what is a young discipline with a great deal of inconsistency and uncertainty in its results. None of the findings reviewed here should be considered to have the status of fact; everything needs to be replicated and further investigated. Still, we believe this is an exciting time for personality neuroscience, when research methods are improving and knowledge is increasing rapidly. We close with several suggestions for those who wish to contribute to the field.

First and foremost, samples should be reasonably large. Many of the effects of interest are likely to be equivalent to correlations of about .25 or less, and such correlations cannot be stably estimated without large samples (Schönbrodt & Perugini, 2013). Note that effects of this size are not negligible. They are comparable to the effects typically found in personality and the rest of psychology (Gignac & Szodorai, 2016; Hemphill, 2003), and these are typical for situations in which there are many causal influences on the phenomena under study. With more than a small number of causal determinants of some measure, the correlation between any one of those causal variables and the measure itself cannot be very large (Ahadi & Diener, 1989; Strube 1991). We expect many different neural parameters to influence broad personality traits such as the Big Five; hence, even relatively small effect sizes may indicate an important neural correlate that will help us to understand the biological mechanisms underlying personality. Our recommendation is that sample sizes should be about 100 at a minimum, and preferably over 200 (Allen & DeYoung, 2017). Note

that such samples are still relatively small and would not be well powered to detect small effects, but we recognize the difficulty in funding larger studies, especially in neuroimaging.

One way to achieve larger samples for studying personality in neuroimaging is to include a standard set of personality measures, structural scans, and a brief period of resting-state fMRI in smaller studies focused on within- rather than between-subjects hypotheses (Mar, Spreng, & DeYoung, 2013). When enough smaller studies have been completed, the measures in common across them can be aggregated into a dataset sufficient for studying individual differences.

Statistical power in neuroimaging studies can be improved by focusing on regions or networks of interest rather than conducting whole-brain or whole-cortex analyses. The studies and theories we have reviewed in this chapter provide many possibilities for the development of hypotheses regarding the association of traits with specific brain regions and networks. The importance of focal hypotheses additionally highlights the importance of psychological theory for personality neuroscience. Once one has a theory regarding the psychological functions that underlie personality traits, the way is open for development of neural hypotheses based on what is known about how the brain carries out the functions in question (Allen & DeYoung, 2017). We recommend that researchers studying individual differences in neural parameters familiarize themselves with theories of personality to guide them in formulating hypotheses.

Finally, we recommend that researchers keep in mind the hierarchical structure of personality traits. It is easy to focus on the Big Five given their prominence and the existence of relatively brief measures of them. However, different subfactors within a Big Five dimension may have different neural correlates, as seen most clearly in research on openness and intellect (DeYoung et al., 2009; Grazioplene et al., 2016). Researchers should make use of questionnaire measures designed to break down broad trait dimensions into narrower subtraits. Not only will these somewhat longer measures provide more reliable measurements of the broad traits in question, but they will also enable

investigation of multiple levels of the trait hierarchy. We suspect that the 10 aspect-level traits will be particularly important for neuroscience research based on the Big Five given that they are likely to reflect the most important distinctions for discriminant validity within each of the Big Five (DeYoung, 2015; DeYoung et al., 2007, 2016).

Personality neuroscience is of interest, in part, as basic science. A complete understanding of personality must include the biological mechanisms that instantiate it. But it is not merely basic science. Neurobiological knowledge can usefully constrain the development of psychological theory. Although one might explain personality in purely psychological terms, ensuring that one's psychological explanations are compatible with brain function is likely to increase their accuracy. The neuroscientific research linking extraversion to the brain's reward system, for example, provides a crucial piece of evidence for the reward sensitivity theory of extraversion. Further, with the increasing recognition that psychopathology is on a continuum with normal personality and shares a very similar covariance structure (DeYoung et al., 2016; Krueger & Markon, 2014; Markon et al., 2005; Wright & Simms, 2015), personality theory is becoming increasingly important for cutting-edge neuroscientific research on psychopathology (Abram & DeYoung, 2017; Shackman et al., 2016). Understanding the mechanisms that produce normal personality function will enable us to better understand how those mechanisms become dysfunctional in mental illness, which may in turn lead to better strategies for prevention, diagnosis, and treatment. We predict that, over the next couple decades, personality neuroscience will develop from its current fledgling state into a discipline of central importance in psychology.

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CHAPTER 9

Behavioral Genetics and Personality

Ongoing Efforts to Integrate Nature and Nurture

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Nature and nurture have been viewed as being at odds for as long as these words have been conjoined. The origin of the phrase “nature–nurture” can be traced to Shakespeare’s *The Tempest* (1611/1974), in which Prospero describes Caliban as “a born devil, on whose nature nurture can never stick” (IV.i.188–190), as well as to Francis Galton (1865), who coined the phrase “nature–nurture” in the context of studying hereditary contributions to human abilities. For Shakespeare and Galton, nature and nurture were independent developmental forces, to be compared in their influence, with the aim of declaring one more influential than the other.

Controversies and debates can be enormously helpful in advancing scientific inquiry. Consider how, in personality psychology, discussion surrounding the roles of the person and the situation in producing behavior strengthened our understanding that persons bring underlying behavioral tendencies to situations, yet modify their behavior to conform to situational expectations (Funder, 2016; Kenrick & Funder, 1988). Nevertheless, controversy can also have unfortunate polarizing consequences, implying

that scientists need to take sides or profess allegiance to one view rather than another. A major goal of this chapter is to show that taking sides in the nature–nurture debate, as applied to personality research, is actually a scientific mistake. Both genetic and environmental factors are important to personality, and they are inherently intertwined during development. The fundamental challenge we face involves understanding just how genetic and environmental factors work together in creating personality. Surmounting this challenge has proven difficult, because doing so involves going beyond the traditional focus of behavioral genetics inquiry, which has been to document the magnitudes of genetic and environmental influences on behavior. Hence, a related goal of this chapter is to describe the methodological and conceptual advances that allow us to begin to understand how genetic and environmental influences actually come together to shape personality. Importantly, research incorporating these advances has just begun to appear in the literature. The “look” of behavioral genetics in psychological science continues to evolve (cf. Chabris, Lee, Cesarini, Benjamin, & Laibson, 2015; Moffitt,

2005), and we hope to convey some of these important advances, as well as the challenges that remain outstanding.

We have organized this chapter into three sections. In the first section, we describe some postulates based on well-established research findings. In the second section, we describe current directions in research as a set of propositions, focused on understanding and modeling the ways in which genetic and environmental forces correlate and interact. In the third section, we move beyond what we currently know and delineate a set of questions for future research. In the process, we hope the reader will come to share our enthusiasm for genetically informed personality research, and share our desire to relegate the nature–nurture debate to the historical backdrop for the development of a scientifically compelling account of how genomes and environmental inputs combine to create individual personalities.

Postulates Based on Well-Established Research Findings

Personality Results from Both Genetic and Environmental Influences

Evidence from Twins

Although Postulate I seems self-evident (i.e., how could personality come about, except through transactions between the blueprint for the construction of the organism [DNA] and the world outside the organism?), establishing this proposition was scientifically critical, because it countered the radical environmentalist view that “there is no such thing as an inheritance of capacity, talent, temperament, mental constitution, and characteristics. These things again depend on training that goes on mainly in the cradle” (J. B. Watson, 1924, p. 94). Watson’s view is incompatible with the results of behavioral genetics studies of self-reported personality variables, most of which were conducted in the decades since Watson was writing. Behavioral genetics studies parse individual differences (population variance) in traits into at least three distinct components: (1) genetic influences, (2) shared environmental influences, and (3) nonshared environmental influences. *Genetic influences* index the

extent to which observed or “phenotypic” variation in a trait arises from genetic differences among people. The well-known heritability statistic is the ratio of variance from genetic sources to total variation in the trait, or the proportion of total trait variation linked to genetic variation. Importantly, it is a statistic indexing variance—the extent of differences among persons within a group. As a concept, it only applies at the level of a specific group of persons (a sample or population of persons, in statistical terms). When we speak of, for example, 50% of variance in extraversion being due to genetic influences, we are referring to differences *among individuals*. We do *not* mean that 50% of any individual’s level of extraversion can be attributed to genetic influences.

Shared environmental influences index the extent to which people are similar, independent of genetic influences, because they grew up in the same household, thereby sharing factors such as family-level socioeconomic status and religious traditions that differ among families. These factors can—but do not always—make people growing up in the same family similar to each other. For example, siblings often experience the same religious upbringing, and many continue that religious observance in adulthood, though considerable numbers do so to rather different degrees.

Nonshared environmental influences index the extent to which family members are different, in spite of sharing genetic material and growing up together. Commonly used examples include having different teachers and friends, participating in different leisure activities such as sports, and receiving different parental treatment. For example, when one child displays more frequent temper tantrums than another, parents may convey sensitively but firmly to that particular child that such behavior is unacceptable. This differential parenting may make the child less similar to the other over the long term. Thus, the distinction between shared and nonshared experiences is subtle. People within a family commonly experience the same putatively objective event (e.g., a household move) differently, so that it does not make them similar. If the event acts to make persons within the same family different, then it will show up as nonshared

environmental variation. Measurement imprecision (e.g., random and systematic error) also gets categorized with nonshared environmental effects, since such imprecision acts to make every individual appear unique (e.g., a person responds randomly or exhibits socially desirable responding when completing a questionnaire). Like genetic influences, both shared and nonshared environmental effects are variance concepts, and they are commonly discussed as proportions of total variance. For example, akin to the heritability, the extent of shared environmental contributions can be conceptualized as the ratio of shared environmental variation to total variation in the trait, or the proportion of total trait variation linked to shared environmental variation.

By far the majority of studies decomposing population variance in personality have been conducted using samples of twins, on the presumption that except for the manner in which they were conceived and gestated, they are just “ordinary folks.” Though there are areas in which this is not entirely accurate (e.g., twin siblings may share a unique social bond; Tancredy & Fraley, 2006), adult personality does not appear to be one of them (Johnson, Krueger, Bouchard, & McGue, 2002); perhaps relatedly, this study found that twins expressed slightly greater social closeness as a general personality trait than did singletons. In many countries, it is therefore feasible to study twin samples that are unusually representative of the general population, particularly when twins are recruited using population records of twin births.

Twins are valuable research participants, because they can vary in genetic similarity. Monozygotic (MZ) twins share effectively all their genetic material, whereas dizygotic (DZ) twins share on average 50%, as is the case with full biological singleton siblings. Other family constellations, particularly adoptive and biological family sets, can also be used to develop variance decompositions. Studies using such samples enrich the literature, involving complementary design features (e.g., we describe the contributions of adoption studies below) that offer different perspectives, but twin studies have clearly dominated.

The Big Five dimensions (John, Chapter 2, this volume) have been major targets of

research on the heritability of personality. After reviewing the literature, Bouchard and Loehlin (2001) concluded that, in adult samples, genetic influences accounted for almost half the variation in each of the Big Five domains. Nonshared environmental influences accounted for most of the remaining variance, and shared environmental influences accounted for essentially no variation. This pattern of findings is well replicated. It holds across sexes, with heritabilities similar for men and women (Bouchard & Loehlin, 2001) when models of personality structure other than the Big Five are considered, and no matter which behavioral trait is examined (e.g., Polderman et al., 2015). Indeed, Turkheimer (2000) went so far as to describe this pattern as essentially applicable to all known human individual differences and enshrined it as a series of laws.

There are several remarkable aspects of the law-like pattern of genetic and environmental influences typically observed in the literature. First, it is striking that each of the Big Five domains is similarly heritable, especially considering the breadth of human individual differences encompassed by the Big Five—from more temperamental features such as activity level and emotional tone, encompassed by domains such as extraversion and neuroticism, to more attitudinal features such as interests in art and literature, encompassed by the domain of openness. Across this breadth of human experience, genes play major roles in explaining why people differ.

Second, genetic influences on personality are not small; accounting for even 30% of the variance in any psychological variable is unusual. Third, the relatively small proportion of variance attributable to shared environmental influences has been surprising (but see Matteson, McGue, & Iacono, 2013, for evidence that some personality traits may contain shared environmental variance that is more readily identified by combining twin and adoption study evidence). This observation has been a source of much generative controversy (Rowe, 1994), as many theories of personality development rest on the premise that family experiences are formative. Yet when one reflects on what the shared environmental component of variance rep-

resents, its absence in understanding *adult* personality may not be too surprising. Recall that it reflects environmental influences that vary among families but make people growing up together within families similar, *independent* of genetic endowment. It reflects environments working *separately and independently* from genetic influences in a manner that reflects not mean level but population-level variance (though theories posit primarily mean-level shared family influences). If environments and DNA work together to produce personality in more *transactional* (interactive and correlational) manners, their influences tend to appear in the genetic or nonshared environmental components of variation in personality (Purcell, 2002), under the models used to generate these classic observations.

These observations regarding genetic and environmental influences are not limited to self-reports, and also extend to observer reports. Riemann, Angleitner, and Strelau (1997) studied self- and peer ratings of the Big Five simultaneously, and found that self- and peer ratings showed broadly similar levels of genetic influence. In addition, much of the reliable variation was common to the self- and peer ratings, which were positively correlated (.55 on average). These observations are important, because together they indicate that neither the behavioral nor the genetic signals picked up by specific reports of personality are unique to the reporter. Personality traits are not simply in the minds of specific reporters, but rather reflect both heritable and environmentally influenced consistencies that can be detected from multiple vantage points (Kandler, Riemann, Spinath, & Angleitner, 2010; Malanchini et al., 2019).

These consistencies also extend beyond reports of personality, to direct behavioral observations. This was a critical extension, because the vast majority of our understanding of the genetics of personality is based solely on adult self-reports of personality traits (Brody, 1993). The work of Borkenau, Riemann, Angleitner, and Spinath (2001) in the German Observational Study of Adult Twins (GOSAT) filled this critical gap in the literature. Three hundred pairs of adult twins from throughout Germany were videotaped while engaging in 15 distinct tasks,

and judges independently rated the twins' personalities from these videotapes, using bipolar rating scales corresponding with the Big Five. Assessed in this manner and modeled as latent phenotypes, the Big Five domains all showed notable heritability, with a median value of 41%. Interestingly, and in contrast to most self-report findings, the video-based observational assessments in GOSAT also showed nontrivial shared environmental influences on average, with a median value across the Big Five of 26%. Another report from the GOSAT group focused on genetic and environmental contributions to observers' personality ratings aggregated across the 15 tasks, as well as the extent to which there were residual genetic influences on task-specific ratings (Borkenau, Riemann, Spinath, & Angleitner, 2006). The group reported that cross-situational genetic influences tended to be stronger than task-specific genetic influences, albeit both cross-situational and task-specific genetic influences were observed.

Taken together, these reports from the GOSAT group were important, because they extended the study of genetic and environmental influences on personality beyond its traditional focus on self-reports. Evidence for genetic influences on personality in adults is not limited to self-reports but extends also to observations (Borkenau et al., 2001). Moreover, cross-situational consistency is not the only place where genetic influences have been observed; heritable influences have also been observed on individual behavioral differences in specific tasks (Borkenau et al., 2006).

Finally, nonshared environmental influences are as large as, if not larger than, genetic influences. Although these nonshared environmental influences are not trivial in the aggregate, they have been hard to link with specific psychological constructs (Plomin, Asbury, & Dunn, 2001; Turkheimer & Waldron, 2000). As with the absence of shared environmental effects, the presence—but frustrating anonymity—of nonshared environmental effects may be profitably addressed by pursuing a more transactional conception of genes and environments. We return to and elaborate on ways to articulate gene–environment transactions throughout this chapter, because we consider this to be

the forefront of research in personality genetics.

Evidence from Adoption Studies

In addition to twin samples, samples of adopted individuals can contribute to understanding genetic and environmental influences on personality. Adoption creates families in which genetic and environment influences can be distinguished. Consider, for example, families with both adoptive and biological children. All the children in those families, both biological and adopted, share a home environment, and the biological children share genetic influences both with each other and with their parents. However, the adoptive children share genetic influences with neither the biological children nor with their common parents, because they are genetically unrelated.

Adoption studies are rarer than twin studies due to the relatively greater ease of recruiting population-representative samples of twins. In addition, parents who adopt children tend to have higher socioeconomic status than parents in the population overall. This, combined with a tendency for people of higher socioeconomic status to participate more readily in scientific studies, makes it particularly difficult to obtain adoption samples that adequately represent persons of lower socioeconomic status. Perhaps at least partly because of these factors, adoption studies come to slightly different conclusions than do twin studies. Like twin studies, not only do adoption studies generally show little influence of the shared environment, but they also yield smaller estimates for genetic influence on personality and temperament (Loehlin, Horn, & Willerman, 1981; Loehlin, Willerman, & Horn, 1982; Plomin, Coon, Carey, DeFries, & Fulker, 1991; Plomin, Corley, Caspi, Fulker, & DeFries, 1998; Scarr, Webber, Weinberg, & Wittig, 1981).

Beyond differences in population representativeness, there are a number of possible reasons for differences between estimates of genetic influence on personality derived from twin and adoption studies (for recent meta-analytic evidence, see Vukasovic & Bratko, 2015). One possibility is that identical twins reared together tend to assimilate or imitate

each other. This possibility can be evaluated by comparing similarity in twins reared together with similarity in twins reared apart. Two major studies of twins reared apart reached somewhat different conclusions on this issue. A study from Sweden showed greater similarity among reared-together MZ twins when compared with reared-apart MZ twins (Pedersen, Plomin, McClearn, & Friberg, 1988). This suggests assimilation on the part of the twins reared together, though it could also indicate shared environmental influences or gene-shared environmental correlation that affects MZ twins more than DZ twins due to their greater physical resemblance. However, another study showed the resemblance of MZ twins reared apart and together to be similar for personality traits (Tellegen et al., 1988). This could indicate that some MZ twins reared together assimilate, while others work to differentiate from each other, and/or that environmental opportunities to express and respond to genetically influenced behaviors are strong enough to match whatever assimilation or shared environmental influences tend to make reared-together MZ twins more similar. In addition, conditions could vary among social groups, countries, and cultures, so that no general “rule” necessarily applies.

Another possibility that receives more consistent support involves nonadditive genetic influences. Genetic influences can be additive, meaning that the multiple genes that contribute to observed variation in a characteristic are fungible, each independently contributing to continuous variation in an observable characteristic, or phenotype. Genetic influences can also be nonadditive, meaning that specific combinations of relevant individual genetic markers are important in understanding the resulting trait. The most commonly used example of nonadditive genetic influences is simple Mendelian dominance, in which the resulting trait in the heterozygous type (non-matching pair of genetic markers) resembles one but not the other of the homozygous types (matching pair of genetic markers). MZ twins share both additive and nonadditive genetic influences completely, because they share the same genotype. Because first-degree relatives, such as siblings, DZ twins, and parents and offspring, share on average

only 50% of their genetic variants, resemblance can be greater for additive than non-additive genetic influences, depending on the importance of dominant genetic markers to the trait, and their frequencies in the population relative to that of the recessive markers. As a result, adoption studies that involve first-degree relatives, such as siblings or parents and their offspring (but not MZ twins) can indicate less overall genetic influence on personality than twin studies involving MZ twins. Specific examples of single dominant genetic markers that exert important influences on personality traits are presently unknown, and studies so far suggest there are unlikely to be many single markers with large influences. There are, however, many other forms of nonadditive gene actions, and some of these could be important contributors to personality variation.

Loehlin, Neiderhiser, and Reiss (2003) provided a very informative analysis of non-additive genetic effects on personality variation derived from data collected as part of the Nonshared Environment in Adolescent Development (NEAD) study (Reiss, Neiderhiser, Hetherington, & Plomin, 2000). The NEAD study was unique in including not just MZ and DZ twin pairs, but also full-sibling pairs in intact families, full-sibling pairs in remarried families, half-siblings in remarried families, and genetically unrelated siblings in remarried families. The existence of these non-twin sibling pairs allowed Loehlin and colleagues (2003) to examine the impact of MZ pairs on heritability estimates for a series of dimensions of both adjustment and maladjustment, akin to personality constructs. In analyses excluding the MZ pairs, smaller estimates of genetic influence were obtained, suggesting the importance of nonadditive genetic influences in understanding personality (cf. Lykken, Bouchard, McGue, & Tellegen, 1992) and/or some of the alternative possibilities we noted earlier. Complexity at the genomic level (cf. Power & Pluess, 2015), as well as these other possibilities involving gene-environment transactions, may well be part of the reason that linking specific alleles with behavior has proven very challenging, as we describe in greater detail below.

In summary, we began this section by postulating that personality results from both

genetic and environmental influences. This postulate is readily supported by evidence stemming from both twin and adoption designs, and including diverse ways of assessing personality. Nevertheless, adoption designs tend to show weaker genetic effects than do twin designs. Various explanations for this difference are plausible, and resolution of these possibilities will likely stem from combining twin and adoption evidence with molecular evidence. For example, the unique combinations of alleles shared within MZ pairs may explain the stronger genetic influences observed in twin studies, and it may ultimately be possible to study this phenomenon at the molecular level.

The Hierarchical Structure of Personality Based on Genetic Covariation Closely Resembles the Structure Based on Observed, Phenotypic Covariation

If we take the findings of numerous behavioral genetics studies of personality variation seriously, the nature–nurture debate is to some extent over, at least if the debate is framed as dominance of one or the other; that is, every individual-differences characteristic that could be measured is probably at least somewhat heritable, but environmental influences are also typically as great as the influences of genes (Turkheimer, 2000). Does this mean that behavioral genetic studies of personality have outlived their usefulness?

The answer to this question is “no,” because the study of *variation* is only one aspect of what can be learned by parsing the contributions of nature and nurture to personality. For example, much inquiry in personality psychology is focused not on variation but on covariation. An especially important topic has been the structure of personality, or the way in which individual differences in personality are organized. When behavioral genetics techniques are used to address personality structure, investigators estimate not only genetic and environmental influences on personality variation but also the extent to which covariation in pairs of traits reflects genetic and environmental sources. For example, the extent to which genetic effects are common to pairs of traits can be indexed by genetic correlations, which are

interpreted in much the same way as observable correlations (e.g., a genetic correlation of 1.0 means that the genetic influences on the two variables are entirely overlapping). Series of these correlations can be subjected to multivariate factor analyses of the same sort that are used to parse the observed structure of personality.

Although the Big Five have been influential constructs in behavioral genetics personality studies, an even broader hierarchical structure integrates various structural models involving two, three, four, and five “big traits” (Krueger & Markon, 2014; Markon, Krueger, & Watson, 2005). Working with normal-range personality traits, when two “higher-order” or broader factors are considered, extraversion and openness from the Big Five combine to form a broader factor of “plasticity,” and agreeableness, conscientiousness, and lack of neuroticism combine to form a broader factor of “stability” (DeYoung, 2006; Hirsh, DeYoung, & Peterson, 2009; Digman, 1997).

If three higher-order factors are modeled, neuroticism breaks off from the broader stability factor, resulting in factors that reflect negative emotionality (neuroticism), positive emotionality (extraversion and openness), and disinhibition (disagreeableness and unconscientiousness). Primary personality traits that delineate the Big Three at the observed level show this same Big Three structure at the genetic level (Krueger, 2000). The observed four-trait model consists essentially of the Big Five without openness, and this model has been influential in research linking personality and psychopathology (D. Watson, Clark, & Harkness, 1994), and related research on dimensional approaches to classifying personality pathology (Widiger, Simonsen, Krueger, Livesley, & Verheul, 2005). Factor analyses of genetic correlations among scales delineating primary dimensions of personality pathology reveal essentially these same Big Four dimensions (Livesley, Jang, & Vernon, 1998). Finally, genetic correlations among scales designed to delineate the Big Five at the observed level reveal the Big Five at the genetic level as well (McCrae, Jang, Livesley, Riemann, & Angleitner, 2001; Yamagata et al., 2006).

This hierarchical perspective on genetic-observed correspondence in personality

structure is consistent with behavioral genetics research examining genetic and environmental influences on traits more specific than the Big Five. Jang, McCrae, Angleitner, Riemann, and Livesley (1998) examined the heritability of variance in facets of the Big Five that remained after the common Big Five variance was removed, and found non-trivial residual heritabilities. We (Johnson & Krueger, 2004) examined the extent to which genetic influences on specific adjectives that delineate the Big Five are tightly clustered within each Big Five domain. We found evidence that genetic influences on extraversion and neuroticism were relatively tightly clustered, whereas genetic influences on conscientiousness, agreeableness, and openness were relatively diffuse. Indeed, there may even be specific genetic influences on very fine-grained “nuances,” or traits below the level of specific personality facets (Mottus, Kandler, Bleidorn, Riemann, & McCrae, 2017). Taken together, these studies suggest that genetic influences on personality are not organized around any specific model of personality, such as the Big Five. Rather, they suggest that genetic influences are organized much like observed individual differences, no matter how they are parsed at the observed level.

A potentially provocative implication of this body of work is that genetic influences may operate differently at different levels of the personality hierarchy. If true, the idea of genes “for” broad phenotypic traits may not map nature well in all cases. For example, genes involved in building brain systems that regulate emotion may contribute to the broad traits of extraversion and neuroticism (Eid, Riemann, Angleitner, & Borkenau, 2003; Smillie, DeYoung, & Hall, 2015) relatively coherently, as we (Johnson & Krueger, 2004) observed, yet there may be other genetic factors that influence more specific, narrow individual differences at levels beneath these very broad traits, such as characteristic responses to more specific stimuli. For example, sociability may have genetic influences at least partly distinguishable from achievement striving, within the broader domain of positive emotionality. Ultimately, better understanding of the brain systems that underlie personality could help to refine theories about how specific genetic

influences contribute to specific observed personality structures at distinct hierarchical levels (Krueger & DeYoung, 2016). Even more informative would be finding functional genetic variants at any level in the trait hierarchy and evaluating empirically the extent to which these variants correlate with other levels, including their association with specific brain systems. Given results of molecular genetics studies of personality (which have not identified highly specific functional genetic variants influencing personality; de Moor, Chapter 10, this volume), however, this is not likely to happen imminently.

Personality Stability over Time Is Attributable More to Genetic Than to Environmental Influences

The multivariate approach to parsing genetic and environmental effects can be extended to study personality development over time in longitudinal studies. Perhaps not surprisingly, this literature suggests that genes act more to maintain stability, whereas environmental influences act more to promote change (Krueger, Johnson, & Kling, 2006). However, this general summary obscures ways in which developmental and social environments transact with genetic propensities (e.g., during the transition to adulthood; Hopwood et al., 2011). For example, early in life, emerging gene expression may be important in understanding temperamental development, tending to stabilize as maturity proceeds. Plomin and colleagues (1993) examined change and continuity in temperament in twins from 14 to 20 months of age and found evidence for newly expressed genetic influences at 20 months. Especially at life transition points such as emerging adulthood, parenthood, or major stressful events such as divorce, however, the new environmental circumstances these transitions present may initiate personality change (e.g., Hopwood et al., 2011). Later in life, the often relatively stable unique environmental niches people occupy, such as occupation, partner relationship, residence, and hobbies, may be important in understanding personality continuity. We (Johnson, McGue, & Krueger, 2005) studied twins who were 59 years old, on average, at a first assessment wave, and 64 years old, on average, at a sec-

ond assessment wave. Consistent with other studies reviewed by Krueger and colleagues (2006), genetic effects on personality were essentially perfectly correlated across the two waves, emphasizing the role of genetic influences in personality stability. We were, however, the first to point out that nonshared environmental influences on personality were also highly correlated across the two waves (.53 to .73), and had been in previous such studies to date. Importantly, because nonshared environmental influences on personality were somewhat greater than 50%, the relative contributions of environmental and genetic influences to personality stability were essentially equal, because the nonshared environmental components included error and greater proportions of total variance, consistent with other longitudinal studies of personality (Johnson et al., 2005).

“Environmental Measures” Are Partly Genetically Influenced and Much of the Genetic Influence on These Measures Is Shared with Personality

One important and provocative finding that has emerged from behavioral genetics research is that many measures considered to reflect environmental circumstances are themselves shaped by genetics. For example, in his seminal work, David Rowe (1981, 1983) showed that family experiences, such as adolescents’ perceptions of their parents’ acceptance and affection, are subject to genetic influence. This indicates that our genes shape the way we experience the world. This likely happens through situation construal, but it also likely happens because genetically influenced patterns of behavior tend to elicit systematic patterns of responses from the environment, and because people gravitate toward environments that meet their psychological needs and avoid environments that do not. In combination, all these processes act to intertwine nurture with nature (Plomin & Bergeman, 1991). This contradicts the assumption underlying all estimates of genetic and environmental influences that the two “sources” are independent. It does so in systematic ways that we understand clearly (Purcell, 2002). However, we do not know with clarity which of the many possible systematic ways apply to personality.

Evidence of genetic influence on environmental measures has been documented using a variety of assessment approaches (Kendler & Baker, 2007), including self-reports and observational measures of the family environments of infants (Braungart, Fulker, & Plomin, 1992), children (Rende, Slomkowski, Stocker, Fulker, & Plomin, 1992), and adolescents (O'Connor, Hetherington, Reiss, & Plomin, 1995). Moreover, identical twins reared together, as well as those reared in different families, generally report more similar family experiences than do fraternal twins (Hur & Bouchard, 1995; Plomin, McClearn, Pedersen, Nesselroade, & Bergeman, 1988). The reared-apart twin studies provide particularly strong evidence that genes influence the way people elicit, react to, and create their individual family environments, because twins reared apart in these studies were rating their different rearing families that in almost all cases shared no genetic relationship. Moreover, as people grow up and have children of their own, they contribute to their children's family environments, and parenting style also shows nontrivial genetic influence (Kendler, 1996; Losoya, Callor, Rowe, & Goldsmith, 1997; Perusse, Neale, Heath, & Eaves, 1994). Importantly, in most families, parents and children share genetic influences, suggesting that genetic transmission of personality similarity within families may be reinforced by the tendency for family members to create and respond to environmental circumstances similarly.

This is to say that genetic influences on personality may drive genetic influences on environmental experiences. Krueger, Markon, and Bouchard (2003) studied this in twins reared apart who provided extensive data on both their personalities and their rearing-family environments, from perceptions of general family climate (characteristics such as warmth and discipline) to physical facilities available in the family home (e.g., books and tools). The twins' recollections of their rearing environments were partly heritable, and genetic influences on recalled environments were entirely overlapping with genetic influences on personality; this suggests that genes influencing personality also incline people to recall and/or interact with family members in specific

ways, so that the way people are nurtured is fundamentally influenced by their natures (Plomin & Bergeman, 1991). Such overlapping genetic influences on personality and environmental measures extend beyond recalled family environments, to areas such as life events (Saudino, Pedersen, Lichtenstein, McClearn, & Plomin, 1997) and parenting styles (Chipuer, Plomin, Pedersen, McClearn, & Nesselroade, 1993; Losoya et al., 1997).

Most Environmental Influences on Personality Are Nonshared, but the Meaning of This Finding Remains Elusive

We have presented evidence from both twin and adoption studies that shared environmental influences of this kind are relatively weak. Plomin and Daniels's (1987) classic paper enumerating reasons why this might be the case is now more than 30 years old, but the absence of shared environmental influences continues to baffle theorists attempting to conceptualize the processes involved in personality development. This bafflement is partly due to the fact that the associations between offspring outcomes and environmental influences such as parental attitudes and rearing styles, religious involvement, and socioeconomic status continue to be robust. It is also because the search for the specific nonshared environmental influences that act to make siblings growing up in the same family so different has been rather disappointing.

Turkheimer and Waldron (2000) documented the results of this search in a well-known meta-analysis. They concluded that a broad range of specifically identified nonshared familial and peer environmental variables, considered theoretically important, accounted for little, if any, of the nonshared environmental variance in personality, at least as measured to date (cf. Plomin et al., 2001). As they saw it, this was likely due to measurement difficulties and underlying stochastic processes that would elude ability to detect and quantify the processes involved in personality development for some time to come.

Harris (1998, 2006) offered an alternative account for the absence of shared environmental influences. She argued that parents

contribute little to socialization of their offspring beyond the genes they pass along, because (1) most socialization takes place in the context of peer, not family, interactions and (2) learning is context-dependent, so what is learned at home does not translate to those all-important situations outside the home. This is consistent with the observations that many variables considered “environmental” show genetic influences, and the interpretation that this occurs because genetic influences shape both perception and generation of situational circumstances.

Distinguishing between Objective and Effective Measurement of Environments

To understand how specific environmental circumstances contribute to personality differences, it is important to distinguish between objective and effective measurement of environments (Goldsmith, 1993; Turkheimer & Waldron, 2000). “Objective” measurement of environments refers to construal of environmental circumstances as they appear to the researcher, regardless of the construal of these circumstances by the people who experience them. Many of the most commonly used variables that distinguish among families, such as parental socioeconomic status and relationship quality, or residence neighborhood and school, are measured objectively this way. Environmental circumstances are objectively nonshared when each sibling within a family has a unique measured value for the circumstance, again, regardless of whether the circumstance acts to make the siblings similar or different. Peer relationships and classroom assignments are common examples of nonshared environmental circumstances usually measured objectively. To emphasize, shared and nonshared characterizations of objectively measured environments refer to their definitions of measurement, not to the kinds of influences the environments may have.

“Effective” measurement of environments refers to the natures of the influences of those environments on the people who experience them, regardless of how they were measured. Environmental circumstances are effectively shared when they act to make family members more similar, and nonshared when they act to make family members different. The

estimates of shared environmental variance resulting from behavioral genetics analyses refer, without actually specifying them, only to environmental circumstances that are effectively shared. This means that objectively shared environmental circumstances, such as socioeconomic status, that are so consistently associated with outcomes such as health and intelligence actually contribute to shared environmental variance only if they act to make family members more similar than they would be based on their shared genetic endowments.

Consider the example of parental education, often measured using the midparent average or the mother’s education. Two siblings in an intact family may both grow up with, say, one parent who attended but did not graduate from college and another who did graduate from college. Measured objectively in this way, the siblings’ parental educational environment is shared, and both experience the influences of growing up with parents with these levels of education. To the extent that matters uniformly for outcomes in question, their parents’ education is acting to make them more similar to each other than to siblings with other patterns of parental education. But one sibling may share more interests with the parent who graduated from college than the other sibling, and may therefore be more influenced by a higher level of parental education. If this is the case, then, measured effectively, at least some of the influence of parental education is nonshared in this family. An estimate of variance due to shared environmental influence will pick up only the portion of influence of parental education acting to make the siblings more similar to each other than they are to siblings with other patterns of parental education.

Moreover, to the extent that social forces and sample recruitment procedures result in little variance in the environmental measure, ability to pick up greater similarities within families than between families is reduced (Stoolmiller, 1999). For example, if socioeconomic status matters and its range is restricted in a sample, then all the families in that sample will be relatively similar, and within-family similarities can be observed only within the context of small between-family variation. In addition, subtle differ-

ences in the actual environment experienced by each sibling (due, e.g., to varying ages of siblings at the time of parental divorce) as well as in siblings' perspectives on that environment (e.g., one sibling blames herself for conflict between her parents and becomes depressed and isolated, whereas another throws himself into activities away from home to escape) will be picked up as non-shared environmental influences. Moreover, chance events and variations in specific combinations of environmental circumstances that act in concert from individual to individual all contribute to nonshared rather than shared environmental influences. This is one reason that perceptions of the environment may be more useful constructs for personality research than "objective" environmental circumstances.

Family Dynamics and Meaning of Environmental Components of Variance

Family members may also act to establish individuality by differentiating from each other (Ansbacher & Ansbacher, 1956; Feinberg & Hetherington, 2000), creating correlations between genetic and nonshared environmental influences, to the extent that this differentiation process is at least initially influenced genetically. Schachter, Shore, Feldman-Rotman, Marquis, and Campbell (1976) suggested that this sibling de-identification process relieves competitive pressures between siblings and is most pronounced for siblings who are more similar in age or sex. The small volume of research in this area has tended to focus on systematic associations between family circumstances and extent of differentiation between pairs of siblings. For example, Grotevant (1978) found that girls with sisters reported fewer feminine occupational interests than did girls with brothers. Feinberg and Hetherington (2000) examined relations between age differences between siblings and similarity of sibling outcomes, with the general observation that siblings who were closer in age tended to be less similar. Feinberg, Reiss, Neiderhiser, and Hetherington (2005) found that shared environmental influences, indicating greater sibling similarity, tended to be higher in families in which parents displayed greater negativity to their children, with the

parental negativity assumed to restrict children's opportunities to express individuality. In contrast, shared environmental influences tended to be lower, indicating greater sibling differentiation, in the presence of higher levels of conflict between parents, perhaps indicating that children sought opportunities wherever they could find them to get away from unpleasant home environments.

Although these kinds of family dynamics may very well affect degrees of sibling similarity and thus estimates of shared environmental influences, motivation to differentiate from siblings may also be related to personality. For example, the well-known twin researcher David Lykken once mentioned that his work with twins had led him to wish that he had had an MZ twin himself, so that he would have experienced the kind of psychological closeness he had observed in many pairs. In contrast, others might be glad to have been spared what would feel like psychological intrusion, growing up constantly presented with someone so similar. Individual differences of this kind should "wash out" from many univariate estimates of shared environmental influences in samples representative of the population. This will be the case, however, only when this response to the physical proximity of psychologically similar others is independent of the traits of interest. In addition, a sibling's particular characteristics may inspire admiration and emulation or scorn and desire to differentiate. Some evidence, at least for the admiration and emulation process, has been provided by McGue and Iacono (2001), who found that older siblings' antisocial and substance use behavior contributed directly to similar behavior in younger siblings.

Propositions Based on Major Directions in Current Research

Genetic and Environmental Influences on Personality Interact

We have summarized in previous sections the relatively well-established findings in personality genetics. The evidence for strong genetic and weak shared environmental influences on personality is robust across measurement approaches and study designs. When environments are measured directly,

they show genetic influences that are closely related to those on personality. Nonshared environmental influences, manifested as anonymous components of variation, are as important as genetic influences, but their psychological natures remain elusive.

As we noted earlier in discussing nonshared environmental influences, integrating these observations in a comprehensive theory of the origins of personality has proven challenging. Yet one often ignored assumption of the reviewed research may provide a key to advancing our understanding and thereby integrating nature and nurture. This assumption is that genes and environments are *independent* as opposed to *transactive*. For example, researchers have traditionally estimated heritability as a statistic that applies to an entire population, to which is added an analogous statistic representing environmental effects to account for the total variation—as if the two were completely independent. We know of many examples, however, in both human and non-human animals, in which genetic variance is not independent of environmental variance within populations. In particular, genetic variance can vary as a function of other variables. For example, in circumstances in which people are free to express genetic proclivities, genetic variation might be enhanced, whereas circumstances that constrain individual freedoms might dampen genetic variance.

Developments in statistical modeling have rendered these conceptual possibilities empirically tractable. We provide only a brief description of these developments here (for more details, see Krueger & Tackett, 2007; Johnson, 2007). When genetic and environmental influences on personality are estimated using the traditional approach, estimates are based on summary statistics that compare the overall similarity of pairs of people in specific groups, such as the overall similarity of MZ twins with the overall similarity of DZ twins. Newer models go well beyond this approach, because they do not model summary statistics, but rather individual-level data. As a result, genetic and environmental influences on personality can be quantified as moderated by, or contingent on, other individual characteristics.

These modeling developments have opened up major conceptual possibilities

for personality genetics that are just beginning to be realized. A broad picture of how the genetic and environmental influences on personality are moderated by other characteristics of persons—and how personality can itself moderate the genetic and environmental influences on other characteristics—is difficult to generate, because this research is in its infancy. Nevertheless, some examples serve to make the general point that genetic influences on personality seem to behave in a more nuanced manner than can be captured by classical variance partitioning approaches.

The major focus of this work has been on ways in which diverse aspects of family life—from relationships to family income—moderate genetic and environmental influences on personality. Characterizing genetic contributions to personality using overall heritability statistics entails summarizing across diverse family circumstances that may dampen or enhance genetic influences. This summarizing process may gloss over a range of scenarios, and looking beyond these statistics may be a key to understanding how genetic and environmental influences transact within families to make family members both similar and different from each other, as well as similar and different from people in other families (Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000). Rather than having direct and purely shared environmental influences that make people from the same families more similar than they would be based on genetic similarity, family variables may sometimes act indirectly, to moderate the impacts of genes and environments on personality.

For example, Boomsma, de Geus, van Baal, and Koopmans (1999) observed that religious upbringing reduced genetic variance in disinhibitory personality characteristics. This would be consistent with the idea that genetic expression is suppressed in more restrictive environments. Jang, Dick, Wolf, Livesley and Paris (2005) observed that a variety of factors, such as parental bonding, family functioning, and nonassaultive traumatic events, impacted genetic and environmental influences on emotional stability (the opposite of neuroticism), often by enhancing nonshared environmental influences. We (Johnson & Krueger, 2006) observed that nonshared environmental influences on

life satisfaction were greater at lower levels of financial standing. Money appeared to buffer the impact of random environmental shocks, thus allowing clearer expression of individuals' genetically influenced happiness set points (Lykken, 1999). We (Krueger, South, Johnson, & Iacono, 2008) observed that adolescents' perceptions of their relationship with their parents impacted the relative importance of genetic and environmental influences on positive and negative emotionality. For example, higher levels of perceived parental regard were associated with greater genetic influences on positive emotionality. Moderating influences on personality are not universal, however; Kendler, Aggen, Jacobson, and Neale (2003) found no evidence that family dysfunction moderates genetic and environmental effects on neuroticism. Similarly, South, Krueger, Elkins, Iacono, and McGue (2016) observed that influence of romantic relationship satisfaction on individual personality traits varied in magnitude.

These types of moderating influences might also work in the opposite direction, with personality constructs acting to moderate genetic and environmental influences on various outcomes. It is tempting to characterize the phenomena described as "gene $\times$ environment interaction," or genetic control of sensitivity to different environments, but this rubric is conceptually problematic because, as described earlier, various aspects of "the environment" also show genetic influences; that is, the ways in which people perceive environments are also affected by genetic influences on how people interpret the external world. "The environment" may sometimes be better conceived as people's psychological experience of the world rather than some putatively objective aspect of the world outside the person. Moreover, moderation of genetic and environmental influences could reflect gene-environment correlation, in which genetic factors influence people's choices of environmental niches. In addition, environmental circumstances such as social policies can result in correlations between genotypes and particular environmental niches.

Along these lines, we (Johnson & Krueger, 2005) found that subjective sense of control moderates genetic and environmental influences on health in a manner similar to the

more putatively objective environment provided by the person's income. Greater sense of control and higher income both acted to suppress genetic influences on physical health. South, Krueger, Johnson, and Iacono, (2008) observed that high levels of positive emotionality are associated with greater genetic influences on parental regard. The fact that high levels of parental regard are also associated with greater genetic influences on positive emotionality in that study suggests a bidirectional feedback loop whereby adolescents with positive emotional dispositions elicit parental regard, a situation that fosters enhanced expression of genetic influences on positive emotionality. Similar to Boomsma and colleagues' (1999) observations regarding the impact of a religious upbringing on disinhibition, Timberlake and colleagues (2006) observed that self-rated religiousness reduced the impact of genetic influences on initiation of smoking.

In summary, there are now quite a few examples in the literature of how family and other circumstances moderate genetic and environmental influences on personality. It seems the family does indeed matter in understanding the origins of personality, but it does so through enhancing or dampening genetic endowments; that is, rather than acting directly to make children in the same family more similar than they would be by virtue of the extent to which they share genes (i.e., through shared environmental main effects), families influence the manner and degree in which genetic influences are expressed.

Personality Is Linked to Outcomes through Correlational and Interactive Processes

When we use traditional methods to estimate genetic and environmental sources of variance, we assume that there are no gene-environment interactions or correlations that would act to create differing degrees of genetic and environmental influences within different subgroups of the population, of the kind that the new methods described above allow us to estimate. Gene-environment interactions ($G \times E$) occur when genetic expression is moderated by environmental circumstances. A simple example is suntan. Our genes express darker skin color when we spend more time in the sun. As a personality-

related example, Caspi and colleagues (2002) observed that boys carrying the low-activity variant of the monoamine oxidase A (MAO-A) gene were more likely to display antisocial behavior in adolescence and young adulthood, but only if they had been exposed to severe parental maltreatment (see also Kim-Cohen et al., 2006). This type of candidate gene $\times$ environment research spawned many replication attempts. Although the ideas driving this approach have garnered much attention, specific candidate gene $\times$ environment effects have been difficult to replicate (Dick et al., 2015). This does not necessarily mean that such effects are not operating, as none of the interactions reported has involved more than modest amounts of variance, and there is no theoretical reason that such small interactive influences of specific genes should be expected to be present in all populations and environments.

Gene–environment correlations (r_{GE}) occur when genetic differences are associated with differential exposure to environmental circumstances. Again, genes involved in skin color offer a simple example when people with lighter skin restrict exposure to sunlight to avoid sunburn. As a personality-related example, Jaffee and colleagues (2004) observed that 25% of the variance in the corporal punishment children received at the hands of their parents could be attributed to genetic influences on the children's own misbehavior, suggesting that parents were punishing children more genetically prone to misbehave more than children less genetically prone to do so.

Though the behavioral genetics models that assumed independence were a first step toward understanding genetic and environmental influences, it is becoming increasingly clear that $G \times E$ and r_{GE} are likely to be common and to be useful in understanding how nature and nurture transact. The efforts people undertake to seek or create environments compatible with their genetic tendencies are fundamental to the process of evolution, and differences in response to the environment caused by genetic differences are the raw material for natural selection (Ridley, 2003). We may tend to think of evolution as a long-term process that took place in the long-distant past, but the day-to-day behavioral activities of response and adaptation to the environment—activities in

which we all engage every day—are the stuff of which it is made. Behavior occurs through genetic expression, and genetic expression reflects the environments in which it takes place. There is a large body of evidence for genetic influences on all other areas of human biological, psychological, and behavioral functioning; it would be distinctly strange if there were no genetic influences on selection of, and responsiveness to, environmental circumstances.

Importantly, violations of the “independence assumption” do not invalidate traditional behavioral genetics methods, though they do bias them in systematic ways. Additionally, they render the estimates applicable only on overall, average bases. In the presence of $G \times E$ or r_{GE} , the components of variance attributable to genetic and environmental influences are not static within the population: Genetic variance could be relatively large within one segment of the population and relatively small in another, and the same is true for environmental variance (Johnson, 2007). The estimates are specific to the population in which they are developed for essentially the same reason: The differences in the components of variance may depend on other characteristics of the individuals in the population, characteristics that can vary from population to population, and within populations over time. These characteristics can be measured either categorically or continuously. For example, Rose, Dick, Viken, and Kaprio (2001) observed that genetic influences are more important in explaining alcohol-use patterns in adolescents residing in urban areas, whereas shared environmental influences are more important for adolescents residing in rural areas. We (Johnson & Krueger, 2005) found that genetic influences on physical health are continuously smaller, with continuously greater perceived control over life. Uncovering how these processes are involved in development and manifestation of personality means identifying relevant moderating variables and measuring them accurately (Rutter, Moffitt, & Caspi, 2006), along with considering the possibility that many variables could have moderating influences in different directions, making it necessary to understand how they come together.

$G \times E$ and r_{GE} introduce systematic distortions, or bias, in estimates of genetic and

environmental influences from traditional models. These distortions have different effects, depending on the nature of the interaction or correlation that violates the independence assumption. Specifically, in twin studies, $G \times E$ between genetic and shared environmental influences acts to bias the estimate of genetic influence high, whereas $G \times E$ between genetic and nonshared environmental influences acts to bias the estimate of nonshared environmental influence high; r_{GE} between genetic and shared environmental influences acts to bias the estimate of shared environmental influence high; and r_{GE} between genetic and nonshared environmental influences acts to bias the estimate of genetic influence high (Purcell, 2002).

These principles can be used in combination with the typical results of behavioral genetic studies of personality to pinpoint likely mechanisms of $G \times E$ and r_{GE} involving personality. $G \times E$ between genetic and shared environmental influences may have exaggerated the apparent genetic influences on personality at the expense of the shared environmental influences typically absent in study results. In contrast, r_{GE} between genetic and shared environmental influences is unlikely, as it would increase apparent shared environmental influences on personality, and we typically observe none. This means, for example, that we might expect to find neighborhood effects on neuroticism that differ by genetic vulnerability to neuroticism, but we would not expect to find that family culture involving neuroticism influences how people make residential choices. $G \times E$ and r_{GE} involving genetic and nonshared environmental influences have offsetting effects and may be common. They both involve transactions between genetic influences and environmental circumstances unique to each individual. Thus, even r_{GE} between genetic and nonshared environmental influences, which tends to inflate estimates of genetic influence, will tend to be idiosyncratic in form (e.g., individual differences in responses to trauma).

Models that estimate genetic and environmental influences can contribute importantly to amplification and illustration of theoretical principles of personality development. In particular, Caspi, Roberts, and Shiner (2005) have articulated the cumulative continuity and the coresponsive

principles of personality development. The *cumulative continuity principle* states that personality stability increases with age. Stability peaks perhaps around age 60, though personality characteristics are never completely fixed. Genetic influences contribute to this stability in a straightforward way (Johnson et al., 2005; Pedersen & Reynolds, 1998; Viken, Rose, & Koskenvuo, 1994). We know this because the same genetic influences contribute to personality at earlier and later adult ages. However, as described earlier, straightforward nonshared environmental influences also contribute to stability in personality (Johnson et al., 2005). This finding likely reflects the fact that, for many people, many aspects of the environment, such as place of residence, spousal relationship, occupation, and leisure and social activities, remain relatively stable over long periods of time in adulthood (Johnson, 2007).

In addition to these contributions of straightforward genetic and nonshared environmental influences to personality stability, transactions between genetic and environmental influences such as $G \times E$ and r_{GE} also make contributions. Caspi and colleagues (2005) have identified niche-building processes, in which individuals create, seek out, or end up in environments that are correlated with their personality traits, as fundamental to personality stability. Because of the genetic influences on personality traits, these niche-building processes are perfect examples of r_{GE} in action. In addition, as Caspi and colleagues noted, once people enter trait-correlated environments, those environments may have causal effects of their own, contributing to maintenance of the personality trait and preventing development of opportunities for change. Such effects are often examples of $G \times E$.

Niche construction processes are an active area of interest in evolutionary research, and these ideas may also be useful in personality psychology (Laland, Matthews, & Feldman, 2016; Penke & Jokela, 2016). Consider, for example, the following two studies that touched on these issues in personality psychology, albeit in samples that were not informative about genetic and environmental influences (Roberts, Caspi, & Moffitt, 2003; Roberts & Robins, 2004). The first study was based on the Dunedin Longitudinal Study of an entire birth cohort in New

Zealand, in which personality and work experiences were measured at ages 18 and 26. In general, lower levels of negative emotionality, reflecting lower stress reaction, aggression, and alienation, and higher levels of positive emotionality and constraint, reflecting especially greater social closeness, social potency, and self-control, were associated with greater occupational attainment, work satisfaction, work involvement, financial security, and work autonomy and stimulation (Roberts et al., 2003). In the second study, Roberts and Robins (2004) measured the fit between person and environment as the correlation between consensus ratings of qualities of a university environment and individual perceptions of the ideal university environment over a period of 4 years in 305 university students from the Berkeley Longitudinal Study; they found that greater academic aptitude and emotional stability, male sex, and lower agreeableness were associated with better fit. In combination with the knowledge that all these traits show substantial genetic influence, these studies suggest inferences about the transactions between genetic and environmental influences that allow stable personality traits to contribute to the emergence of individualized environmental niches.

But such transactions between genetic and environmental influences contribute to personality change as well as stability. Caspi and colleagues' (2005) coresponsive principle summarizes the process. According to this principle, life experiences tend to reinforce the personality characteristics that originally draw people to those experiences. The easygoing, cheerful child who expresses affection naturally is well received by others and quickly establishes friendships that build further social skills and a solid basis of positive emotional experience, developing and deepening the trait we think of as extraversion. In contrast, the stress-reactive, socially awkward child who is easily angered is frequently rebuffed by others and quickly becomes resentful and alienated, developing and deepening the trait we think of as aggression. In the language of life-course dynamics and the psychopathology literature, the coresponsive principle links the process of social selection, in which people seek experiences that are correlated with their personality traits, with the process of social

causation, in which experiences affect personality traits. In the language of behavior genetics, the coresponsive principle links active r_{GE} , in which the correlation between environmental and genetic influences results from niche building, with passive and evocative r_{GE} , in which the correlation between environmental and genetic influences arises from growing up with family members similar to oneself and from the responses of others to genetically influenced behavioral displays.

The two studies described earlier addressed the coresponsive principle as well as niche building. In the Dunedin sample (Roberts et al., 2003), young adults at age 26 who attained higher-status jobs and jobs that involved acquisition of resource power became more socially dominant, harder working, happier, and more self-confident. Those who found more satisfying work tended to become less anxious and less prone to stress. Work involvement was associated with increases in willingness to work hard and support for conventional norms. Those who attained greater financial security tended to become less prone to stress and better adjusted socially. Confirmation of the coresponsive principle was evidenced by the fact that these same personality characteristics at age 18 had predicted the age-26 occupational outcomes. In the Berkeley sample (Roberts & Robins, 2004), fit improved a little over the course of the study, primarily because students' views of the ideal university environment changed to more closely match the actual university environment. In addition, students who fit better with the university environment underwent less personality change, and fit between person and environment was associated with increases in emotional stability and decreases in agreeableness. In both these studies, influences were not dramatic but they were consistent, and the samples consisted of young adults. Many people are still just embarking on their occupational careers at age 26, so actual career outcomes are far from clear. College attendance itself is a period of transition for most people. Thus, we could anticipate greater coresponsive effects and clearer indications of niche building over longer time frames.

In summary, life experiences and the situations in which people find themselves do not occur randomly, unilaterally bringing

about transformations in personality over time and across situations. Rather, traits that people already possess lead them to create experiences and situations that reinforce and elaborate on those same personality traits. Though the studies to date that have provided data supporting this proposition have not specifically addressed the roles of genetic and environmental influences in these processes, we can infer them from the general knowledge we have that both genetic and environmental influences on personality are pervasive, yet neither is deterministic. Future studies should be designed to address these roles directly, but we propose that, to paraphrase an old expression, genetic influences on personality affect the beds we make, and then we lie in them.

Finding Main Effects of Specific Genes on Personality Has Been Difficult

Underlying the aggregate genetic influences we have discussed so far are specific genomic variants that contribute to population variation in personality. Discoveries in this area have the potential to revolutionize personality research by making it possible to use individuals' specific genotypes to clarify causal relations from cells to social processes, thereby illuminating how genes influence personality development. Actually making such discoveries remains challenging, despite many concerted gene searches and improvements in techniques used, power to detect specific genetic associations, and great reductions in costs of implementing these techniques. Molecular genetics personality research is described in more detail by de Moor (Chapter 10, this volume). Here, we briefly review research strategies and the general state of the literature in an effort to reach some conclusions regarding conceptual challenges inherent in working to connect specific polymorphisms and personality.

Two major approaches have been employed to associate specific genetic variants with specific personality variables: candidate gene studies and genome-wide association studies (GWAS). Candidate gene studies involve using theory to specify, *a priori*, the genetic variant(s) of interest, whereas GWAS involve scanning the entire genome, hunting for numerous potentially associated variants. Variants that are the focus of GWAS

are known as single-nucleotide polymorphisms (SNPs). SNPs are located throughout the genome and constitute millions of specific differences from person to person at the level of individual nucleotides, the most fundamental building blocks of DNA. The SNPs that are studied in most GWAS research are known as *common variants*, because they vary notably in the population. Specifically, common variants are those SNPs for which the less common variant or *minor allele* is present in at least a notable minority of the population (e.g., 1–5%).

Generally speaking, candidate gene studies preceded GWAS, because the technology needed to implement GWAS arrived on the scene later than the technology involved in genotyping individual variants. As of this writing, results from candidate gene–personality research have not been convincingly and consistently replicated (Munafò et al., 2003; Munafò & Flint, 2011; Okbay & Rietveld, 2015), and the approach has fallen out of favor.

There are many specific reasons for limited replicability of candidate gene–personality associations, but they can be summarized under one general heading: The traits involved are polygenic (Sanchez-Roige, Gray, MacKillop, Chen, & Palmer, 2018). This means that many genes, each with small influence, are involved in expression of each trait. We know this to be the case because, unlike the wrinkled and not-wrinkled peas studied by Gregor Mendel, the offspring of, for example, a stress-reactive father and a calm and unflappable mother are not neatly described as either stress reactive or calm and unflappable, as they would be if a single gene were involved in stress reactivity. Rather, the offspring's relative stress reactivity can be ordered along a basically normally distributed continuum. Although most of the individual genes involved in personality may follow the basic Mendelian patterns of transmission and expression, and their effects may even be neatly additive, no single gene is likely to be essential to trait expression, and possession of any one of them is unlikely to determine trait expression. This means that two family members who are relatively concordant for, say, level of aggression may share relatively few to none of the genes relevant to their level of aggression with two other family members who are sim-

ilarly concordant and similarly aggressive but from another family. This may be more the case for more broadly defined traits. To complicate the picture, most of the genes involved in commonly occurring personality traits are likely to be *pleiotropic*—which means that these genes have more than one function: They are likely involved in many different biochemical processes throughout the brain and thus may be associated with several different personality traits, no matter how independent those traits are manifested behaviorally.

Consistent with the theoretical conceptualization of personality as highly polygenic, GWAS research on individual differences suggests that numerous genetic variants are associated with human individual differences of all kinds. Within the broad GWAS rubric, two approaches to initial analysis of genomewide data have been implemented. The first approach examines the aggregate variation in SNPs across the genome, and associates this variation with variation in a personality variable. This approach is conceptually akin to twin and adoption designs, but instead of using known relationships among family members to identify genetic variance, it uses measured genomewide markers (SNPs) to identify genetic variance among unrelated persons.

One popular software package for this “molecular variance decomposition approach” is known as genomewide complex trait analysis (GCTA). As a result, this approach is frequently known as GCTA (not coincidentally, these are also the labels for the four molecular bases in DNA). GCTA can estimate the total “genomic heritability” of personality (i.e., the total variation in personality that can be attributed to aggregate variation in SNPs across the genome) but is not designed to single out specific SNPs.

Generally speaking, GCTA suggests that the heritability of various personality traits is greater than zero but smaller than the estimates from twin research (e.g., Power & Pluess, 2015; Realo et al., 2017; Rietveld et al., 2013; Vinkhuyzen et al., 2012). There may be a number of reasons for this discrepancy, but one potential reason is that GCTA estimates only sum genetic variation derived from the study of common variants. As described earlier with reference to twin studies,

MZ twins share the combinations of common and uncommon alleles (forms of genes), and if such combinations are important to personality variation, this genomewide non-additive variation is reflected in similarity of MZ twins, but not by the GCTA approach. This implies that the yield of GWAS research focused on identifying specific SNPs may be modest relative to the heritability estimates derived from twin research.

Results from large personality-relevant GWAS consortia are just beginning to appear in the literature. Recent consortia studies focused on neuroticism and related traits have convincingly identified a handful of specific associated SNPs, albeit these SNPs account for only a very small amount of population variation in neuroticism (de Moor et al., 2015; Okbay, Beauchamp, et al., 2016). More promising results are found for educational attainment, with a recent publication reporting 74 associated loci (Okbay, Baselmans, et al., 2016). Although educational attainment (EA) may seem distal from some aspects of personality (e.g., those beyond cognitive ability), twin research suggests genetically mediated associations linking traits in the openness and conscientiousness domains with EA (Tucker-Drob, Briley, Engelhardt, Mann, & Harden, 2016). This suggests the possibility of working with EA-relevant SNPs to predict personality-relevant qualities such as self-control and academic motivation (Belsky et al., 2016; Smith-Woolley, Selzam, & Plomin, 2019). In summary, as of this writing, the GWAS consortium approach is beginning to yield SNPs that are credibly associated with personality, albeit the numbers of associated SNPs are small, and they account for only small amounts of personality variance.

Contemplating replication problems in candidate gene research, and the modest yield of GWAS to date, yields a number of conclusions regarding challenges that are inherent in seeking potential molecular correlates of personality. As we see it, the basic problem is that everyone has a unique personality, yet everyone also expresses all the basic personality traits to some degree in diverse situations. Moreover, there are likely many different pathways within the brain to actualize any behavior related to personality. This multiplicity may be the reason

that personality structure is so richly hierarchical. In addition, regardless of the level of detail at which we measure personality, the traits we measure are amalgamations of different motivations and responses. For example, compliance, a facet of agreeableness in the five-factor model, may involve perception that cooperation has some long-term reward, fear of punishment, actual enjoyment of the activities involved for their own sakes, lack of alternative activities and intolerance for boredom, and, in any case, ability to comprehend requirements and activate appropriate behaviors. Activity, a facet of theoretically independent extraversion in the five-factor model, may involve many similar motivations and responses to varying or even similar degrees. Obviously, experience will affect how one perceives one's situation with respect to these kinds of motivations and responses as well, but the point here is that it is very unlikely that particular genes will be involved in activity but not in compliance, or vice versa.

Universality of at least some level of expression of all basic personality traits suggests that variation in genetic expression may underlie much of the observed variation in personality traits. Though genetic expression itself is at least partially under genetic control (York et al., 2005), work with experimental nonhuman animals makes clear that variation in genetic expression can also be triggered by environmental circumstances. For example, Weaver and colleagues (2004) described differential environmental effects on genetic expression in rats. Differences in maternal licking, grooming, and nursing practices were associated with long-term differences in offspring's hypothalamic–pituitary–adrenal response to stress. These differences appeared to result from differences in DNA methylation of a glucocorticoid receptor gene promoter in the hippocampus. The differences in maternal treatment appeared to contribute to parental behavior by the offspring as well, leading to differences in stress response that were transmitted from generation to generation. Whether or not there are processes directly analogous to these in humans, it is highly likely that these kinds of general processes take place in humans, contributing to genetic variation that we can sometimes pick

up through statistical decomposition of variance but not through examination of DNA samples.

In humans, MZ twins provide information about another mechanism that complicates the search for genes for polygenic traits such as personality. Though MZ twins share common genetic backgrounds that tend to make them similar, significant variation in gene expression remains. Extent of this variation has been observed to increase with age (Fraga et al., 2005), suggesting that it is subject to environmental influences. But post-natal environmental experiences are probably not the only sources of these epigenetic differences. MZ twins tend to be similar to similar degrees regardless of whether they are reared together or apart (Wong, Gottesman, & Petronis, 2005). This “similarity of similarity” may be due to r_{GE} . It may also result from tendencies for additional resemblance due to shared rearing environments to be offset by differentiation, as described earlier.

Two Broad Questions That Remain Relevant to Genetic Research on Personality

We began this chapter with well-established observations in personality genetics and moved to current trends in research. In closing, we briefly outline two very challenging—but, in our view, perennially important—questions that we feel are highly relevant in contemplating the link between genetics and personality.

Do We Need to Find Specific Genes and Specific Environmental Influences to Understand Personality Processes?

For many, the primary purpose of demonstrating the presence of genetic influences on human personality and other behavioral traits has been to provide evidence warranting a search for the specific genes involved. Though the fact that genes code for proteins rather than psychological characteristics is well established, the implications of this fact for understanding behaviors influenced by many genes have not been fully absorbed (Kendler, Kuhn, Vittum, Prescott, & Riley, 2005). In particular, we cannot expect that

any specific genes will necessarily lead to a specific level on a personality trait, and we cannot expect that any specific genes will only influence one particular trait. Instead, the influences of specific genes are likely to be contingent on other factors such as environmental circumstances or presence of other genes. Finally, the proteins that are the direct products of gene expression are only initial steps in long series of transactional processes that lead to a particular personality phenotype, and these processes may be interrupted or altered at many stages and thus lead to a wide range of phenotypes.

Everyone has a personality and manifests behaviors shared with all other humans. Everyone is aggressive in some situations and passive in others. What makes each individual personality unique is the distinct eliciting circumstances, and the unique combination of underlying behavioral systems relevant to personality (e.g., individual differences in sensitivity to specific eliciting circumstances, intensity of resulting behaviors, and so on). Consider, as an analogy, physical health. Everyone has cardiovascular, respiratory, and digestive systems that perform the same basic functions with varying degrees of efficiency. Health lies in optimal functioning of these systems, and illness takes idiosyncratic forms depending on eliciting circumstances and particular constellations of genetic vulnerabilities.

For physical health as measured by numbers of chronic illnesses, we (Johnson & Krueger, 2005) observed that genetic variance is greater with lower monetary income and lower perceived control over life. In other words, under psychologically and physically stressful environmental conditions, genetic vulnerabilities to illness were more likely to be expressed—a form of $G \times E$ interaction. These results also indicated patterns of r_{GE} , which further influence health outcomes, beyond $G \times E$ interactions. Importantly, the expressed genetic vulnerabilities took many different forms involving different physiological systems; without doubt they involved many different genes. The situation for personality may ultimately prove to be similar, such that correlational and interactive personality processes can be understood by modeling r_{GE} and $G \times E$, without necessarily identifying the specific

genetic polymorphisms involved in these effects (South, Hamdi, & Krueger, 2017).

What Can We Learn from Understanding the Link between Quantitative and Molecular Genetics Research?

If everything is heritable, why is it so hard to find the genes involved in personality? The key to unraveling this riddle may lie in understanding just how much variation is glossed over by a general heritability statistic. As one example, we (Krueger et al., 2008) examined how genetic and environmental contributions to personality traits might change as a function of the nature of adolescents' relationships with their parents. Across a range of parental regard (e.g., "I admire my parent and my parent admires me"), genetic contributions to positive emotionality (akin to extraversion) varied widely, from 34% at low levels of regard to 77% at high levels of regard. Fifty percent is a good "halfway point" (indeed, the heritability of positive emotionality was 52% when we estimated it without modeling regard as a moderator). But this very general 52% value disguised a wide range of etiological scenarios, in which genetic effects on positive emotionality were markedly diminished and enhanced. In summary, we might ask not "how heritable a trait is" but rather "what are the circumstances in which genetic contributions to this trait are enhanced or suppressed?"—and look for specific polymorphism–personality associations in circumstances in which genetic contributions are enhanced.

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CHAPTER 10

Molecular Genetics of Personality

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What makes a person unique, and what makes a person different from other persons? How do we develop into the persons we are? It is by now widely accepted that individual differences in personality, and the development thereof, can be explained by a combination of the genes that we inherit from our parents at conception and the experiences we gain as we are exposed to (and seek out) different environments throughout our lives. The importance of genetic inheritance (or “heritability”) of personality has been repeatedly demonstrated by behavior geneticists (reviewed by Vukasovic & Bratko, 2015, see also, Krueger & Johnson, Chapter 9, this volume). But can we find this “heritability of personality” in our DNA? Are there genes that make a person more likely to develop a certain personality, and if so, which are these genes, and how do they influence our personalities?

In this chapter, I review the molecular genetics studies that aim to localize genes associated with personality. I show that important progress has been made in recent years, although much scientific work remains to be done if we want to further increase our understanding of the complex molecular genetics structure underlying personality. This chapter is organized as follows. I start with a brief introduction into personality theories and heritability studies on personality. Next, I introduce terminology about the human

genome that is needed to understand molecular genetics studies on personality. Then, I will review and discuss different types of molecular genetics studies on personality. Finally, I close by summarizing what we have learned about the molecular genetics of personality and discuss promising directions for future research.

Personality can be defined as the complex and dynamic organization of psychophysiological systems, residing within a person, that create patterns of behaviors, cognitions, and emotions that are characteristic for this person. These behaviors, cognitions, and emotions are unique to each individual and are thought to be relatively stable over time and across settings. Three theories of personality have been shown to be particularly important for molecular genetics research on personality. The personality theories of psychologists Hans and Sybil Eysenck (1985; Eysenck, 1967) and psychiatrist Robert Cloninger (1987; Cloninger, Svrakic, & Przybeck, 1993) assume that personality has a genetic, (neuro)biological basis, yet propose quite different higher-order personality traits. Eysenck and Eysenck (1985) distinguished three dimensions of personality: *neuroticism*, *extraversion* and *psychoticism*. Persons high in neuroticism are emotionally reactive in response to external stimuli, which is hypothesized to be rooted in the functioning of the limbic brain system,

which is closely connected to the endocrine and autonomic nervous systems. Persons high in extraversion are underaroused and seek out stimulation, whereas persons low in extraversion (introverts) are overaroused and avoid stimulation, which is hypothesized to be related to the cortical structures of the brain. Psychoticism, including characteristics such as recklessness, nonconformity, impulsivity, hostility, and anger, has been linked to testosterone levels and the brain's monoamine oxidase (MAO) pathway.

In the psychobiological theory of personality from Cloninger (1987; Cloninger et al., 1993), a distinction is made between temperament (four dimensions) and character (three dimensions). Temperament is assumed to have a strong genetic basis and to develop early in life, while character is assumed to be less heritable and to develop in adulthood. The four temperament dimensions are *novelty seeking*, *harm avoidance* (sometimes labeled *anxiety proneness*), *reward dependence*, and *persistence*. Novelty seeking can be viewed as reflecting the behavioral activation system, and has been hypothesized to be linked to the dopaminergic pathway. Harm avoidance reflects the behavioral inhibition system and is suggested to be correlated with serotonergic brain activity. Reward dependence, including characteristics such as warm communication, sensitivity to social cues, sympathy, and, in extreme form, social dependency, is hypothesized to be related to low noradrenergic neurotransmitter activity. Persistence, reflecting the tendency to persevere in a task, especially when challenged, for example, by frustration or fatigue, has not been clearly linked to a particular neurotransmitter system, but it has suggestively been related to prefrontal brain activity.

The third theory, the five-factor model (FFM) of personality (McCrae & Costa, 1987; John, Chapter 2, this volume), was not developed from a genetic or neurobiological perspective, but it has also been important for molecular genetics research on personality. The FFM includes five dimensions of personality: *neuroticism*, *extraversion*, *openness to experience*, *agreeableness*, and *conscientiousness*. Although there are clear and important differences between the personality theories discussed earlier, studies have also shown that there is substantial

overlap among theories in the personality traits (Markon, Krueger, & Watson, 2005). Neuroticism and harm avoidance seem to cluster into a negative emotionality factor, while altruism, conscientiousness, novelty seeking, and persistence cluster into a disinhibition factor, and reward dependence and extraversion cluster into a positive emotionality factor.

Twin studies have repeatedly shown that personality traits are heritable (see Krueger & Johnson, Chapter 9, this volume). This finding holds for all personality traits from all personality theories described earlier. Heritability of personality was confirmed by a recent meta-analysis of 45 twin, family, and adoption studies, reporting an average heritability estimate of 39% (Vukasovic & Bratko, 2015). Heritability did not vary across the personality theory and corresponding instrument that was used, but it did vary by study design, with twin studies yielding higher heritability estimates than family and adoption studies (47 vs. 22%). Moreover, heritability estimates did not vary greatly across traits, with a range of 30 to 51%. Van den Berg et al. (2014) found a heritability of 48% for neuroticism and 49% for extraversion, meta-analyzing the personality data from six twin cohorts based on Eysenck's, Cloninger's and the FFM personality theories. These heritability estimates are highly similar to the twin-study-based heritability estimate for personality reported in Vukasovic and Bratko (2015). Given the widely replicated heritability of personality, a next step is to identify genetic variants for personality that explain its heritability. In the next section, I introduce some terminology of the human genome in order to explain how genetic variation can be measured in molecular genetics studies. In the subsequent section, I review the findings from these studies.

The Human Genome

Some Terminology

The *human genome* concerns all the genetic information in a person. This genetic information is stored on 23 pairs of *chromosomes* plus the mitochondrial DNA. Chromosomes are large deoxyribonucleic acid (DNA) mol-

ecules that are found in each cell nucleus of the human body.¹ Humans carry 22 pairs of autosomes and two sex-specific chromosomes (XX for females and XY for males). Each chromosome consists of two interconnected strands of *nucleotides*, also known as the double helix. The nucleotides consist of different chemical groups: a sugar molecule, a phosphate group, and one of four nitrogenous *bases*: adenine (A), cytosine (C), guanine (G) and thymine (T). *Genes* are specific sequences of nucleotides that are functional and code for proteins via the processes of transcription and translation (*gene expression*). The human genome carries approximately 20,000–25,000 genes. Ninety-nine percent of the human genome is identical for all humans. The remaining 0.01% contains the genetic variation that create the individual differences among humans.

Measuring Genetic Variation

In molecular genetics studies, different types of genetic variation are distinguished and measured. Single-nucleotide polymorphisms (SNPs) are an important type of genetic variation that represent loci where individuals vary on one single nucleotide (e.g., some humans have A on this location, while others have C). Most SNPs are biallelic, that is, just two variants occur in a specific population. SNPs are commonly used in candidate gene and genomewide genetic association studies. Another type of genetic variation is represented by variable number tandem repeats (VNTRs), in which a sequence of nucleotides is repeated a variable number of times. VNTRs are sometimes also called microsatellites. The sequence of nucleotides is usually rather small (two to 10 nucleotides) and is commonly repeated between two and 50 times. Together with SNPs, VNTRs are used in candidate gene association studies. VNTRs are also used in genetic linkage studies.²

Molecular Genetics Studies of Personality

Linkage Studies

Genetic linkage studies examine how a genetic marker cosegregates with a trait (or disease) within families. It uses the prin-

ciple of genetic linkage; loci close together are said to be “linked.” Alleles at loci close together on the genome tend to be inherited together, because the chance of a recombination event for two loci close together is very small (Ferreira, 2004). For example, in pairs of siblings, one may test whether an increased sharing of a marker inherited from the same parent predicts resemblance for a personality trait (Haseman & Elston, 1972). Genomewide linkage analysis uses multiple markers along the genome. A handful of genomewide linkage studies has been conducted for personality, the first of which appeared in 1998 (Cloninger et al., 1998). Most studies focused on neuroticism (Fullerton et al., 2003; Kuo et al., 2007; Nash et al., 2004; Neale, Sullivan, & Kendler, 2005). Another study included, besides neuroticism also extraversion, psychoticism and lying (Gillespie et al., 2008), and one study has been conducted for the traits harm avoidance, reward dependence, and novelty seeking (Cloninger et al., 1998). These studies identified several candidate regions, but many of those regions could not be replicated across studies. The study by Fullerton et al. (2003) identified a region on chromosome 12q for neuroticism, which showed suggestive linkage in the studies by Kuo et al. (2007) and Gillespie et al. (2008). Fullerton et al. (2003) further identified two regions on chromosome 1 (on 1q and on 1p for females specifically). The 1p region was also found in the study by Nash et al. (2004), and the 1q region also appeared in Neale et al. (2005), although it should be noted that the locations are not exactly the same, and the peaks at these regions were not significant genomewide. The study by Cloninger et al. (1998) found a genomewide significant peak on chromosome 8p for harm avoidance, but nonsignificant results for reward dependence and novelty seeking. The peak for harm avoidance was replicated in an independent study focusing on three chromosomal regions including 8p (Zohar et al., 2003). The linkage findings for neuroticism did not overlap with the findings for harm avoidance, despite the strong phenotypic and genetic overlap (Gillespie, Johnstone, Boyce, Heath, & Martin, 2001).

In brief, genomewide linkage studies have not been very successful in robustly

identifying the genomic regions that might harbor genes for personality. With sample sizes of around 200–1,300 sib pairs, these studies have probably been underpowered. Furthermore, it has proven to be quite difficult to locate regions with enough precision (Roberts, MacLean, Neale, Eaves, & Kendler, 1999). Nowadays, genomewide linkage studies are not considered to be the most suitable technique to identify genes for complex traits (i.e., phenotypes that are influenced by many common genetic variants with each small effect size) (McCarthy et al., 2008; Stranger, Stahl, & Raj, 2011). Molecular genetics researchers have now turned to genomewide association studies as a more promising approach to find genetic loci for personality traits. Genomewide association (GWA) studies resemble genomewide linkage studies in that a genomewide “search” is conducted, without an a priori hypothesis about which genetic loci are likely to be associated with personality. However, GWA studies are quite different from genomewide linkage studies in the sense that they are not conducted in families tracing the cosegregation of genetic variants and traits. Rather, they are conducted in samples of unrelated individuals and rely on standard regression techniques in which the association between a genetic variant and a phenotype is tested.³ This technique is also the basis of candidate gene association studies, in which a specific genetic variant, mostly located in or near a well-characterized candidate gene, is tested for association with the phenotype based on a theory-driven a priori hypothesis.⁴ In the next section, I first discuss such candidate gene association studies for personality. This is followed by a section reviewing GWA studies for personality.

Candidate Gene Association Studies

In 1996, two years before the first genomewide linkage study for personality appeared, the first candidate gene association studies for personality were published, one study focusing on a serotonin gene and neuroticism/harm avoidance traits (Lesch et al., 1996) and two other studies focusing on a dopamine gene in relation to novelty seeking/disinhibition (Benjamin et al., 1996; Ebstein et al., 1996). The first study examined the

association between a VNTR (*5-HTTLPR*) in a promoter region near the serotonin transporter gene (*5-HTT* or *SLC6A4*) on chromosome 17 and anxiety-related personality traits, among which were neuroticism and harm avoidance (Lesch et al., 1996), testing the hypothesis that anxiety-related personality traits are correlated with genetically influenced serotonergic brain functioning. In a sample of 505 individuals, higher neuroticism was associated with one or two copies of the short allele of *5-HTTLPR*. In addition, *5-HTTLPR* was also significantly associated with measures of anxiety and harm avoidance. Ever since, the study has been cited over 5,000 times, and many studies have attempted to replicate the original findings. Subsequently, the results of these studies have been summarized by several meta-analyses (Munafò, Freimer, et al., 2009; Schinka, Busch, & Robichaux-Keene, 2004; Sen, Burmeister, & Ghosh, 2004). In the meta-analysis by Sen et al., which included 23 studies on *5-HTTLPR* and anxiety-related personality traits in adults, it was found that *5-HTTLPR* was significantly associated with neuroticism ($p = .000016$), but not with harm avoidance ($p = .166$) or other anxiety-related personality traits ($p = .944$). Schinka et al. (2004) arrived at a similar conclusion, meta-analyzing 26 studies showing that the effect size for the association between *5-HTTLPR* and anxiety-related personality overall was very small ($d = 0.10$), but larger for neuroticism ($d = 0.23$) compared with harm avoidance ($d = 0.04$). These two meta-analyses were followed by a third meta-analysis in 2009, including 42 studies, that confirmed that *5-HTTLPR* is not significantly associated with harm avoidance ($d = 0.02$, $p = .37$) or Eysenckian neuroticism ($d = 0.01$, $p = .71$), but there is evidence for association with FFM-based neuroticism ($d = 0.18$, $p < .001$) (Munafò, Freimer, et al., 2009). These outcomes lend only partial support for Cloninger’s hypothesis that serotonergic brain activity is involved in anxiety-related personality traits. Munafò, Freimer, et al., in their discussion of the meta-analysis results, question the usefulness of finding a genetic effect that is specific to an FFM measure of neuroticism (the NEO Personality Inventory—Revised [NEO-PI-R]).

Two other early candidate gene studies on personality appeared back-to-back in the same issue of *Nature Genetics* in 1996, and both examined the association between the dopamine receptor D4 (*DRD4*) gene and novelty seeking (Benjamin et al., 1996; Ebstein et al., 1996). In the study from Ebstein et al., the most common long allele (7-repeat) of the *DRD4* exon III polymorphism was found to be associated with higher scores on novelty seeking in sample of 124 adults. Benjamin et al. (1996) replicated these findings by showing in sample of 315 subjects, that the *DRD4* exon III long alleles (6–8 repeats) were associated with higher scores on extraversion and with lower scores on conscientiousness compared to short alleles (2–5 repeats). In addition, the *DRD4* exon III polymorphism was significantly associated with estimated scores on novelty seeking. Many studies have aimed to replicate these findings since then, with very mixed results. Munafò et al. (2003), in a meta-analysis that included studies examining the association between candidate genes in the serotonin and dopamine neurotransmitter pathways (including but not restricted to *5-HTT* and *DRD4*), concluded that only the association between *5-HTTLPR* and avoidance traits such as neuroticism and harm avoidance remained significant ($p = .038$).

Given the difficulties in replicating the original findings of associations between serotonin-related and dopamine-related genes and personality traits, as illustrated by Munafò et al. (2003), researchers have further moved into broadly two directions in the search for genetic variants for personality. Some researchers have argued that the genetic effects may be confounded by exposures to environments, and state that we can only detect genetic effects if we consider their interaction with the environment (Belsky & Pluess, 2009; Caspi, Hariri, Holmes, Uher, & Moffitt, 2010). However, similar problems arise in these gene $\times$ environment ($G \times E$) interaction studies in that the original $G \times E$ effects are often difficult to replicate, as has been shown for example for the interaction effect between *5-HTTLPR* and stressful life events on depression (Munafò, Durrant, Lewis, & Flint, 2009; Risch et al., 2009), which was also found to be absent for neuroticism (Middeldorp et al., 2010).

Other researchers have argued that following the successes of GWA studies for medical phenotypes, we should conduct similar studies for social, behavioral, and psychiatric phenotypes in order to identify novel loci that enable the generation of novel hypotheses about the underlying (neuro)biological mechanisms of these phenotypes (Cichon et al., 2009). Once such genetic variants are robustly identified, the possibility of studying the moderating effect of the environment can be considered. I discuss such GWA studies in the next section.

Genomewide Association Studies

GWA studies have become feasible since the entire human genome was mapped in 2003 (Altshuler et al., 2005) and some technical advances occurred in our ability to genotype tens of thousands of SNPs (Barrett & Cardon, 2006). In such studies, hundreds of thousands or even millions of SNPs, covering a large part of the common genetic variation along the genome, are tested for association with a particular phenotype (Hirschhorn & Daly, 2005). The first GWA studies for personality were published in 2008, just five years after the completion of the human genome map. Lessons had been learned from the abundance of non-replications found in both candidate gene association and genomewide linkage studies. Therefore, these initial GWA studies already comprised samples of considerably larger size (thousands rather than hundreds of subjects), frequently included a replication sample, and used stringent significance thresholds to deal with the multiple tests performed in GWA studies and the associated risk of false-positive discoveries. In GWA studies, hundreds of thousands or millions of genetic variants are typically tested, and associations with p values below 5×10^{-8} are considered significant genomewide.

The first two GWA studies focused on neuroticism (Shifman et al., 2008; van den Oord et al., 2008). In the study by Shifman et al. (2008), no genomewide significant hits were found in a sample of around 2,000 individuals, but one variant in the *PDE4D* gene on chromosome 5 was suggestively associated with neuroticism ($p < .001$) that was marginally associated ($p < .05$) with

neuroticism in one out of the four replication samples. In a sample of 1,227 subjects, Van den Oord et al. (2008) found suggestive evidence that neuroticism was associated with the *MAMDC1* gene (also labeled the *MDGA2* gene). This locus could be replicated using a nominal *p*-value threshold of .05 in a sample of 1,880 Germans. The *MAMDC1* locus could also be replicated in a study on harm avoidance in 541 healthy individuals and 199 depressed patients (Heck et al., 2011) but not for neuroticism in another study (Hetteema, van den Oord, An, Kendler, & Chen, 2009).

Terracciano et al. (2010) published the first GWA study on the five FFM personality traits in a sample of 3,972 subjects from a genetically isolated population. Again, no genomewide significant signals were found, but some interesting and suggestively significant associations were reported: between neuroticism and *SNAP25*, extraversion and *BDNF* and two cadherin genes, and agreeableness and the *CLOCK* gene, a gene involved in circadian rhythms. The association between *CLOCK* and agreeableness could be replicated in two out of three samples; the other associations were not replicated. In the same year, a GWA study ($N = 5,117$) on the four Cloninger temperament traits was published (Verweij et al., 2010). Again, no genomewide significant hits were found.

These early GWA studies seemed to confirm that personality traits are indeed highly polygenic and suggested that even larger sample sizes with more statistical power are required to detect genetic variants that account for the heritability of personality. At that time, it became clear to molecular genetics researchers interested in complex phenotypes such as personality traits that in order to increase sample size, data from multiple cohorts needed to be pulled together and analyzed by meta-analytic techniques. An overview of the meta-analytic genomewide association studies for personality published since then is provided in Table 10.1. de Moor et al. (2012) conducted the first meta-analysis of GWA studies for personality, focusing on the five FFM dimensions of personality assessed in 10 different samples, with a total sample size of 17,375 individuals. Replication of top signals was sought in five independent samples comprising an

additional 3,294 subjects. Together, these cohorts formed the start of the Genetics of Personality Consortium, a large collaboration between cohorts with data on both genomewide genotypes and personality. Genomewide significant loci were found for openness to experience near the *RASA1* gene on chromosome 5 and for conscientiousness in the brain-expressed *KATNAL2* gene on chromosome 18, although these associations were not clearly replicated. Surprisingly, no genomewide significant loci were detected for neuroticism, the personality trait on which most molecular genetics studies focused in the past. Around the time that this paper appeared, meta-analyses of GWA studies for other complex traits, such as height, showed that if sample size is further increased, the technique is able to detect much more genetic variants (see, e.g., the successes for the molecular genetics study of height, for which 180 loci were identified in over 180,000 individuals; Allen et al., 2010). In order to maximize sample size beyond the ~17,000 individuals included in the study from de Moor et al. (2012), a harmonization procedure was developed that linked the personality questionnaires from Eysenck's, Cloninger's, and FFM models of personality. The procedure resulted in harmonized estimated scores for neuroticism/harm avoidance and extraversion/reward dependence in over 63,000 individuals from 29 cohorts (van den Berg et al., 2014). A meta-analysis was conducted on the GWA results for the harmonized neuroticism and extraversion in these cohorts (de Moor et al., 2015; van den Berg et al., 2016). For neuroticism, a replication cohort of almost 10,000 individuals was also available. A genomewide significant association was found for neuroticism with a variant in the *MAGI1* gene on chromosome 3. This variant was not significant genomewide in the replication cohort, but remained significant genomewide in the meta-analysis of all 30 cohorts. The *MAGI1* gene is expressed in the brain, particularly in the hippocampus, and has been linked to major depression, schizophrenia, and bipolar disorder—disorders that are known to be genetically correlated to each other and with neuroticism. For extraversion, no genomewide significant hits were found in the same cohorts and the equally large sample size (van den Berg et al., 2016).

TABLE 10.1. Overview of Meta-Analyses of Genomewide Association Studies for Personality

Study	Personality test	Personality traits	Sample size discovery set	Sample size replication set	Genomewide significant hits		
					Index SNP	Location	Associated gene
de Moor et al. (2012)	NEO-FFI	Neuroticism	17,375	3,294	—	—	—
		Extraversion			rs1477268/ rs2032794	5q14.3	RASA1
		Openness to experience			—	—	—
		Agreeableness			rs2576037	18q21.1	KATNAL2
de Moor et al. (2015)	Latent scores based on NEO-PI-R/FFI, TCI and EPQ	Conscientiousness	63,661	9,786	rs35855737	3p14	MAG1
		Harmonized neuroticism			—	—	—
van den Berg et al. (2016)	Latent scores based on NEO-PI-R/FFI, TCI and EPQ	Harmonized extraversion	63,030	9,783	—	—	—
Smith et al. (2016)	EPQ	Neuroticism	106,716	—	rs490647	1p34.3	GRIK3
					rs4653663	1q42.12	ENAH, SRP9
					rs12637928	3q13.13	PVRL3
					rs62353264	4q32.3	TMEM192, KLHL2, MSMO2
					rs12682352	8p23.1	>10 genes
					rs12378446	9p23	PTPRD
					rs4977844	9p21.3	ELAVL2
					rs111433752	17q21.31	>10 genes
Okbay et al. (2016)	(Latent scores based on) NEO-PI-R/FFI, TCI and EPQ	(Harmonized) neuroticism	170,911 ^a	—	rs1187264	18q12.2	CELF4
					rs35688236	3p22.3	>10 genes
					rs2572431	8p23.1	PTPRD
					rs10960103	9p23	ELAVL2
					rs2150462	9p21.3	ELAVL2

Lo et al. (2017)	Big Five	Neuroticism Extraversion Openness to experience Agreeableness Conscientiousness	122, 886 ^b 122, 886 76, 600 ^c 76, 600 76, 600	rs193236081	17q21.31	>10 genes DRD2 ADM, AMPD3 LINGO1 PAFAH1B1 CELF4 CELF4
				rs4938021	11q23.2	
				rs139237746	11p15.4	
				rs12903563	15q24.3	
				rs12938775	17p13.3	
				rs1557341	18q12.2	
				rs12961969	18q12.2	
				rs6981523	8p23.1	XKR6 L3MBTL2, CHADL
				rs9611519	22q	
				rs57590327	3p	GBE1 MTMR9
				rs2164273	8p	
				rs6481128	10q	PCDH15 WSCD2
				rs1426371	12q	
				rs7498702	16p	RBOX1 —
				—	—	
				rs3814424	5q	— LINC00461
Nägel et al. (2018)	(Latent scores based on) NEO-PI-R/FFI, TCI and EPQ, and EPQ	(Harmonized) neuroticism	449, 484 ^d	136 loci (of which 122 were new at time of analysis)	Several chromosomes; see article for more information.	599 genes; see article for more information.

Note. EPQ, Eysenck Personality Questionnaire; FFI, Five-Factor Inventory; SNP, single-nucleotide polymorphism; TCI, Temperament and Character Inventory.

^aThis sample is a combination of the GPC samples (de Moore et al., 2015) and the U.K. Biobank sample (Smith et al., 2016).

^bThis sample is a combination of the GPC-2 (de Moor et al., 2015) and the 23andMe sample.

^cThis sample is a combination of the GPC-1 (de Moor et al., 2012) and the 23andMe sample.

^dThis sample is a combination of the GPC-2 (de Moor et al., 2015), the 23andMe sample and the U.K. Biobank sample.

In 2016, a published meta-analysis of GWA results of 106,716 individuals, of which 91,370 are part of the large U.K. Biobank project, identified nine novel loci for neuroticism (Smith et al., 2016). Two of the loci were in very large linkage disequilibrium (LD) blocks containing many genes, which makes it difficult to link these loci to any specific gene. Other loci represented smaller regions containing a single gene. Some interesting candidate genes were found, many of which are expressed in the brain and have some known neuronal function, including *GRIK3*, which is a glutamate receptor gene (for the full list of genes associated with the index SNPs, see Table 10.1). The *MAG11* gene as identified by de Moor et al. (2015) was not confirmed in this study, although the direction of effect was the same. At about the same time as the study from Smith et al. (2016), Okbay et al. (2016) published a study in which the U.K. Biobank results for neuroticism were meta-analyzed together with the Genetics of Personality Consortium (GPC) results for harmonized neuroticism.⁵ This study reported 11 loci for neuroticism, of which five can be considered novel loci, since they were not found in either of the studies from De Moor et al. (2015) or Smith et al. (2016), or previous GWA studies. Of note is the genome-wide significant finding on chromosome 11q, near the dopamine receptor D2 (*DRD2*) gene. *DRD2* was also found to be significantly associated in some candidate gene studies reviewed in Munafò et al. (2003), but after correcting for heterogeneity in findings, the association became nonsignificant. It should be noted, however, that the polymorphism studied was not the same in the genome-wide versus the candidate gene studies. In general, candidate genes are rarely detected in GWA studies, and with the exception of *DRD2*, this also appears to be the case for studies on personality.

In 2017, another meta-analysis of genome-wide studies for the five FFM personality traits was published (Lo et al., 2017). In this meta-analysis, data from 23andMe were combined with data from the GPC for agreeableness, openness to experience, and conscientiousness, harmonized neuroticism, and harmonized extraversion. For neuroticism, two loci were found, of which one was also identified in the studies from Smith et

al. (2016) and Okbay et al. (2016): a large LD block on chromosome 8p23.1, which contains many genes. As suggested by both Okbay et al. (2016) and Lo et al., (2017) this region might contain multiple independent associations that might be accounted for by an inversion polymorphism in this region. Lo et al. (2017) also combined the results of 23andMe, GPC, and the U.K. Biobank in one large meta-analysis of 260,861 subjects, and showed that this locus was highly significant with a p value of 3.17×10^{-24} and 3.95% of the variance in neuroticism explained, which is the largest effect size found in a GWA study for personality that is attributable to a single SNP. The other loci found for neuroticism, extraversion, and conscientiousness have all been found in other GWA studies for related phenotypes, including psychiatric phenotypes and educational attainment (Lo et al., 2017).

The most recent GWA meta-analysis, studying just neuroticism, included data from the U.K. Biobank, 23andMe, and the GPC, reaching a sample size of 449,484 subjects (Nagel et al., 2018). This study reports 136 genome-wide significant loci (of which 124 were new at the time of analysis) that could be linked to many genes involved in specific brain cell types, including dopaminergic neuroblasts, medium spiny neurons, and serotonergic neurons. Gene set analyses suggest pathways involved in neurogenesis, behavioral response to cocaine processes, and axon part.

Overall, these large meta-analytic studies show that if sample sizes in GWA studies are sufficiently large (i.e., hundreds of thousands), genetic variants can be detected at genome-wide significant levels, that is, beyond levels of chance, taking into account the multiple association tests performed in a genome-wide study. It further shows that the likelihood of replication of findings is also increased across cohorts if sample sizes are very large, as evidenced by the detection of the 18p23.1 locus for neuroticism. The effect sizes are, however, very small, and much of the genetic variance as estimated in heritability studies remains unexplained. SNP-based heritability studies give more insight in what causes this discrepancy, also known as “the missing heritability problem” (Maher, 2008).

SNP-Based Heritability Studies

In their seminal work, Yang, Lee, Goddard, and Visscher (2011) developed a new statistical technique that uses genomewide SNP data to estimate heritability. The technique was called genomewide complex trait analysis (GCTA). Studies that apply this technique are also known as SNP-based heritability studies. In brief, the technique works as follows. Even unrelated individuals, because they share common ancestors, are to some degree genetically related. GCTA makes use of this principle by estimating a genetic relationship matrix for all individuals in a sample, based on the available genomewide SNP data. Next, this genetic relationship matrix is used to estimate the proportion of phenotypic variance explained by (additive) genetic variance. Many of the more recent GWA studies also report these SNP-based heritability estimates for personality (e.g., de Moor et al., 2015; Lo et al., 2017; Nagel et al., 2018; van den Berg et al., 2016; Verweij et al., 2012; Vinkhuyzen et al., 2012). SNP-based heritability estimates have varied across studies and personality traits from 0% and nonsignificant up to 18% and significantly different from zero. In the study from Lo et al. (2017), including almost 60,000 subjects, SNP-based heritability ranged from 9% for agreeableness to 18% for extraversion. SNP-based heritabilities for all five personality traits were significant in this study. The SNP-based heritability in the largest meta-analysis for neuroticism was 10% (Nagel et al., 2018). These are important results, in that they suggest that common genetic variants of small, additive effects do influence personality traits, despite the perhaps somewhat disappointing results from GWA studies aiming to identify single variants. At the same time, it shows that a considerable portion of the heritability of personality as estimated in twin and family studies remains unexplained, leaving the missing heritability problem largely unsolved for personality traits. The study of other types of variants, such as rare variants, other types of effects (dominant–recessive effects rather than additive effects), gene $\times$ gene interaction effects, $G \times E$ interaction effects, and deeper coverage of the genome, among others, have been put forward as

fruitful avenues to pursue the goal of more fully explaining the heritability of personality.

Polygenic Association between Personality and Related Traits

Personality Traits

Although some theories of personality, such as the FFM, posit that the main dimensions of personality are orthogonal, it is well-known that most personality traits are correlated. For example, the phenotypic correlations between the Big Five personality traits in the large 23andMe sample ranged between .01 and .34, and were significant for all pairs of traits except for the correlation between conscientiousness and openness to experience (Lo et al., 2017). The correlation between neuroticism and extraversion was $-.24$, and highly similar to previous reports (e.g., Gillespie et al., 2001). Multivariate twin-family studies have shown that personality traits are also genetically correlated (Fracis, Borsboom, Dolan, & Boomsma, 2014; Jang et al., 2006). Using genomewide SNP data to estimate genetic correlations among personality traits yields a similar picture: Genetic correlations among Big Five personality traits range between .11 and .40, and were significant for all pairs of traits with the exception of openness to experience with agreeableness. Furthermore, SNP-based estimated genetic correlations tend to be somewhat larger than their phenotypic counterparts (Lo et al., 2017).

Psychiatric and Other Traits

Personality traits are viewed as important predictors for a variety of life outcomes, including mental and physical health outcomes. Molecular genetics studies on personality in this regard are often conducted in the hope to not only increase our understanding of the underlying neurobiological etiology of personality traits themselves, but also to shed light on the underlying neurobiological mechanisms that explain why some people are at risk for and develop psychiatric disorders, while others are not. Middeldorp et al. (2011) showed that polygenic risk scores, based on GWA results for the five personal-

ity traits from GPC (de Moor et al., 2012), uniquely predicted diagnoses of major depressive disorder (MDD) and bipolar disorder (BD) in independent samples. Polygenic risk scores for neuroticism predicted MDD, while polygenic risk scores for extraversion predicted BD. The prediction of MDD from polygenic scores for neuroticism was confirmed by de Moor et al. (2015). Okbay et al. (2016) estimated the genetic correlations of neuroticism with depressive symptoms, subjective well-being, and a range of neuropsychiatric and physical health phenotypes, by investigating the overlap of the GWA results of all these phenotypes. Neuroticism was genetically correlated to both depressive symptoms ($r_g = .70$) and subjective well-being ($r_g = -.75$). The genetic correlation of neuroticism with anxiety disorders was also large; smaller yet significant genetic correlations were found with BD and schizophrenia. Neuroticism was not found to be genetically correlated with Alzheimer's disease or autism spectrum disorder. With regard to physical health phenotypes, neuroticism was not found to be genetically correlated with body mass index, fasting glucose or triglycerides, but small genetic correlations were found with coronary heart disease and ever smoking (Okbay et al., 2016). Lo et al. (2017), using the same technique as Okbay et al. (2016), computed the genetic correlations among the Big Five personality traits and six psychiatric disorders: MDD, BD, schizophrenia, attention-deficit/hyperactivity disorder (ADHD), autism spectrum disorder, and anorexia nervosa. Neuroticism was highly genetically correlated with MDD ($r_g = .56$); extraversion showed a moderate genetic correlation with ADHD ($r_g = .30$). Openness to experience was moderately correlated with schizophrenia, BD, and MDD (r_g from .28 to .36). MDD was further genetically correlated with not only neuroticism and openness to experience but also agreeableness and conscientiousness (moderate negative correlations). Principal component analysis of the genetic correlation matrix further showed that the five personality traits and six psychiatric phenotypes can be grouped along two genetic dimensions: the first dimension mainly separating personality traits from psychiatric phenotypes, and the second dimension reflecting an

externalizing–internalizing distinction (Lo et al., 2017). Nagel et al. (2018) also report a range of significant genetic correlations between neuroticism and subjective well-being ($-.68$) and between neuroticism and a range of psychiatric phenotypes (.20–.82, with 0.79 for MDD). Taken together, these studies show clear genetic overlap among personality traits on the one hand and psychiatric phenotypes on the other. Moreover, neuroticism is most prominently genetically linked to internalizing disorders such as MDD and anxiety disorders, whereas extraversion is linked to ADHD and BD. In a previous section of this chapter, I showed that GWA studies have begun to robustly identify specific loci for personality, such as the 18p locus for neuroticism. An important next step would be to further characterize the function of such loci in human (brain) tissues, and to relate this functional knowledge to insights into the genetic and neurobiological etiology of psychiatric phenotypes.

Conclusion and Future Directions

Over the past few decades, important progress has been made in the search for genetic variants associated with personality traits that might explain the well-established heritability of personality. A shift has taken place from relatively small studies that either search the entire genome for loci but are not so powerful and precise (linkage studies) or studies that focus on just a few candidate genes (candidate gene association studies) toward much larger, more powerful studies that cover a large portion of the genetic variation on the human genome (GWA studies). New techniques have been developed in the context of GWA studies, such as meta- and mega-analysis, and techniques that use genomewide SNP data to estimate SNP-based heritability for single traits and compute genetic correlations among multiple traits: personality traits, and psychiatric and other related phenotypes. These techniques have been successfully applied to the molecular genetics study of personality, and show that personality traits are highly polygenic and genetically overlap with other mental and behavioral phenotypes. The efforts of large-scale GWA studies that identify single vari-

ants associated with personality have only just begun to bear fruits.

New technical and analytical developments already taking place in the field of public health and personalized medicine are expected to be applied soon to the genetic and neurobiological study of personality. These developments include next-generation sequencing, genomewide gene expression and epigenetic studies, omics studies, imaging studies, and big data approaches that combine data at these different levels (Auffray et al., 2016; Eisenstein, 2015; Thompson, 2019). Such developments will likely lead to novel insights into the molecular genetics of personality but should not preclude more traditional research directions that continue to be important: carefully designed longitudinal studies with lifespan approaches to personality development, as well as fine-grained studies that incorporate detailed assessments of environmental factors that could explain the remaining part of the variance in personality that is not attributable to genes. Ultimately, and supported by twin-family studies on personality that highlight the importance of gene-environment interaction and correlational processes (Krueger & Johnson, Chapter 9, this volume), these lines of research (molecular genetics/omics approaches vs. environmental/longitudinal approaches) should not just be further developed independently but should brought together in multidisciplinary collaborations. A challenging task will be to interpret the findings such multidisciplinary big data analyses will yield in the context of existing theoretical frameworks on personality. Hopefully, these proposed future directions for the (molecular genetics) study of personality will further contribute to our knowledge on the development of and individual differences in personality, and how personality is related to important life outcomes such as mental and physical health, and human well-being in general.

NOTES

1. Mitochondrial DNA is found in the cytoplasm of the cell, and is not discussed further in this chapter.

2. Other types of genetic variants exist, such as copy number variants or rare mutations, but since

they have not been studied (yet) in the context of personality, they are not discussed in this chapter.

3. But family-based association methods are also available.

4. More recent candidate gene studies also have examined the additive effects of multiple genetic variants within the same gene or a cluster of related genes in a so-called “polygenic” risk analysis.

5. Along with results for genetically correlated phenotypes for well-being and depressive symptoms.

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PART III

DEVELOPMENT

CHAPTER 11

Personality Development across the Life Course

A Neo-Socioanalytic Perspective

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Since 2008, the field of personality development has experienced a renaissance. New longitudinal studies of personality development have provided such a wealth of findings that the topic now needs to be divided among several chapters (in this volume, see Bleidorn & Denissen, Chapter 14; DeFruyt, Chapter 13; Mroczek, Graham, Turiano, & Aro-Lambo, Chapter 15; Atherton & Schofield, Chapter 16; Shiner, Chapter 12). With these findings came new ways of conceptualizing personality and personality development (Specht et al., 2014; Wrzus & Roberts, 2017). In conjunction with the increased interest in personality development, we developed new frameworks and theoretical ideas to help understand and explain these new findings and patterns. This included the neo-socioanalytic model (Roberts & Wood, 2006; Roberts & Damian, 2017; Roberts & Nickel, 2017) to address issues in personality and personality development that were not part of existing frameworks. In this chapter we provide an up-to-date perspective on personality development derived from the neo-socioanalytic model.

The Neo-Socioanalytic Model

According to the neo-socioanalytic model, personality consists of four domains: traits, values and motives, abilities, and narratives. Figure 11.1 depicts these primary, essentially distinct domains, as well as the units of analysis, the modes of assessment, and the primary contexts that may influence personality development. We define *traits*, the first domain, as the relatively enduring, automatic patterns of thoughts, feelings, and behaviors that people exhibit in similar situations across time. The second domain consists of *values and motives*, reflecting what people want in their lives. *Abilities*, the third personality domain, reflect people's capabilities. While abilities are generally thought about in terms of *cognitive* abilities, this domain could include other types of abilities (e.g., emotional or physical abilities) (Lubinski, 2000; Joseph & Newman, 2010). The focus of the fourth domain is *narratives*, or the stories that we use to understand ourselves, our environments, and the history of our lives (McAdams, Chapter 5, this volume).

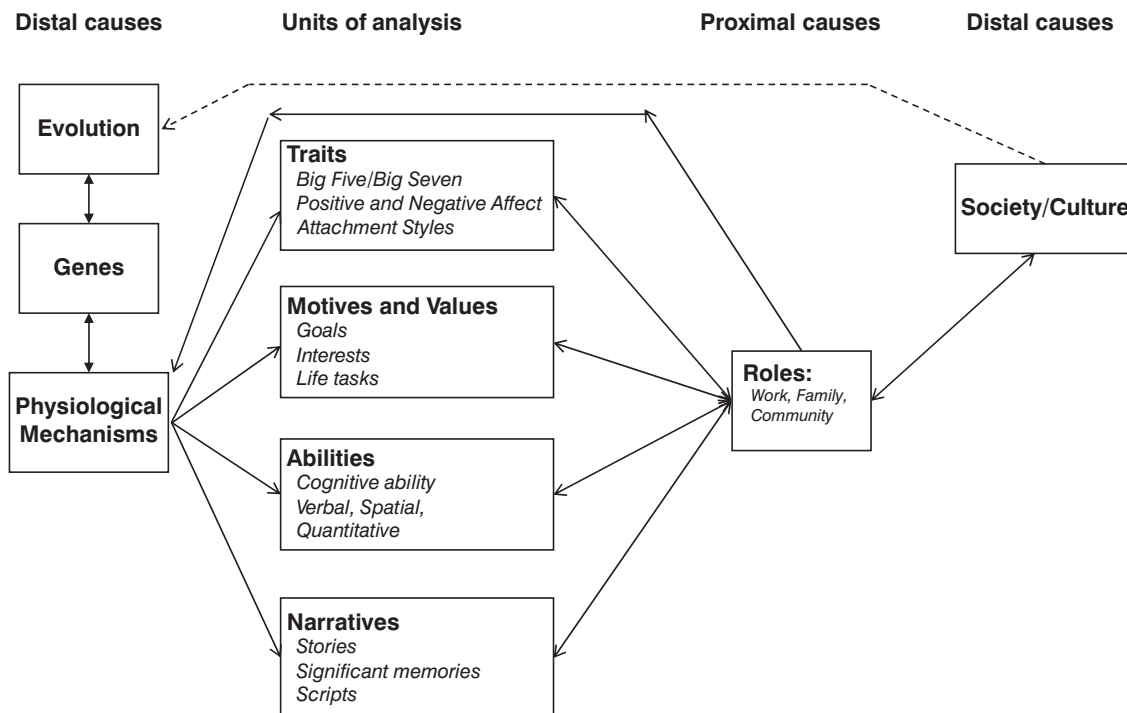


FIGURE 11.1. The revised neo-socioanalytic model of personality.

Environments can be described and catalogued in many ways (Rauthman et al., 2014). We prefer social roles as the unit of analysis, because they reflect the aggregation of many smaller components of environments and thus match the level of aggregation typically found in personality traits. For example, being a parent subsumes activities with one's children, as well as engagement with institutions such as education systems (e.g., parent-teacher meetings). Most social roles can be categorized according to two broad domains: status and belongingness (Roberts, 2007). Roles associated with status include work and social-position roles, such as manager, parent, or coach. Roles associated with belongingness include friendship, family, and community roles, such as relative or friend. The workplace is often associated with status hierarchies, but roles associated with belongingness can also be found there. People often aspire to and achieve higher-status roles at work, such as those in leadership. But work also affords the opportunity for many friendships, providing meaning and support related

to belongingness in a situation in which status may be especially salient.

As we articulate below, personality and roles are intrinsically linked. People are attracted to and select specific types of roles that reflect their personality. In turn, roles provide the platform from which experience can render changes in personality. Roles subsume broad sets of situations and concomitant expectations, rewards, punishments, and behavioral affordances that drive experiences that can and do lead to personality change. Reflecting our recent theorizing about traits, and the sociogenomic model of traits in particular (Roberts, 2018), we see role experiences acting on moment-to-moment states that then lead to changes in traits. The sociogenomic model of traits also proposes that experiences can affect pliable epigenetic systems that may impart permanent change in personality. We draw the dashed line from society/culture back to evolution only to acknowledge the fact that evolution is an ongoing process that is constantly affecting human development.

Pervading all aspect of the model are the ways we can access information about traits, abilities, motivations, and narratives that typically center on the concepts of identity and reputation (not depicted in the model). The domains of personality are manifested through identity and reputation, which represent both psychological and methodological concepts. We assess identity through self-reports (i.e., what people say about themselves), and reputation through observer reports (i.e., what others say about them). Self-reports and other reports give personality researchers two ways of obtaining information about individuals. Widely used personality inventories, such as the Big Five Inventory–2 (BFI-2; Soto & John, 2017), represent the standard way to obtain self-reports, while observer reports are represented by informant ratings of behavior or personality sometimes using the same item content found on self-report inventories.

Identity and reputation, the corresponding psychological constructs, mean something beyond just the methods used to assess them. *Identity* reflects the conscious opinions that people hold about themselves across the four units of analysis described earlier. For example, traits are one component of identity. The conscious acknowledgment via self-reports of personality traits reflect the identity component of personality. Identity also pertains to the metacognitive perception of those same self-perceptions. For example, people differ in how confident and clear they are about their ratings of their personality traits or motivations (Baumeister & Tice, 1988; Lodi-Smith, Spain, Cologgi, & Roberts, 2017). Self-esteem and other global evaluations of one's standing or perceived worth are also found in identity (Robins, Chapter 26, this volume). So people can simultaneously think of themselves as "extraverted" while also holding the opinion that they are clear about that judgment (e.g., self-concept clarity) and that they believe people like themselves who possess that trait should be held in high regard (e.g., self-esteem).

Reputation reflects the opinions that other people have of a target person in terms of the four domains. Numerous studies have shown that identities and reputations are only modestly related, and that opinions of the same construct taken from self-report

and observer perspectives offer complementary information (Vazire & Carson, Chapter 41, this volume). This complementarity reflects the fact that our own behavior is not always evident to us, and other people may recognize patterns in our personalities that we fail to see. In fact, the portion of personality uniquely captured by observers is most likely the best possible support for the idea that much of our personality is implicit and lies outside of our awareness. People also care about and actively shape their own reputations—people actively attempt to persuade others of their desirable qualities and do not share all of their self-perceptions with them (Goffman, 1959).

The units of analysis in the neo-socioanalytic model provide a mapping of the constructs and conditions we believe are most important to understanding the field of personality, as well as any given person's personality. It is primarily a descriptive model and is not intended to answer deeper questions about why people behave the way they do. For example, some persons may behave in an extraverted fashion because it is an intrinsic, automatic response to the presence of people, while others may do so because they desire to assert authority over a group of employees. We do not spell out a deeper theory for how and why these units are separate and interrelated in this chapter but focus instead on how personality traits develop over the lifespan.

Applying the Neo-Socioanalytic Model to Personality Development

With the structural aspect of the neo-socioanalytic model outlined, we address four questions that are fundamental to the idea of personality development:

1. Are personality traits consistent?
2. Do personality traits change?
3. If personality traits change, why?
4. If personality traits change, can we change them through intervention?

We provide a broad overview of empirical answers to these questions and discuss the principles of personality development drawn from these empirical patterns.

Are Personality Traits Consistent?

Determining personality traits' consistency is fundamental to the field of personality psychology because it is definitional. The most frequently given definitions of personality traits (e.g., the relatively enduring, automatic patterns of thoughts, feelings, and behaviors elicited in affording environments) all include consistency as a defining feature of personality. If personality, and especially personality traits, are not consistent, then the defining feature of the entire field is nullified, as well as one of the core features of how personality psychologists believe human nature is defined. However, "consistency" has many meanings, and without a concrete point estimate definition of consistency, one researcher's "consistency" is a second researcher's "variability," and a third researcher's "set like plaster."

Despite these definitional ambiguities, the evidence for the "relatively enduring" nature of personality traits appears to be sufficiently high for researchers to conclude that the definitions of personality, and personality traits in particular, have merit. Since the earliest reviews of rank-order consistency, researchers have been reporting the same two findings: Personality traits demonstrate moderate to high rank-order consistency (i.e., correlations between .40 and .60) over reasonably long periods of time (i.e., 4–10 years), and the longer one tracks rank-order consistency, the lower it gets (e.g., Fraley & Roberts, 2005). Moreover, personality traits increase in rank-order consistency throughout the lifespan, peaking between the ages of 50 and 60, with a plateau or decrease after that decade. In addition, rank-order consistency does not vary markedly across the Big Five traits, assessment method (i.e., self-reports, observer ratings, and projective tests), or gender. The fact that five reviews/meta-analyses on the topic have been produced over the last few decades (Ardelt, 2000; Bazana & Stelmack, 2004; Ferguson, 2010; Roberts & DelVecchio, 2000; Schuerger, Zarrella, & Hotz, 1989) testifies to the importance of the idea of personality consistency to the field.

A fair question at this juncture is whether, and to what extent, we can put more concrete parameters on the phrase "relatively enduring." Some researchers use these levels

of consistency as evidence that personality is unchanging (McCrae & Costa, 2008). While it appears that this finding only contributes to the perspective that personality traits are unchanging, several things need to be kept in mind. First, the levels of consistency, while substantial, are no more substantial than many other social science variables, such as the consistency of income or life satisfaction over time (Fujita & Diener, 2005). Second, the levels of consistency never peak at unity—there is always less-than-perfect test–retest stability, indicating that there is always room for change. Third, the estimates of consistency are bounded by the base of empirical data, which focuses most strongly on longitudinal studies tracking personality over moderate time spans such as 1–5 years. For example, the average time between tests in the Roberts and DelVecchio (2000) meta-analysis was 7 years, which was increased by the existence of a small number of studies that tracked individuals over several decades.

Then what is the level of continuity over much longer time windows? The answer is, surprisingly low. In fact, the most systematic estimates of the long-term stability of personality traits show that raw test–retest stability appears to plateau around a correlation of .20 (Fraley & Roberts, 2005), though this estimate was based on very little data that tracked stability beyond 20 years. Since that review, several long-term studies have arrived at similar, if not lower, estimates of stability. In the 40-year follow up of the Hawaiian Longitudinal Study, most of the Big Five traits showed stabilities around .20, but the stability of neuroticism was conspicuously indistinguishable from zero. Similarly, in the longest study to date, individuals rated by their teachers at age 14 on a set of traits described as dependability, showed zero stability when these scores were linked to observer ratings and self-reports made when participants were 77 years old (Harris, Brett, Johnson, & Deary, 2016). The stability may have been zero in this latter study because the teacher ratings made in participants' adolescence correlated more highly with cognitive ability than personality traits. In a more recent study stretching from ages 16 to 68 (Damian, Spengler, Sutu, & Roberts, 2019), self-reported personality traits showed levels of consistency remark-

ably close to the estimates provided by Fralvey and Roberts (2005).

It appears that personality across many decades is stable, but the stability is relatively modest. What does this mean? Cognitive ability appears to be much more stable over similar time spans (Deary, Whiteman, Starr, Whalley, & Fox, 2004). In this way, cognitive ability and personality traits are distinctly different (see also Briley & Tucker-Drob, 2014). There is much less stability in personality traits over long time spans, indicating that though there is some continuity, there is a preponderance of change over multiple decades.

There is another period of the life course in which the levels of continuity are quite low, that when combined with the findings over the entire life course hold some importance for how we conceptualize personality traits. In particular, the levels of continuity from early childhood to adulthood are remarkably modest, often hovering around .10 when tracked from age 3 to the mid-20s, for example (Caspi et al., 2003). These low correlations are important for informing the extent to which genetic factors created at conception play a conspicuous role in personality stability, which is a common assumption (Tucker-Drob & Briley, 2014). If the correlation from toddlerhood to adulthood is only .10 and the average long, long-term stability of personality is only .20, then other factors must explain the higher levels of stability found over shorter periods of time, especially across adulthood. In a recent revision of the sociogenomic model of personality traits (Roberts, 2018), we proposed that beyond the stability caused by genetic differences found at conception, certain epigenetic changes may bring about changes in personality (described as *pliable processes*) that are functionally permanent. These factors may explain why adult levels of personality remain modestly more stable than those from childhood to adulthood. Beyond pliable factors, we also proposed epigenetic changes that work over longer time windows than typical state-trait models posit, such that changes in personality can occur and stay in place for months (if not years) before dissipating. Regardless, the modest levels of stability in personality traits over long time periods call into question the importance of genetic factors for personal-

ity traits, especially those determined at the beginning of life.

How Do Personality Traits Change with Age?

At the time of the writing of the chapter in the previous handbook (Roberts, Wood, & Caspi, 2008), the prevailing perspective was that personality traits continue to change in adulthood, often into old age, and that these changes may be quite substantial (e.g., Mroczek & Spiro, 2003; Roberts, Walton, & Viechtbauer, 2006; Srivastava, John, Gosling, & Potter, 2003). Specifically, cross-sectional research (comparisons of different-age participants at a single time point) has shown that middle-aged individuals tend to score higher than young adults on agreeableness, conscientiousness and emotional stability, and lower on extraversion and openness (Lucas & Donnellan, 2011; Specht, Egloff, & Schmukle, 2011; Srivastava et al., 2003). Moreover, within middle adulthood, 60-year-old participants scored higher than 40-year-old participants on most dimensions. The argument for cohort influences on personality trait change is losing traction, because these age differences in the Big Five traits have been reported for so long.

Studies examining longitudinal changes in personality traits have found similar results. Meta-analytic estimates of longitudinal mean-level change across the life course show significant change in all trait domains at some point in the life course (Roberts et al., 2006). Extraversion—specifically, social dominance, a subdomain of extraversion akin to assertiveness—increases the most during young adulthood. Agreeableness shows incremental, if modest, increases with age. There is a small increase in conscientiousness during adolescence and marked increases throughout young adulthood and into midlife. Emotional stability increases steadily through midlife. Finally, individuals increase in openness to experience during adolescence, followed by equivalent declines in old age.

More recent cross-sectional and longitudinal work has provided support for the argument that people generally become more agreeable, conscientious, and emotionally stable as they grow older. For example, the participants in one longitudinal study taking place in Iowa increased in constraint,

a form of conscientiousness, and decreased notably in neuroticism as they transitioned from adolescence to young adulthood (Donnellan, Conger, & Burzette, 2007). Similar findings have been reported in comparable longitudinal studies from Minnesota (Johnson, Hicks, McGue, & Iacono, 2007), Germany (Lüdtke, Roberts, Trautwein, & Nagy, 2011), Finland (Josefsson et al., 2013), and Italy (Vecchione, Alessandri, Barbaranelli, & Caprara, 2012).

Since 2008, researchers have paid a tremendous amount of attention to personality trait development in adolescence. The earlier perspectives viewed adolescence as an oddly quiescent period of the life course in which there were few, if any, strong increases or decreases in personality traits (Young & Mroczek, 2003). More recent work has pointed to the possibility of a post-middle school dip in personality, such that most adolescents decrease on most of the Big Five dimensions from age 10 to ages 12 or 13, then rebound somewhat (Soto & Tackett, 2015). Moreover, multimethod studies have shown that parent ratings of agreeableness and neuroticism declined notably from ages 11 to 15 (Göllner et al., 2017). Finally, other studies have shown that various facets underlying the Big Five, such as sensation seeking and impulsivity, show conflicting patterns of change that may cancel each other out at the global level of a trait such as conscientiousness (Harden & Tucker-Drob, 2011). The data are far from definitive; it still appears that adolescence is a uniquely quiet time for normative increases or decreases in broad personality traits, but the lack of normative trends may hide more complex changes.

Overall, the findings for patterns of mean-level change described in 2008 appear to be holding up in more recent studies. Childhood and adolescence are not periods in which systematic changes in traits appear to occur. Young adulthood is when most trait domains “take off”—traits change most during this period of life, and the changes are predominantly positive. This pattern may change our perspective on what is going on in childhood and adolescence: Rather than being a key time of personality trait development, these ages might be better construed as periods of preparation for development that comes later, at least in cur-

rent Western cultures. In contrast, middle and old age are periods of peak consistency and fewer systematic changes, but one still finds individual differences in personality trait change even in this relatively quiet portion of the life course (Hill, Payne, Jackson, Stine-Morrow, & Roberts, 2014; Schwaba & Bleidorn, 2018). These individual differences in change not only reflect the continued plasticity of personality even in old age but also are the main source of data for why personality traits might be changing.

Why Do Personality Traits Change?

The question of why personality traits change is intrinsically a question of the existence and correlates of individual differences in personality trait change. Not everyone changes in the same direction or to the same degree; some people change less than their peers, while others change more than the norm (De Fruyt et al., 2006; Robins, Fraley, Roberts, & Trzesniewski, 2001; Roberts, Caspi, & Moffitt, 2001). There is robust evidence for the existence of individual-level change across the life course, even into old age (Möttus, Johnson, & Deary, 2012; Schwaba & Bleidorn, 2018; Steunenbergh, Twisk, Beekman, Deeg, & Kerkhof, 2005). Thus, the possibility of finding correlates and therefore potential causes of personality trait change exists at all stages of life.

A large volume of research has now tracked life events and life experience correlates and personality trait change (Bleidorn, Hopwood, & Lucas, 2018). Achievement- and work-related experiences have been linked to changes in personality traits across the life course. For example, children who increased their effort on homework showed commensurate increases in conscientiousness (Göllner et al., 2017); older students prepping for a major test showed similar increases (Bleidorn, 2012). Achieving more in work through attaining higher status was associated with increases in the social dominance facet of extraversion and sometimes conscientiousness-related traits (Clausen & Gilens, 1990; Elder, 1969; Le, Donnellan, & Conger, 2014; Roberts, 1997; Roberts, Caspi, & Moffitt, 2003). Achieving higher status at work was also associated with increases in masculinity and decreases in femininity (Kasen, Chen, Sneed, Craw-

ford, & Cohen 2006). Being more invested and committed to one's work is associated with increases in conscientiousness (Hudson, Roberts, & Lodi-Smith, 2012; Hudson & Roberts, 2014). Particular types of work are also associated with distinct patterns of personality trait change. For example, people who followed work roles with more leadership demands increased in extraversion (Wille, Beyers, & De Fruyt, 2012). In addition, positive experiences in work are reliably associated with increases in traits tied to the domain of emotional stability (Le et al., 2014; Roberts & Chapman, 2000; Scollon & Diener, 2006; Specht et al., 2011; van Aken et al., 2006).

Marital and family experiences have also been found to be associated with changes in personality traits. For example, engaging in a serious partnership for the first time in young adulthood is associated with decreases in neuroticism and increases in conscientiousness and self-esteem (Lehnart, Neyer, & Eccles, 2010; Neyer & Asendorpf, 2001; Neyer & Lehnart, 2007). Men who get married or remarried in late middle age and old age tend to decrease in neuroticism over time (Mroczek & Spiro, 2003). However, these initial estimates of the effect of partnering may have been overstated (Wagner, Becker, Lüdtke, & Trautwein, 2015). The question of whether getting married is a cause or consequence of personality development was addressed in a co-twin control study (Burt et al., 2010). Holding genetic confounds constant, getting married was associated with decreases in antisocial behavior, indicating the possibility that forming traditional bonds may lead to changes in traits from the domains of agreeableness and conscientiousness.

Relationship experiences beyond the process of partnering itself are also associated with personality trait change. Individuals who experience satisfying and fulfilling relationships become more emotionally stable and conscientious (Lehnart & Neyer, 2006; Roberts & Bogg, 2004; Roberts & Chapman, 2000; Robins, Caspi, & Moffitt, 2002; Scollon & Diener, 2006). Negative relationship experiences, such as difficulties in one's sex life, are associated with increased neuroticism (Lüdtke et al., 2011). Receiving more support from family members during adolescence is associated with increases

in agreeableness (Asendorpf & van Aken, 2003; Branje, van Lieshout, van Aken, & Haselager, 2004).

A host of experiences beyond love and work have been investigated as potential correlates of personality trait change. Negative life experiences in general, whether in aggregate or in particular, are associated with increases in neuroticism (Jeronimus, Riese, Sanderman, & Ormel, 2014; Laccueille, Nederhof, Karreman, Ormel, & van Aken, 2012; Lüdtke et al., 2011; Riese et al., 2014). Moreover, in a recent genetically informed study, the link between changes in stress and changes in personality traits appeared to be entirely due to environmental, rather than genetic, factors (Luo, Derringer, Briley, & Roberts, 2017). Clinical issues are also associated with personality trait change or the lack of normative personality trait change. For example, continuing or increasing substance use and abuse is associated with a failure to increase in conscientiousness and a decrease in emotional stability (Lee, Ellingson, & Sher, 2015; Roberts & Bogg, 2004). Similarly, changes in mental health and depression are associated with decreases in most of the Big Five, and emotional stability in particular (Chow & Roberts, 2014; Mu, Luo, Nickel, & Roberts, 2016). Interestingly, travel abroad is associated with positive personality trait change. In one study of Germans, travel to another country was associated with increases in agreeableness and openness, and decreases in neuroticism (Lüdtke et al., 2011). A second study of German "sojourners" (students who study abroad) found strikingly similar results. Similar to those who simply traveled to another country, these sojourners grew more agreeable and open, and less neurotic the longer they stayed abroad (Zimmermann & Neyer, 2013). In contrast to the positive aspects of studying abroad, young adults who entered the military for a period of time failed to increase in agreeableness as much as their peers who chose a different path (Jackson, Thoemmes, Jonkmann, Lüdtke, & Trautwein, 2012).

In summary, individual differences in personality trait change and correlates of personality trait change exist at all ages across the life course, including old age (Lodi-Smith & Roberts, 2012; Hill, Payne, Jackson, Stine-Morrow, & Roberts, 2014). However,

in the absence of intervention research, it is challenging to draw causal conclusions from this research. Nonetheless, the sheer number of studies, their consistency, and their scope support an inference that personality trait change is unlikely to be caused only by pre-programmed genetic factors (e.g., McCrae & Costa, 2008) and is most likely the result of a variety of different experiences, both objective and subjective. This conclusion leads to our next question: If personality traits do change and appear to change because of experience, is it possible to intervene to change traits if one is so motivated?

Can Personality Traits Be Changed?

With the accumulation of consistent and robust evidence that personality traits can and do change, the natural question becomes whether they can be changed through an active intervention. This idea has not been widely entertained in developmental or personality research until recently, a possible result of the continued debate over whether personality traits exist, and whether they are or are not stable enough across time and situation (Roberts, 2009). Also, some have hypothesized that the change identified in personality traits is entirely the result of genetic factors (McCrae & Costa, 2008), but this hypothesis has not been borne out in genetically informed research (Bleidorn, Kandler, Riemann, Angleitner, & Spinath, 2009; Luo et al., 2017).

Despite the prevailing lack of attention focusing on whether personality traits can be changed, there have been a few studies that demonstrated the possibility. For example, Piedmont (2001) reported that treatments to improve vocational skills, coping abilities, and spiritual development are associated with changes in the Big Five. More recently, a cognitive intervention was associated with changes in openness to experience in old age (Jackson, Hill, Payne, Roberts, & Stine-Morrow, 2012), but this finding failed to replicate in similar interventions (Sander, Schmiedek, Brose, Wagner, & Specht, 2017). From the viewpoint of personality psychology, there have been a few, though provocative, studies supporting the argument that personality traits can be changed.

While there is only a small literature in personality psychology, there has been a

long-standing literature within clinical psychology on personality trait change resulting from typical clinical interventions (e.g., Bagby, Joffe, Parker, Kalembo, & Harkness, 1995; Borkovec et al., 1987). More recently, clinical researchers have focused on and called for interventions that change personality traits (e.g., Barlow, Sauer-Zavala, Carl, Bullis, & Ellard, 2014; Magidson, Roberts, Collado-Rodriguez, & Lejuez, 2014; Quilty et al., 2008; Soskin, Carl, Alpert, & Fava, 2012). This perspective was generated from the insight that not only are clinical interventions potentially efficacious for changing personality traits, but also personality trait change may be the mechanism through which therapy is effective. For example, a double-blind placebo control trial showed that taking an antidepressant resulted in both improvement in depression and increases in emotional stability (Tang et al., 2009). Most importantly, the changes in emotional stability mediated the effect of antidepressants on depression and long-term relapse, indicating that long-term effectiveness of therapy may result through changes in personality traits.

Upon further examination, we recently found that there is a rather large amount of research in clinical psychology that examined (if not explicitly, then indirectly) whether personality traits change as a result of therapy. Many clinical researchers include personality trait measures in their evaluation of various forms of therapy, seemingly to be thorough; while a symptom measure of anxiety may have been the primary outcome measure of interest, these researchers also included measures of trait anxiety, for example. Once we discovered that clinical psychologists have a habit of including trait measures in their evaluation research, we found over 200 clinical studies reporting changes in personality that resulted from therapy. In a meta-analytic review, we found that going through any form of psychotherapy resulted in marked increases in emotional stability (Roberts, Luo, Briley, Chow, Su, & Hill, 2017). These changes in emotional stability were confirmed in a subset of experimental studies, as well as a small set of studies that tested interventions with nonclinical samples or for nonclinical issues. Most importantly, a relatively large subset of studies tracked

changes in personality traits well past the termination of therapy and found that the changes experienced in therapy remained in place months and even years later. Most surprisingly, the majority of trait change happened relatively quickly—in the first few weeks of therapy.

While it remains unclear the extent to which the changes imparted in therapy are the result of true trait change (Noordhof, Kamphuis, Sellbom, Eigenhuis, & Bagby, 2018), these studies show that scores on standard measures of personality traits can and do change quickly—much more quickly than any existing model or theory of personality would predict. While one may not be willing to ascribe transformative powers to psychotherapy, these studies demonstrate that it is possible to change personality traits and change them relatively fast, strongly

supporting the idea that personality traits are plastic (see below).

Principles of Personality Development

With the ability to answer these pragmatic questions of personality development (How consistent are personality traits? Do personality traits change? If they change, why do personality traits change? And can we change personality traits?), we now have enough of an empirical foundation to synthesize principles of personality development that can be used to develop testable hypotheses and a conceptual, if not theoretical, foundation to the research on personality development. The following eight principles were derived from a synthesis of the above findings (see Table 11.1).

TABLE 11.1. Principles of Personality Development

Principle	Definition	Example research	Strength of evidence
Cumulative continuity principle	Personality traits increase in rank-order consistency until midlife.	Ferguson (2010)	Strong
Maturity principle	People become more socially dominant, agreeable, conscientious, and emotionally stable with age.	Donnellan, Conger, & Burzette (2007)	Strong
Social investment principle	Investing in social institutions, such as age-graded social roles, outside of the self is one of the driving mechanisms of personality development in general and greater maturity in particular.	Bleidorn et al. (2013)	Good
Corresponsive principle	The effect of life experience on personality development is to deepen the characteristics that lead people to those experiences in the first place.	Roberts, Caspi, & Moffitt (2003)	Moderate
Niche-picking principle	Through their personality traits, people create social environments and paths in their lives that help maintain their current trait levels.	Roberts & Robins (2004)	Weak
Plasticity principle	Personality traits are open systems that can be influenced by the environment at any age.	Lodi-Smith & Roberts (2012)	Strong
Role continuity principle	Consistent roles rather than consistent environments are the cause of continuity in personality over time.	No example exists.	Weak
Identity development principle	With age, the process of developing, committing to, and maintaining an identity leads to greater personality consistency.	Lodi-Smith, Spain, Cologgi, & Roberts (2017)	Weak

The Cumulative Continuity Principle

According to the cumulative continuity principle, personality traits increase in rank-order consistency throughout the lifespan (Roberts & Caspi, 2003). Rank-order consistency reaches its highest point between ages 50 and 60, after which there is a plateau or decrease (Roberts & DelVecchio, 2000). The evidence for the cumulative continuity principle is stronger than the evidence for most of the remaining principles of the neo-socioanalytic model. We derived this principle from a meta-analysis of the rank-order consistency of personality traits (Roberts & DelVecchio, 2000), and a second meta-analysis confirmed the findings, using a new set of longitudinal studies (Ferguson, 2010). Recent empirical research even finds evidence for the cumulative continuity principle in adolescence (Borghuis et al., 2017). Despite recent work (Costello, Srivastava, & Saucier, 2017) that failed to find evidence for a statistically significant increase in stability (the increases tend to be small decade to decade), we believe that this principle is akin to the “first law” of behavior genetics (i.e., virtually all phenotypes are heritable; Turkheimer, 2000). Based on the evidence, the first law of personality development should be that, at a population level, rank-order consistency increases as people grow older until midlife (even in self-esteem; Trzesniewski, Donnellan, & Robins, 2003).

The Maturity Principle

According to the maturity principle, people become more psychologically mature as they get older—maturity is defined as increasing agreeableness, conscientiousness, and emotional stability (Hogan & Roberts, 2004). Findings in both cross-sectional and longitudinal data support this principle: As people age, they tend to increase in these three personality traits (Donnellan & Lucas, 2008; Roberts et al., 2006; Srivastava et al., 2003).

The recent longitudinal evidence in support of the maturity principle encompasses data from many different research teams and multiple longitudinal studies from a variety of countries. As previously mentioned, evidence for this principle comes from longitudinal studies from Iowa (Donnellan et

al., 2007), Minnesota (Durbin et al., 2016), Germany (Lüdtke et al., 2011), Finland (Jorssésson et al., 2013), and Italy (Vecchione et al., 2012). Like the cumulative continuity principle, the maturity principle has strong support and could be considered the second law of personality trait development.

The Social Investment Principle

The social investment principle helps explain the reasons for greater maturity with age. According to this principle, young adulthood is a prime time for personality trait change, because it is the age when many individuals newly invest in conventional social roles (e.g., spouse, employee) that have attached to them experiences and expectations for being agreeable, conscientious, and emotionally stable (Roberts, Wood, & Smith, 2005). Put more simply, young adults’ personalities change due to their new commitment to adult social roles (Lodi-Smith & Roberts, 2007). The social investment principle describes a normative process (Helson, Kwan, John, & Jones, 2002); in societies all over the world, people commit themselves in young adulthood to adult roles associated with family, work, and community.

Findings from longitudinal data have shown that changes in investment in adult social roles are correlated with changes in personality traits. In a study of age differences in personality trait development in 62 countries, the participants who invested in adult social roles at a younger age developed more quickly in terms of personality in a manner consistent with the social investment principle (Bleidorn et al., 2013). In two longitudinal studies, people who increased their commitment to work also increased in conscientiousness (Hudson, Roberts, & Lodi-Smith, 2012; Hudson & Roberts, 2014). Similarly, the results of a 3-year longitudinal study of Finnish students indicated that the first-time initiation of a career or job was linked to an increase in conscientiousness (Leikas & Salmela-Aro, 2015). Analogous associations have been found for relationship experiences. For example, remaining in a stable relationship is associated with increases in conscientiousness (Jonkmann, Thoemmes, Lüdtke, & Trautwein, 2014; Robins et al., 2002), and becoming increas-

ingly socially invested in romantic relationships is associated with increases in emotional stability and self-esteem (e.g., Lehnart et al., 2010).

Two recent findings challenge the social investment principle or create the need to modify the principle. First, in the research on the psychological factors associated with social investment, investment in work was associated with personality trait change at all ages, not just in young adulthood (Hudson et al., 2012). Though only one study, the findings challenge the assumption that social investment is primarily a cause of personality trait change in young adulthood. It is possible that there is nothing special about social investment in young adulthood, and experiences related to work or relationships may lead to change across the lifespan. If this is true, researchers will need to determine whether the majority of factors associated with the social investment principle occur during young adulthood.

Additionally, the lack of personality trait change associated with new parenthood (Specht et al., 2011; Van Scheppingen et al., 2016), or the change occurring in the opposite direction than we would expect (Galdiolo & Roskam, 2014; Jokela, Kivimäki, Elovainio, & Keltikangas-Järvinen, 2009), presents a challenge for the social investment principle. This does not mean that having children does not lead to psychological changes, as research has found that taking on the role of parent is associated with identity change (Sengsavang, Pratt, Alisat, & Sadler, 2018). But becoming a parent, unlike other normative transitions, is not associated with the same changes in personality traits on which we based the social investment principle (i.e., increases in agreeableness, conscientiousness, or emotional stability). It may actually be related to even slightly negative changes (e.g., Galdiolo & Roskam, 2014).

We see two possible explanations for these findings. First, the expected changes (i.e., those associated with other normative transitions) may happen before a person becomes a parent. Individuals who plan to become parents may increase in agreeableness, conscientiousness, and emotional stability prior to making the effort to conceive (Roberts, O'Donnell, & Robins, 2004). Second,

it is important both to define social investment correctly and to understand the causal mechanism behind the principle. Perhaps a person's personality trait change occurs not because he or she acquired or made a commitment to a role, but because he or she feels a new sense of mastery derived from the successful fulfillment of that particular role. Given the almost random nature of a child's personality and behavior in infancy (Loehlin, 2005) it is quite possible that a fair number of parents experience stress because of the intrinsic conflict that comes with handling people who are unlike themselves and/or handling children who are truly inconsistent over time and situation. Future research should investigate further what aspects of the experience of taking on new roles are associated with normative changes in personality traits in young adulthood. It may also be the case that parenting does not affect personality trait change as much as change in the other domains of personality, such as goals and narratives.

The Corresponsive Principle

According to the corresponsive principle, people's personality traits lead them to enter specific environments and have specific experiences, and those environments and experiences change the personality traits that led them to that particular situation. For example, people might choose a job in sales because of their high levels of extraversion, and the demands of being a salesperson may lead to increases in extraversion. The corresponsive principle describes a reciprocal relationship, similar to what the theory of self-efficacy describes (Bandura, 1977). One thing to note is that the corresponsive principle is not stated in the extreme (i.e., that all person–environment transactions occurring over the life course follow this reciprocal pattern) (Wood & Harms, 2016). It came about because of recurring patterns in many longitudinal studies, but this pattern was not found in all studies, or for all relationships.

The original studies that led to the development of the corresponsive principle tended to test a large number of personality traits and life experiences simultaneously (e.g., Lüdtke et al., 2011; Roberts et

al., 2003, 2004; Roberts & Robins, 2004). Recent, similarly structured studies also support the corresponive relationship between personality traits and experiences. For example, greater neuroticism predicts stressful life events and, in turn, stressful life events predict increasing neuroticism over time (Laceulle, van Aken, Ormel, & Nederhof, 2015). A second study examining the relation between goal change and personality change using a genetically informed model found that changes in agentic goals and extraversion were associated, and the corresponive nature of this relation was due to both genetic and environmental factors (Bleidorn et al., 2010). In another, genetically informed study, increases in stress were found to be associated with increases in neuroticism after researchers controlled for the predictive relation between neuroticism and stress (Luo et al., 2017). Researchers have also found support for the corresponive principle in studies on personality and psychopathology (Klimstra, Akse, Hale, Raaijmakers, & Meeus, 2010), neuroticism and negative life events (Jeronimus et al., 2014), impulsivity and substance use (Kaiser, Bonsu, Charnigo, Milich, & Lynam, 2016), negative emotionality/effortful control and relational aggression (Atherton, Tackett, Ferrer, & Robins, 2017), effortful control and school behavioral problems (Atherton, Zheng, Bleidorn, & Robins, 2019), and the Big Five and work expectations (Denissen, Ulferts, Lüdtke, Muck, & Gerstorf, 2014).

However, both conceptual and empirical issues can make it challenging to test the corresponive principle. Not all associations between personality traits and life experiences are corresponive. For example, people higher in openness tend to experience greater difficulties in their sex lives, their sleeping and eating habits, and their finances (Lüdtke et al., 2011). But people who experienced these problems did not increase in openness; rather, they increased in neuroticism. These more open individuals inadvertently increased their levels of neuroticism because of their more open personalities. In addition, students higher in social power were initially more agentic (Wood & Harms, 2016). However, increases in social power were not associated with increases in agency; rather, increases in agency were as-

sociated with increases in communal factors in the social environment.

The additional issue beyond mixed findings in support of the corresponive principle is the logical consequence of this type of pattern over time. If corresponive, or reciprocal, relationships dominated personality development, then the logical consequence would be something akin to the Matthew principle played out on an extreme scale. With time and age, all people would become increasingly different—extraverts would get more extraverted; introverts would get more introverted. The net result of this pattern would be that variance in personality traits would increase across the life course. There is some evidence for this pattern in adolescence (Möttus et al., 2019), but not in adulthood (Möttus, Allik, Hřebíčková, Kõöts-Ausmees, & Realo, 2015). The lack of a fanning out of personality traits with time and increased variance in adulthood would indicate that corresponive relationships may not continue over the long run. At this juncture, we can say with some confidence that there is evidence of short-term patterns of corresponiveness between personality traits and social experiences. But not all associations between personality and life course patterns are corresponive, and clearly, there are factors that appear to mitigate these patterns over the long run, such that they do not cause runaway divergences in personality traits with age.

The Niche-Picking Principle

Since we introduced the principles of personality development (Roberts & Wood, 2006), the corresponive principle has caused a great deal of confusion. Many researchers misinterpret the corresponive principle to mean that entering into environments as a result of one's personality traits would result in *greater personality trait consistency* rather than change. In order to clarify this issue and to acknowledge the possibility that entering into a personality-consistent environment would result in greater consistency, we introduced the niche-picking principle (Roberts & Damian, 2017; Roberts & Nickel, 2017). This niche-picking principle states that, through their personality traits, people create social environments and paths

in their lives that help maintain their current trait levels (see also Nye & Roberts, 2019). Either because niche picking results in fewer expectations for change or the positive affect that sometimes comes with person–environment fit, the assumption is that this type of person–environment transaction should lead to greater personality trait consistency.

To our knowledge, there have been only two studies testing the niche-picking principle. One study took place at a highly competitive university, where students who were both high in extraversion and low in agreeableness fit into that environment better than students without that combination of personality traits. This better fit resulted in more continuity and less change in these students' personality traits (Roberts & Robins, 2004). This finding was partially replicated by another study at a different highly competitive university (Harms, Roberts, & Winter, 2006). But, similar to the several of the principles we describe below, there is insufficient evidence to make any firm conclusions about the veracity of the niche-picking principle. The niche-picking principle may serve as a complement to the corresponive principle to help clarify the latter and to provide motivation to test the former.

The Plasticity Principle

According to the plasticity principle, personality traits may change at any point in a person's life. Much evidence exists for mean-level changes in personality traits throughout the life course. Young adulthood is the primary age period when mean-level change in personality occurs, mostly for the better (i.e., increases in conscientiousness, decreases in neuroticism; Donnellan et al., 2007; Johnson et al., 2007; Josefsson et al., 2013; Vecchione et al., 2012). But there also is evidence for mean-level change in both middle adulthood (Allemand, Gomez, & Jackson, 2010) and older adulthood (Kandler, Kornadt, Hagemeyer, & Neyer, 2015; Wortman, Lucas, & Donnellan, 2012). Sometimes personality trait changes in older adulthood are decreases in positive traits, reflecting approaching senescence.

The plasticity principle is supported by findings on individual differences in person-

ality trait change described earlier. Previous work has uncovered associations between personality traits and life experiences, including experiences in relationships (Lehnart et al., 2010), stressful life events (Jeronimus et al., 2014; Laceulle et al., 2012), and work experiences (Le et al., 2014) in adolescence and young adulthood. There is similar evidence for individual differences in personality trait change in middle age (van Aken et al., 2006) and old age (Möttus et al., 2012). For instance, in a study of older adults (ages 60–90), changes in perceived social support were related to changes in conscientiousness (Hill et al., 2014). Similarly, Lodi-Smith and Roberts (2012) reported that changes in social engagement in old age were associated with changes in conscientiousness and agreeableness. While some traits may be less plastic in middle and old age (Allemand et al., 2010), most findings provide support for the plasticity principle across the life course.

Finally, with recent research showing the effect of therapy on personality trait change (e.g., Roberts, Luo, et al., 2017), the plasticity principle is strongly supported by the empirical evidence. Most importantly, in the meta-analysis of the relation between therapy experiences and personality trait change, the findings were not moderated by age. Thus, young, middle aged, and older individuals were equally likely to show personality trait change as a result of therapy. It should be noted that evidence for the plasticity of personality trait change does not mean that the preponderance of people transform themselves on a day-to-day, month-to-month, or year-to-year basis. When examined in detail and within a person, the average number of traits that show robust changes in any given period of the life course is one in five (Roberts et al., 2001). The capacity for change, and the existence of evidence for change, does not necessarily mean all people are changing all of the time on all traits.

The Role Continuity Principle

According to the role continuity principle, it is the consistent psychological meaning of roles, not constituent, concrete situations in those roles, that cause continuity in personality traits over time. For example, people could move from one romantic re-

lationship to another, and despite having different partners with different personalities, they could maintain the same type of romantic partner role across partners (e.g., the avoidant type). To our knowledge, this idea has yet to be tested empirically, but there is indirect evidence in studies showing that people maintain similar levels of relationship dissatisfaction resulting from neuroticism across different partners (Robins et al., 2002). Some existing findings even contradict the role continuity principle. Staying in a relationship longer (i.e., maintaining a consistent role) is related to greater changes in personality traits (Neyer & Lehnart, 2007; Robins et al., 2002). Yet this principle suggests that experiencing a consistent role within a relationship would lead to more, rather than less, consistency in personality traits.

The Identity Development Principle

The identity development principle describes the process of developing, committing to, and maintaining an identity over time. This process may lead to greater personality consistency (Roberts & Caspi, 2003). According to this principle, identity development leads to more personality consistency because it results in a clearer perspective to aid in making important decisions. A clear, strong identity can serve as a filter for life experiences; this should lead individuals to interpret new experiences in a manner that is consistent with their identities. Only one study has examined identity structure and personality continuity, and the results indicate that self-concept clarity is unrelated to personality consistency (Lodi-Smith et al., 2017). Because one study is insufficient to draw any notable conclusions, more research is necessary to evaluate the identity development principle.

The neo-socioanalytic principles of personality development, derived from the observations of personality development across a critical mass of longitudinal studies, provide a set of concrete, testable principles and corollary hypotheses that can be supported or refuted with ample data. While many of the principles describe developmental patterns, they only indirectly point to the mechanisms that explain those patterns.

In the next section, we look further at the mechanisms that may explain the patterns described by the principles of personality development.

Person–Environment Transactions and Personality Development

The links between personality development and the ways people interact with their environment were discussed long before personality development was a focal chapter in this handbook (Buss, 1987). Beginning with transactional processes (i.e., selection, evocation, and manipulation), personality psychologists have discussed ways in which people interact with their environment and how those interactions result in continuity and change in personality. Moreover, recent work has gone on to differentiate and identify the components and mechanisms at a very molecular level that underlie these broader person–environment transactions (Baumert et al., 2017; Wrzus & Roberts, 2017). Rather than going through these many processes and mechanisms one by one, we describe two hypothetical case studies, moving from adolescence into young adulthood and beyond, and use these to illustrate how these mechanisms might come into play to both create continuity and promote change.

Consider two hypothetical 21st-century American teenagers named Carol and Tom. Carol is studious, serious about school, and plans to attend college after high school. Tom is a talented athlete, an average student, and has not thought seriously about college but also has not ruled it out. In their junior year of high school, Carol practices for and achieves a high score on the American College Test (ACT) and standardized achievement test (SAT). Tom takes the SAT because he is forced by the school and does not take it seriously. In the spring of his junior year, however, Tom is contacted by a college recruiter for basketball and asked whether he would like to attend a specific college on an athletic scholarship.

Even with this minimal information one can see two transactional processes in play—selection and attraction. *Attraction* refers to people being drawn to personality-consistent environments in which they be-

lieve they will thrive (Nye & Roberts, 2019). Carol is attracted to the college environment to achieve her goals and because she sees her personality fitting with that experience and the rewards that it will bring, such as a white-collar, professional occupation. *Selection* refers to people being selected into environments because of their personality (Roberts, 2006). Tom is being recruited by a college despite not having a strong desire to go to college. Let's assume that the coach is recruiting Tom because he likes Tom's personality and how it will fit with his team and their team climate. Presumably, going into an environment that one is both attracted to and selected for because of one's personality should result in increased continuity (via the niche-picking principle) because these environments will support Carol's and Tom's existing personality qualities.

The reason why individuals like Carol and Tom are attracted to specific life paths and environments is that they perceive the qualities of those environments as fitting with their personality. Recently, we proposed the TESSERA model to help identify the more concrete mechanisms that help translate person–environment transactions into personality continuity and change (Wrzus & Roberts, 2017). In the TESSERA model environments come with Triggering situations and Expectations for certain behaviors. These expectations can be from others in the situation or are generated by a person's interpretation of what the situation requires. These triggers and expectations elicit States (concrete thoughts, feelings, and behaviors). If the States are consistent with existing personality structure, Expressions are evoked. If the states elicited are contradictory to a person's personality and are maintained for a long enough period of time, then personality change may occur. Finally, people ReAct to their experiences and changes in states, and through that reflection react to the situation (e.g., leave the situation), accommodate to the demands of the situation (e.g., change), and reconcile these changes into their identity. Repetitive sequences of situations, expectations, triggers, and reflection drive continuity and change in personality results. For Carol and Tom, it is the perceived triggering situations and their perceived expectations for these new environ-

ments that would motivate them to want to enter specific schools.

Of course, life does not always go as planned. For the sake of argument, let's contemplate what would happen if Carol's life takes an unexpected turn: in her senior year, Carol becomes pregnant and decides to keep the baby without marrying the father. Here we have a completely new set of unexpected situations—though quite possibly Carol might have at least begun to think of those options which by themselves might influence some preparatory personality change (Roberts et al., 2004). This unexpected transition to parenting would be a robust triggering situation with an unforeseen set of expectations, many coming from other parties, such as her family and friends. When confronted with the reality of parenting a newborn child and the changes in states that it necessitates, Carol defers her entry to college and focuses on raising the baby with the help of her family. Given the demands of parenting and the collective expectations for increased responsibility for another life, Carol is forced to do and feel unexpected things. Rather than thinking of her own progress toward achievement goals, Carol must now understand and comply with expectations of nurturing and raising her child, and subordinating her goals to the needs of another. These unexpected triggering situations and expectations would presumably bring with them changes in states that, if triggered consistently over a long enough period of time, might result in at least temporary personality change (Roberts, 2018). These changes are captured in the person–environment transaction of transformation (Roberts, 2006).

Similarly, Tom did not consider college seriously, and when selected for a college option, let's assume he was not prepared for the experience. Unlike his relaxed life in high school, in college he is forced to handle the demands of higher expectations for studying and combining these challenges with the difficulty of working for a sports team in which many hours are dedicated to practice. One could see within a year of making the transition that Tom would confront persistent triggering situations calling for increased conscientiousness and emotional stability and thus a transformation

of his personality. Like Carol, to the extent that these triggering situations and their associated expectations would be met over a long period of time, then one would assume personality change would result.

It should be noted that time has been proposed as a key moderator of personality change (Roberts & Hill, 2017; Roberts, Hill, & Davis, 2017). This is in stark contrast to the perspective that discrete events are the cause of personality change. From a neo-socioanalytic perspective, true personality change is more likely to result not from the discrete event but from the long-term experiences that result from the event. The transition to parenting or college per se is not the cause of change, but rather the situations and expectations that are experienced for weeks, months, and years afterward. And, more importantly, it is the subjective experience that is key. Newborn children vary widely in their temperament and can bring just as wide a variance in parenting experiences. Parenting a colicky baby will make most new parents keenly distressed for long periods of time, while parenting a mellow baby who is a good sleeper might lead parents to feel quite efficacious about the experience. As articulated in our discussions of how to change conscientiousness (Roberts, Hill, et al., 2017), time brings extra opportunities to be exposed to demands for change—a higher dose of the “intervention”—and it brings increased opportunity for reflection (an element of the TESSERA model) in which one can look back on the changes that have occurred and consolidate them in psychological terms.

Of course, people are not unwitting victims of their environments and their experiences. One of the key person–environment transactions that counters being subjected to the whims of a changing environment is *manipulation*. Once in an environment that may not fit especially well with one’s personality, people do have a choice to try and change their environment rather than change themselves. For example, in a longitudinal study in which personality and perceptions of the environment were tracked over time, the latter changed more than the former (Harms et al., 2006). We took this finding to indicate that people are capable of either changing their environment literally

or symbolically, even when the environment is structurally static (e.g., the same school over time). It is also likely that the process of evocation—in which one’s personality creates reactions from others that are consistent with that personality—would help mold the environment to better fit with existing personality structure rather than motivate personality change.

In the case of Carol and Tom, we can envision how both could manipulate their unexpected experiences to fit more closely with their past identities. In the case of Carol, maybe she coordinates with her mother to care for her child on a regular basis so that she can take online college courses to continue her education and prepare to enter college at some future date. In Tom’s case, maybe he takes advantage of the party atmosphere on his college’s campus to move his experience closer to his past easygoing lifestyle. Both of these choices may have unintended consequences in the future (especially for Tom, who risks getting kicked off the team if he indulges too much). Nonetheless, in the short run, manipulating one’s environment to better conform to preexisting personality features diminishes the demands for personality change and helps maintain consistent levels of personality over time.

The last type of person–environment transaction relevant to patterns of continuity and change over time is *attrition*, or leaving the relevant environment. Let’s assume that after a year or two, Carol has started working part-time at a coffee shop to help support herself. In part because she is so conscientious, her employer grooms her for a management position and makes it clear that she would be ideal for that in the future. While the idea of moving up and being in charge is appealing to Carol, she decides instead to leave the job and pursue her college degree. Leaving these types of environments and experiences could have consequences for her personality change. For example, we know that students who transition to the labor market sooner show earlier increases in conscientiousness compared to students who remain in school (Golle et al., 2019; Lüdtke et al., 2011). By leaving her job and reentering school, Carol may be forestalling changes that might have been initiated and maintained by remaining in the labor mar-

ket. A similar story could be told for Tom. Let’s assume that after 2 years he fails to handle the responsibilities of school and the sports team, parties too much, gets kicked off the team, and leaves school. By leaving school, he avoids the necessity of changing in a way to conform to the dual high expectations for behaving more responsibly.

Figure 11.2 shows the hypothetical paths and cycles of person–environment transactions taken by Carol and Tom, and how attraction, selection, transformation, manipulation, and attrition play out over time. Along with these fundamental person–environment transactions, we highlight how lower-order TESSERA mechanisms help to explain both continuity and change. Several observations about these transactions should be made. First, as we noted earlier, the majority of person–environment transactions result in continuity, not change (Nye & Roberts, 2019; Roberts, 2006). Attraction, selection, manipulation, and attrition should all go toward promoting continuity, whereas, the only transaction linked to change would be transformation. This preponderance of continuity-promoting person–environment transactions may partially explain why stability in personality is more commonly found than change.

A second observation is that our hypothetical descriptions are oversimplified. In reality, Carol and Tom would be confronting many different life paths and their requisite environments and experiences si-

multaneously. They would be dealing with experiences in romantic, family, and friend relationships, while attempting to manage work and achievement demands, along with experiences in domains such as health among other things. This means that any one event or experiences resulting from that event should be a minor factor in the larger tapestry of a person’s life, another reason why individual life events have such modest relations to personality change.

While the topics of person–environment transactions and their putative effect on personality continuity and change have been the focus of theorizing for a number of decades, the level of empirical testing of these ideas has been quite limited. Person–environment transactions such as selection, manipulation, and attrition are some of the longest-standing but least-tested ideas in personality development. The idea that being attracted to and selecting certain environments leads to greater personality consistency is widely accepted, as are the ideas of reactance, evocation, manipulation, and attrition. Nonetheless, the empirical linking of these transactions to personality continuity, for example, is lacking. We know that people find environments consistent with their personality traits and interests attractive (e.g., Ackerman & Heggestad, 1997; Botwin, Buss, & Shackelford, 1997), but the idea that successfully selecting a personality-consistent environment is linked to greater continuity has not been thoroughly tested. There is a

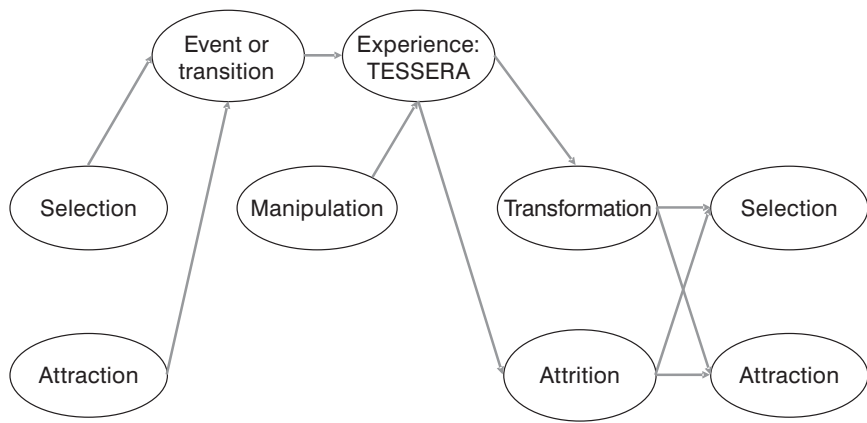


FIGURE 11.2. Person–environment transaction cycles.

striking lack of longitudinal research testing whether these mechanisms play out in the expected way, and this constitutes one of the more serious empirical omissions in the field of personality development.

Within the one transaction leading to change, we have in the past identified a set of change mechanisms contained therein, such as standard reinforcement factors, and social-cognitive factors, such as observing others (Caspi & Roberts, 1999; Roberts & Caspi, 2003). If the evidence for continuity-promoting factors is weak, then the evidence for change factors is even weaker. Many of the mechanisms of change appear to be quite obvious (how could anyone doubt that expectations bring rewards and punishment contingencies that shape behavior?), so this is surprising. Behaviorists have shown that we can mold behavior using different schedules of reinforcement and punishment, yet personality psychology has failed to demonstrate that such contingencies actually shape personality. Why?

Instead of testing these mechanisms of change, researchers have instead tested the associations between demographic and “experiential” variables and longitudinal changes in personality traits. This may be consistent with many of the person–environment transactions outlined in the neo-socioanalytic model, but none of these types of studies have looked more closely at the mechanisms of change. The potential effect of listening to someone’s feedback, or the experience of punitive factors over time, on personality trait change has essentially gone untested in longitudinal research. Even in research that examines the effect of interventions, such as therapy on personality trait change, the mechanistic features of the intervention are typically glossed over (Roberts, Luo, et al., 2017).

In summary, both the mechanisms of continuity and the mechanisms of change have been studied insufficiently. It is easy to accept the basic premises behind the mechanisms, and selection and socialization processes have been studied in laboratory settings to demonstrate short-term behavior change. But those who study personality development have failed to follow up on the short-term selection and socialization processes to look at their effects on long-term continuity

and change. To further the study of personality development, we need to investigate more deeply the person–environment transactions and the lower-order mechanisms behind continuity and change in personality traits.

Conclusion

We have provided in this chapter an update to the global view of personality development that has supported both the creation of the neo-socioanalytic model of personality development and the testing of many of its ideas. The neo-socioanalytic model was initially mostly descriptive—it described personality and personality development to capture more fully new findings that were inconsistent with existing frameworks. This goal rendered, and continues to render, the neo-socioanalytic model as a useful framework, because other frameworks fail to capture as fully the broad scope of domains of personality psychology and the associated developmental patterns in those domains. The neo-socioanalytic model contains testable hypotheses—the principles of personality development and the mechanisms of continuity and change—but more clear articulation of those ideas is needed. Also, the neo-socioanalytic model fails at parsimony. Currently, the model’s focus is on personality trait development, but once it expands to accommodate the landscape of abilities and motives, it will certainly become even more complex. But we have found that the neo-socioanalytic model is excellent for the generation of new ideas—currently, more ideas have been generated than tested. Overall, the neo-socioanalytic model is a useful model that has much room for improvement.

Going forward, we see three main areas of improvement for the neo-socioanalytic model. First, we need to test the mechanisms of both continuity and change in longitudinal research. What we currently think of as mechanisms may not actually be mechanisms, resulting in changes to and greater parsimony of the model. Second, the focus of the neo-socioanalytic model (and most other related frameworks) is personality development in adulthood. There is a

tremendous need for more theorizing and more research of personality development in childhood, especially longitudinal research bridging the gaps between temperament research and personality trait research. Excellent work has been developed to identify the core personality attributes in childhood (e.g., Tackett et al., 2012), and there is work linking some factors, like parenting practices to childhood personality (Atherton & Schofield, Chapter 16, this volume). Less attention has been focused on the contexts that lead to the development of characteristics over time, using a unified system that links temperament and trait dimensions and can thus answer the questions of whether there are the environmental antecedents to not only the level of a personality characteristic in childhood but also the growth of that characteristic from childhood to adulthood. Given the emerging consensus on the importance of personality for leading a successful and fulfilling life, it would be invaluable to know the childhood antecedents of adult personality. Third, as we mentioned earlier, it is imperative that we begin to tackle the most difficult question: Why do people behave the way they do, and what are some of the deeper structures guiding the development of personality? Descriptive frameworks such as the neo-socioanalytic model can be quite useful but are ultimately dissatisfying when the ultimate questions like these go unanswered.

To conclude, much work has emerged in the last decade on personality development. While loosely guide by frameworks and models, this next generation of developmental research should and could pursue stronger and riskier tests of these models in order to improve our understanding and thinking about personality development.

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CHAPTER 12

Personality Development in Middle Childhood

Rebecca L. Shiner

How do children's personalities develop during middle childhood—the span of life stretching from roughly age 5 or 6 to age 11 or 12? Middle childhood is bookended by two periods of life that may seem more dramatic in their impact, namely, early childhood (infancy through preschool age) and adolescence. During early childhood and adolescence, the changes in youths' physical, cognitive, and social–emotional capacities may seem more significant, visible, and striking than the changes taking place during middle childhood. Middle childhood may sometimes seem like a period of relative stability and consolidation rather than a period of dynamic change. In contrast to such views of middle childhood as a more stable period, recent research has demonstrated that children begin to display a broad range of personality differences during the school-age years and that these personality differences lay an important foundation for the personality development that is to come in adolescence and adulthood.

McAdams (2015, 2019; Chapter 5, this volume) has articulated a helpful model for how personality differences emerge over the life course. In earliest childhood, children are already *actors* on the stages of

their lives, displaying tendencies to think, feel, and behave in particular ways that are at least somewhat consistent across situations and time. These earliest tendencies are temperament traits that become elaborated over time and, by middle childhood, take the form of the broader Big Five personality traits (John, Chapter 2, this volume). By middle childhood, children start to become motivated *agents* who are able to shape their lives as they pursue goals that are meaningful to them. These capacities for self-directed goal pursuit emerge as school-age children develop greater capacities in the domains of cognition, theory of mind, and self-regulation. Finally, later in adolescence, youth start to become *authors* who cultivate narratives that weave together stories linking their past with their present and their expectations for the future. Although people do not develop fuller life narratives until later in adolescence, school-age children increasingly remember and elaborate on particularly important stories from their lives—stories that may later be woven into their life narratives.

Figure 12.1 presents this developmental model for personality development. As the model would suggest, middle childhood is a

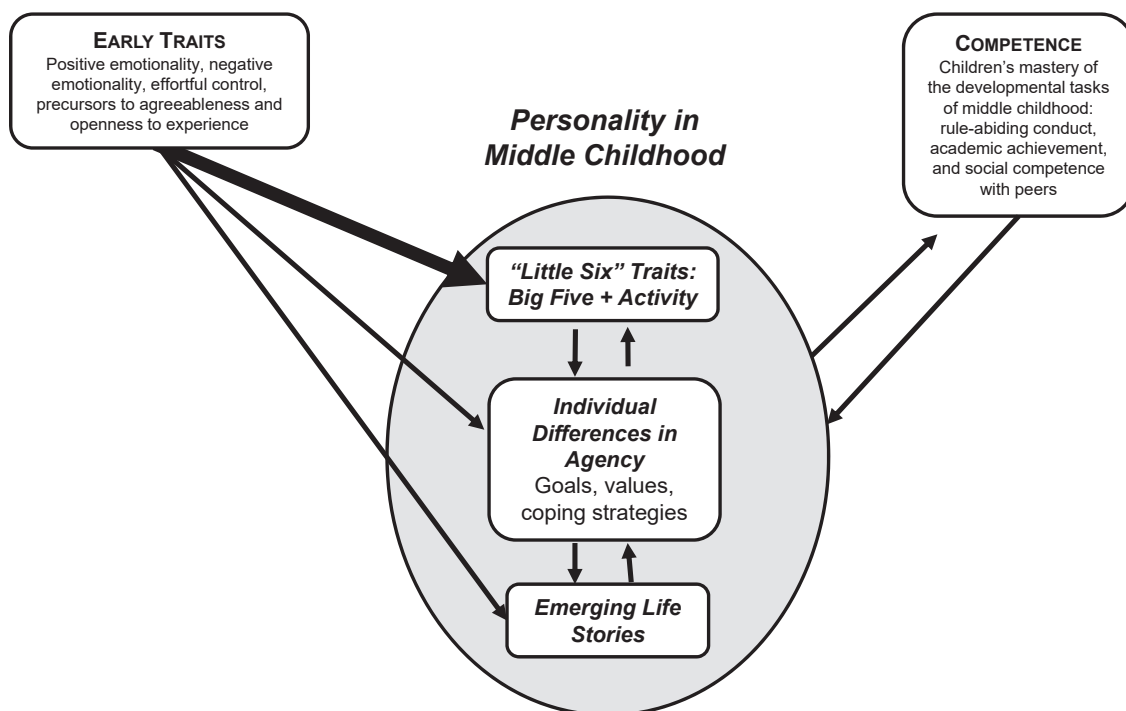


FIGURE 12.1. A conceptual model for personality development in middle childhood.

particularly important time for personality development, because it is during this period that children begin to display traits more similar to adults; exhibit individual differences in goals, motives, and coping strategies; and consolidate important life-defining memories that may form the later basis for life narratives.

In this chapter, I present empirical findings that substantiate the claim that middle childhood is an especially rich period for personality development. Rather than providing an in-depth look at any one component of children's personalities, I highlight the broad range of interesting and important individual differences among school-age children. The chapter is organized in three main sections. The first provides an update on the biological, cognitive, social-emotional, and contextual changes in middle childhood that enable children to display such a wide range of personality differences during this period. In the second section, I review research on children's individuality as *actors*—with a focus on the Big Five traits, plus the addi-

tional trait of Activity. In the third section, I review children's emerging differences as *agents*—meaning their goals, values, and strategies for coping with stress and adversity. For each aspect of personality, I describe what is known about its structure, then review any existing research on patterns of *rank-order stability* (the extent to which individuals maintain their relative standing on an individual difference over time) and *mean-level stability* (normative patterns in which a sample as a whole changes on average levels of an individual difference over time). In this chapter, I focus on the first two levels of McAdams's personality model—the individual as actor and agent, because the third level—the individual as *author*, does not emerge fully until adolescence (McAdams, 2015, 2019), although I highlight this aspect of individuality later as an important topic for future research. At the end of the chapter, I summarize key findings and offer several suggestions for future work on personality development in this vital but sometimes neglected period of life.

What Is Middle Childhood?: Having “Sense,” Getting Noticed, and Developing Skills for Life

Middle childhood is a period of substantial physical, cognitive, social–emotional, and environmental growth and change; these changes enable children to display a broader range of personality differences than in early childhood and set the stage for the significant personality development that is to come in adolescence and early adulthood. Fifty-five years ago, White (1965) marshaled evidence for an important transition at the start of middle childhood called “the age 5- to 7-year shift.” White argued that children across cultures undergo cognitive changes during this transitional period that enable them to take on greater responsibilities and to engage with a broader social world than earlier in childhood. Although later research has revealed that the transition may be gradual and that children continue to change significantly throughout middle childhood, White did highlight important changes that affect children’s personality development during this transition (McAdams, 2015; Sameroff & Haith, 1996). In this section, I review the significance of middle childhood, based on both contemporary empirical research on children’s changing capacities and evolutionary investigations into the role of this period in the life course.

In terms of biological development, middle childhood is most similar to the “juvenile” stage observed in other primates between infancy and puberty (Campbell, 2011). The early part of middle childhood (roughly the 5- to 7-year shift) is characterized by a wide range of biological changes: eruption of the first molars, which enables children to eat a wider variety of foods; greater motor control similar to that seen in adults; brain volume nearly reaching its ultimate size; the start of cortical maturation and increased reorganization; and *adrenarche*—the initial secretion of the adrenal glands, leading to increased sexual differentiation in brain pathways and greater brain plasticity (Campbell, 2011). These biological changes are accompanied by a variety of cognitive changes: greater skill in reasoning and problem solving, stronger capacities for adopting multiple perspectives (*theory of mind*), and growth

in attention and working memory (Del Giudice, 2014; McAdams, 2015). By around age 4 or 5, children can mentally project themselves into the future (Atance, 2008); their capacities for future thinking continue to develop during middle childhood. School-age children experience continued growth in the ability to both preexperience future events (*prospection*; Coughlin, Lyons, & Ghetti, 2014) and plan for the future (Gauvain, Perez, & Reisz, 2018), although by the end of middle childhood, these capacities for future thinking do not yet reach the levels seen in adulthood.

During the transition to middle childhood, children change along a number of social–emotional dimensions as well. Children’s skills in emotion regulation improve considerably, both before the start of middle childhood and across the middle childhood years. Between ages 3 and 5, children’s executive functioning abilities show large improvements, leading to significant gains in emotion regulation, and school-age children continue to improve in their use of internal, cognitive strategies for emotion regulation (Eisenberg, Hofer, Sulik, & Spinrad, 2014). By around age 8, children develop greater understanding of their own characteristics (including their traits, interests, and abilities) and are able to use that information to evaluate and reflect on their thoughts, emotions, and behaviors (Davis-Kean, Jager, & Collins, 2009). Relatedly, across the middle childhood years, children become better able to compare themselves to others, which leads to more accurate and, in many cases, less positive evaluations of their own behaviors and skills; children’s emerging understanding of their own race, gender, sociodemographic status, and appearance begin to affect their well-being later in middle childhood as well (Davis-Kean et al., 2009).

All of these biological, cognitive, and social–emotional changes enable children to become a more critical part of their societies during middle childhood; thus, children’s contexts typically change in significant ways in middle childhood as well. Based on a comprehensive review of the cross-cultural ethnographic record, Lancy (2008; Lancy & Grove, 2011) concluded that, across cultures, middle childhood is about “making sense” and “getting noticed.” “Making

sense” refers to the significant cognitive and social–emotional changes that emerge during the 5- to 7-year shift; across cultures, as a result of these changes, adults begin to focus on deliberately teaching children the norms, capacities, and roles of their cultures, including the development of compliant behavior and the skills necessary to carry out chores and the later work expected for their social group in adulthood. This is why it is during middle childhood that children start to “get noticed” by adults as people in their own right. In short, across cultures, middle childhood is a period of profound “*social learning* and *social integration* in a system of roles, norms, activities, and shared knowledge” (Del Giudice, 2014, p. 196).

In modern, developed societies, middle childhood is likewise an intense period of learning and significant integration into the expectations of the broader society. Children typically enter formal schooling at this time and are expected to participate in more structured academic activities with a heavy cognitive focus, are evaluated with more stringent standards, and are expected to be more independent from adults (Shiner, 1998). Children begin to spend more time with peers, and their interactions with peers play an increasingly important role in shaping the emotion regulation challenges that they face and the ways they view themselves (Rubin, Bukowski, & Bowker, 2015). In some cultures, children also participate in organized activities outside of school (e.g., sports, music, art, recreation, academic enrichment; Vandell, Larson, Mahoney, & Watts, 2015). It is important to note that not all developed societies offer these academic and extracurricular opportunities during middle childhood. Indeed, in some societies in which children face extreme poverty, war, slavery, violence, or other threats, the period of middle childhood may no longer truly exist (Lancy & Grove, 2011). And in many developed societies, the focus on learning now often begins in early childhood rather than middle childhood (Lancy & Grove, 2011).

In developed societies in which children have varied opportunities for learning during middle childhood, children are working on the mastery of three particularly important developmental tasks (Masten & Telle-

gen, 2012). First, as in more traditional societies, children are working on developing *rule-abiding conduct*, or the ability to comply with society’s norms for behavior rather than engage in disruptive behavior. Second, children focus on *academic achievement* in domains considered important in their culture. Third, children develop *social competence with peers* by learning how to get along with other children and develop friendships. In the context of learning how to get along, children also learn how to engage in social competition with peers as they jockey for status, allies, and friends (Del Giudice, 2014). Children’s relative mastery of these three tasks shapes their competence in the later tasks of adolescence and adulthood, including the development of romantic relationships and effectiveness at work (Masten & Tellegen, 2012). Thus, the learning that takes place during the school-age years has particular significance for the development of competence across the life course. Figure 12.1, which depicts aspects of personality development in middle childhood, highlights this important role for school-age children’s personalities in shaping their competence in these critical developmental tasks.

Taken together, these findings on the nature of development during middle childhood offer several important implications for personality development. First, because of children’s increasing cognitive and social–emotional capacities during middle childhood, the personality traits that school-age children display include individual differences in how they view themselves relative to others (e.g., their sense of being liked and accepted), as well as their thoughts, emotions, and behaviors involving the future (e.g., worries about the future, capacities for planning and persevering over time, responsibility toward others). Second, some of the most important personality differences involve children’s behaviors and goals in the context of peer relationships (e.g., sociability, motivation for social status) and in the context of academic work (e.g., carefulness in schoolwork, motivation for academic achievement). Third, as noted previously, children begin to display new personality differences that reflect their emerging capacities for agency (McAdams, 2015). Because children become better able to imagine the

future, develop greater independence, and work on adopting the norms and roles of their societies, they begin to be able to engage in self-directed pursuit of particular goals, and they learn coping strategies as they encounter challenges in the pursuit of those goals. As Lancy and Grove (2011, p. 281) concluded from their ethnographic work on middle childhood across the globe, “Middle childhood is about coming out of the shadows of community life and assuming a distinct, lifetime character.” It is to the description of that character that I now turn.

Personality Traits in Middle Childhood: The “Little Six”

Because of the significant cognitive, social, and emotional changes that take place during the 5- to 7-year shift, school-age children are able to become *actors* who display a rich, complex set of traits on a “stage” that is far broader than that in early childhood. Over the last 25 years, it has become increasingly clear that personality traits are organized in middle childhood in a Big Five trait structure similar to that seen in adults, but with some significant differences in the traits’ content and structure, and with the addition of a sixth trait—namely, activity. In this section, I review what is known about the traits that emerge earlier in childhood, before the school-age years, the basic structure and content of personality traits in middle childhood, and the rank-order and mean-level stability and change in these traits.

Traits in Early Childhood

The Big Five traits in middle childhood emerge out of a narrower range of traits in early childhood. The traits displayed by infants and toddlers are typically called “temperament” rather than personality traits, but, in fact, there are good reasons to believe that the temperament and personality traits are essentially the same basic set of dispositions. As discussed here, the two sets of traits show considerable overlap in their content and basic structure. Furthermore, they are both shaped by complex interactions among genetic, biological, and environmental factors across time (Shiner & De Young, 2013).

As children grow older, their growing capacities and broadening environments enable them to display a broader range of traits. In addition, new genetic influences contribute to increasing variation in personality traits over time from late childhood through late adolescence (Kandler, Waaktaar, Möttus, Riemann, & Torgersen, 2019). But the nature of the basic traits is not fundamentally different over time.

There is general consensus for three overarching temperament traits in early childhood (Rothbart, 2011; Shiner et al., 2012). *Surgency* taps children’s tendencies toward sociability, positive emotions, and eagerness to engage in potentially pleasurable activities. *Negative emotionality* measures children’s general tendencies toward a wide range of negative emotions, including fear, withdrawal, sadness, irritability, and frustration. *Effortful control* reflects children’s emerging behavioral constraint and regulation, including the ability to sustain attention and persist at tasks. Although most of the support for these overarching traits comes from questionnaire research (Rothbart, 2011), there is also evidence for this three-trait structure in experimenter ratings of 3- to 7-year-old children’s behavior during a set of lab tasks (Vroman, Lo, & Durbin, 2014).

These three traits may not encompass the full range of traits that children display in early childhood. Researchers’ conceptualizations of what is considered “temperament” often lead them to leave out other tendencies that are displayed by young children, leading to distortions in our understanding of trait structure early in life (Shiner & De Young, 2013). For example, temperament measures typically leave out agreeableness and openness, and aspects of the other Big Five traits that emerge somewhat later in the preschool years, because of a priori assumptions that these tendencies are not part of temperament. Yet when these other traits are assessed in preschoolers, they yield a coherent structure that resembles the structure seen in middle childhood. For example, when parents rated their 4- to 5-year-old children on several temperament measures and a Big Five measure, the results provided evidence for traits resembling low extraversion, negative emotionality, conscientious-

ness, disagreeableness, activity level, and a sensitivity factor that may be a precursor to openness (De Pauw, Mervielde, & Van Leeuwen, 2009). Moreover, the structure of the most widely used childhood temperament questionnaire—the Children’s Behavior Questionnaire for children ages 3–7 years—is characterized by more traits than just *surgency*, *negative emotionality*, and *effortful control* when analyzed using contemporary statistical techniques, thus suggesting that more than three traits are necessary to describe the breadth of these traits even before middle childhood (Kotelnikova, Olino, Klein, Kryski, & Hayden, 2016).

The “Little Six”

Whereas research on temperament in childhood focuses on a narrower range of traits, personality research in childhood adopts a broader perspective on the traits that children may display. There is robust evidence that, by middle childhood and perhaps earlier, children’s personality traits take the form of the Big Five traits, with the possible addition of a sixth trait of activity level. Table 12.1 presents the facets (or mid-level constructs) for the Big Five traits in three of the most widely used personality trait measures for school-age children: the Hierarchical Personality Inventory for Children (HiPIC; Mervielde, De Fruyt, & De Clercq, 2009); the Inventory of Child Individual Differences (ICID; Halverson et al., 2003; Tackett et al., 2012); and the Big Five Inventory-2 (BFI-2; Soto & John, 2017). The facet traits in Table 12.1 illustrate the breadth of constructs included in the Big Five traits by middle childhood.

Two lines of questionnaire research in the personality tradition indicate that the Big Five model may capture many of the individual differences in traits observed in children. First, a number of questionnaires have been created specifically to measure the Big Five in children and adolescents via reports from parents and teachers. Some of these measures have used descriptors derived from parents’ free descriptions of their children rather than simply importing descriptors from adult measures, in order to increase the developmental validity of the measures; these measures include the Hierarchical

Personality Inventory for Children (HiPIC; Mervielde, De Fruyt, & De Clercq, 2009; Vollrath, Hampson, & Torgersen, 2016) and the Inventory of Child Individual Differences (ICID; Halverson et al., 2003; Tackett et al., 2012). Second, Big Five structure has been obtained in questionnaires not designed specifically to measure the Big Five but instead created simply to tap a wide range of childhood traits; the best known measure of this type is the common-language California Child Q-Set (CCQ; Caspi et al., 1992; John, Caspi, Robins, Moffitt, & Stouthamer-Loeber, 1994; Soto & John, 2014). In addition, other Big Five questionnaire measures have been used successfully in childhood, for example the BFI-2, which was originally created for use in adults.

There is emerging evidence that the Big Five is not adequate to capture the structure of personality traits in childhood; rather a Big Five model plus an additional sixth trait of Activity better describes the structure of traits in children and adolescents (reviewed in De Pauw, 2017; Shiner & DeYoung, 2013; Soto & Tackett, 2015); this model has been dubbed the “Little Six” (Soto, 2016; Soto & John, 2014). The Little Six model appears to be especially stable beginning around age 6, the beginning of middle childhood (Soto & John, 2014).

Although the content of the Big Five traits overlaps considerably with the adult Big Five, there are some significant differences in each of the traits, as seen in work on the HiPIC, the ICID, the CCQ, and research examining the joint structure of the Big Five and temperament (De Pauw et al., 2009). In the following, I highlight some of the developmental differences in the makeup of each trait.

Extraversion in childhood includes tendencies toward positive emotions, sociability, and expressiveness. It is interesting to note that the CCQ measure of Extraversion includes expressiveness of both positive and negative emotions and experiences (Soto & John, 2014); extraverted children seem prone to share *all* aspects of their experiences with others, not just their positive ones. It is notable that most childhood Big Five measures do not include positive expressions of assertiveness and social dominance as a facet of extraversion; rather, as I note

TABLE 12.1. Facets for the Big Five Personality Traits in Three Widely Used Childhood Questionnaires

HiPIC	ICID	BFI-2
<u>Neuroticism</u>	<u>Neuroticism</u>	<u>Neuroticism</u>
Anxiety	Fearful/insecure	Anxiety
Self-confidence	Negative emotionality	Depression
	Shy	Volatility
<u>Extraversion</u>	<u>Extraversion</u>	<u>Extraversion</u>
Energy	Activity level	Energy
Expressiveness	Positive emotionality	Sociability
Optimism	Considerate/sociable	
Shyness	Openness	
Assertiveness		
<u>Imagination</u>	<u>Openness</u>	<u>Openness</u>
Creativity	Intellect	Creative imagination
Intellect		Intellectual curiosity
Curiosity		Aesthetic sensitivity
<u>Benevolence</u>	<u>Agreeableness</u>	<u>Agreeableness</u>
Altruism	Strong willed	Compassion
Dominance	Antagonism	Trust/forgiveness
Egocentrism		Respect
Compliance		
Irritability		
<u>Conscientiousness</u>	<u>Conscientiousness</u>	<u>Conscientiousness</u>
Concentration	Distractible	Productivity
Persistence	Organized	Organization
Orderliness	Achievement orientation	Reliability
Achievement		

Note. HiPIC, Hierarchical Personality Inventory for Children (Mervielde, De Fruyt, & De Clerq, 2009); ICID, Inventory of Child Individual Differences (Halverson et al., 2003); BFI-2, Big Five Inventory–2 (Soto & John, 2017).

shortly, childhood measures tend to focus on negative expressions of assertiveness and social dominance and include these tendencies as part of the low end of agreeableness. The BFI-2 and other measures originally developed for adults include assertiveness as part of extraversion; positive expressions of social confidence and assertiveness deserve greater attention in childhood because of their likely importance for emerging leadership skills.

Childhood *neuroticism* shares much in common with adult neuroticism, in that it includes predispositions toward a wide variety of negative emotions, including anxiety and fear, sadness, moodiness and emotional instability, and insecurity and vulnerabil-

ity (see, e.g., Shiner & Masten, 2012). The nature of neuroticism changes by middle childhood, at least, in that it includes various self-evaluative emotions (e.g., insecurity, sensitivity about criticism), consistent with the previously described rise in self-understanding in middle childhood. Neuroticism and low agreeableness seem to be more strongly related in childhood than in adulthood, and in many cases, irritability and frustration may be more strongly related in childhood to agreeableness than to neuroticism (De Pauw, 2017; Tackett et al., 2012). In adults, moodiness, irritability, and emotional volatility are more clearly an aspect of neuroticism (De Young, Quilty, & Peterson, 2007; Soto & John, 2017). This discrepancy

may arise in part because adults are typically the reporters of children's traits, and they may not be able to distinguish children's internal experiences of emotional volatility (neuroticism) from their external expressions of anger and hostility (low agreeableness). It is also important to note that the neuroticism trait does not replicate as clearly across cultures in childhood as other traits do (Tackett et al., 2012).

Conscientiousness in childhood includes children's impulse control, planning, high standards, perseverance at tasks, dependability, attention, carefulness in work, and orderliness. As children move from middle childhood to later adolescence, conscientiousness increasingly involves descriptors that index principled behavior toward others, acceptance of responsibility, and dependability (Soto & John, 2014). Conscientiousness is more strongly related to agreeableness in childhood than in adulthood, suggesting the presence of an overarching self-regulatory trait (Soto & Tackett, 2015). Interestingly, conscientiousness in childhood is often associated with the intellect component of openness—a link that does not occur in adulthood (Soto & Tackett, 2015) and that may result from the slow development of the prefrontal cortex in childhood and its potential influence on both traits (Shiner & De Young, 2013).

Agreeableness is an especially broad trait in childhood. Children's agreeableness includes their considerateness, kindness, cooperativeness, compliance, concern about others, and generosity on the high end, and manipulativeness, aggression, bossiness and social dominance, anger, self-centeredness, and stubbornness at the low end. All of these tendencies relate to how well children can regulate themselves in order to maintain positive relationships with both peers and adults; descriptors of agreeableness toward adults (e.g., compliance, obedience) are salient in child measures in a way that is largely absent in adult measures of agreeableness. Childhood measures of agreeableness include strikingly large numbers of descriptors for the low end of the trait (De Pauw, 2017; Tackett et al., 2012), and this is true across cultures, perhaps because disagreeable children pose so many challenges for adults. As noted previously, childhood agreeableness

has stronger associations with low neuroticism and high conscientiousness in childhood than in adulthood.

Openness/intellect has proved to be the most challenging trait to define in childhood. Children who are high on this trait are quick to learn, knowledgeable, perceptive, imaginative, curious, and original. A recent study found a moderate correlation ($r = .41$) between openness at age 10 and at age 30 in a sample of American participants when childhood openness included items assessing children's positive, energetic, enthusiastic involvement in intellectual and academic work and in extracurricular activities, as well as the more typical descriptors for openness (e.g., creativity, curiosity, quickness to learn) (Shiner, Allen, & Masten, 2017). As noted previously, middle childhood is the period in which children in many cultures begin formal school and engage in more extracurricular activities and hobbies, so openness may manifest itself during this period of life in children's positive, enthusiastic engagement with academic and nonacademic tasks. Interestingly, there is evidence that the intellect aspect of openness (e.g., good thinking, quickness to learn, good memory) emerges as a distinct factor in parent ratings across multiple cultures already by the age of 3 (Tackett et al., 2012).

Finally, as noted, there is growing evidence that *activity* is a developmentally distinctive aspect of personality structure by at least preschool age (Shiner & De Young, 2013; Soto & John, 2014). Activity level is an important trait in most temperament models (Shiner & De Young, 2013), but it has typically been neglected in personality models. Activity includes, not surprisingly, children's tendency to be physically active and energetic; depending on the assessment measure, it may include youths' assertive engagement and pleasure in striving to do things well (e.g., Soto & John, 2014)—or, instead, their tendencies toward impulsivity and sensation seeking (De Pauw et al., 2009). Activity may change as a component of personality over time, shifting from reflecting primarily motor activity to reflecting achievement motivation and competitiveness, then eventually becoming a component of extraversion and conscientiousness (Soto & John, 2014).

Rank-Order Stability of Personality Traits

As noted previously, *rank-order stability* refers to the degree to which the relative ordering of individuals on a given trait is maintained over time. Rank-order stability is typically indexed by correlations between scores on the same measure across two points in time, but in childhood, different measures are sometimes used at different time points because of the ways that children's traits manifest differently over time. Children's temperament and personality traits exhibit some rank-order stability even very early in life, and this stability increases over time. Roberts and DelVecchio's (2000) meta-analysis of rank-order trait stability obtained these population cross-time correlations for traits in childhood: 0 to 2 years = .35; 3 years to 5 years = .52; and 6 years to 11 years = .45. Later studies have suggested that rank-order stability may be even higher in childhood, when the results are corrected for measurement error (Ferguson, 2010) and when stronger measures are used (De Fruyt et al., 2008; de Haan, De Pauw, Van den Akker, Dekovic, & Prinzie, 2017; Prinzie & Dekovic, 2008). Laboratory assessments of traits likewise show moderate to strong stability for youth's observed behavioral tendencies (reviewed in Shiner, 2014), although the stabilities are somewhat lower than those obtained using questionnaire measures (e.g., Dyson et al., 2015). Far from being transitory, children's and adolescents' traits are an important, enduring aspect of their individuality across childhood and adolescence, although change certainly does occur.

Mean-Level Change in Personality Traits

Mean-level changes involve changes in the average levels of traits across different periods of the life course. Given the rapid biological, cognitive, emotional, and environmental changes that take place during the first two decades of life, it seems plausible that children and adolescents would show significant mean-level change in personality traits. The literature on mean-level changes in early and middle childhood is relatively limited but does point to some intriguing patterns of mean-level change in childhood and the transition to adolescence.

Early in childhood, children change rapidly, which results in significant mean-level changes as new capacities come online. Infants begin to express the primary emotions of joy, surprise, fear, sadness, and interest within the first year of life (Lewis, 2000), which suggests that mean levels of individual differences in those emotions should increase over time. Infants develop stronger tendencies to smile, vocalize, and laugh during the first year (Bates, Schermerhorn, & Goodnight, 2010). The biological fear system comes online in the latter part of the first year (Rothbart, 2011), which suggests that individual differences in fear and inhibition should increase during this first year. Mean levels of anger gradually increase over the first several years (Deater-Deckard & Wang, 2012), as do empathy and prosocial behavior (Knafo & Israel, 2012). Physical aggression likewise increases from infancy onward and peaks around age 3 (Tremblay & Nagin, 2005). The more self-regulatory aspects of temperament, specifically, attention and effortful control, develop rapidly in early childhood as well, as several attentional systems come online during the latter part of the first year (Rueda, 2012). Thus, as traits become better established aspects of children's individuality in the first years of life, mean levels of emotion-focused and regulatory traits—including extraversion, activity level, negative emotionality, self-control and attention, and empathy/altruism—increase overall during early childhood.

In the preschool years and middle childhood, several patterns of mean-level change emerge. Extraversion tends to decrease in a linear fashion over this time (De Fruyt et al., 2008; Prinzie & Dekovic, 2008; Soto, 2016; Van den Akker, Dekovic, Asscher, & Prinzie, 2014); early on, this may occur because of decreases in energy and optimism, but later in childhood, this may include drops in expressiveness as well (de Haan et al., 2017). For neuroticism, in parent reports, the more internalizing aspects increase in early childhood (e.g., self-confidence goes down and anxiety goes up) (de Haan et al., 2017) and in middle childhood (Prinzie & Dekovic, 2008; Soto, 2016). This may occur because of children's growing abilities to reflect on themselves and to consider themselves in comparison to others, as reviewed earlier.

However, interestingly, children themselves may not report increases in neuroticism (Van den Akker et al., 2014). The more externalizing aspects of neuroticism—including irritability and frustration—seem to be more stable or even decrease over childhood (Deater-Deckard & Wang, 2012; de Haan et al., 2017), as children become better at regulating these types of negative emotions.

Findings for conscientiousness in childhood are not entirely consistent. In the preschool years, children's capacities for concentration continue to increase (de Haan et al., 2017; Rueda, 2012), but findings for the broader conscientiousness trait are inconsistent, with some studies showing declines in conscientiousness during middle childhood (de Haan et al., 2017; Ong, Hong, Tsai, & Tan, 2019; Soto, 2016) and others showing increases (Van den Akker et al., 2014).

Agreeableness increases from early childhood through the preschool years (de Haan et al., 2017; Prinzie & Dekovic, 2008), as children become more compliant and prosocial, and less egocentric. As with conscientiousness, however, findings for agreeableness are not consistent in middle childhood. Compliance may decrease in middle childhood, and girls may become more prosocial and altruistic (de Haan et al., 2017), but other aspects of agreeableness may remain relatively stable (de Haan et al., 2017; Soto, 2016) or may increase slightly (Van den Akker et al., 2014). These mixed findings for conscientiousness and agreeableness may arise because different measures tend to emphasize different facets of the traits, and the facets may change in different ways.

Finally, for openness, although the intellect component may increase in the preschool years (de Haan et al., 2017), the trait as a whole generally decreases across the middle childhood years (de Haan et al., 2017; Soto, 2016). Taken together, over the preschool years and middle childhood, children become less energetic, optimistic, expressive; less confident and more anxious; less irritable and angry; better able to concentrate; and less curious and imaginative. The patterns of mean-level change for other aspects of conscientiousness and agreeableness remain unclear.

Far more studies have investigated mean-level change in the transition to adolescence,

perhaps because youth can provide self-reports by this time, and because adolescence has been viewed as a period of “storm and stress.” A meta-analysis of 14 studies (Denissen, van Aken, Penke, & Wood, 2013), as well as subsequent other studies, including a cross-sectional study of over 1 million participants providing self-reports (Soto, John, Gosling, & Potter, 2008), has provided evidence for what has been called the *disruption hypothesis*—namely, that, during the transition from late childhood to adolescence, some negative personality changes take place, followed by increasing personality maturity in the transition to adulthood (Soto & Tackett, 2015). Specifically, youth may display decreases in conscientiousness, agreeableness, and openness during this time and may continue their decreasing trajectory of extraversion. Pathways of neuroticism may diverge for girls and boys, with girls showing an increase in neuroticism and boys remaining stable or even decreasing on this trait. Youth then later show increases in conscientiousness, agreeableness, and openness in many studies. The name *disruption hypothesis* implies that youth undergo “negative” personality changes in the transition to adolescence, but many of these changes may already be underway in middle childhood—including the decreases in openness and the increases in aspects of neuroticism. A better understanding of normative change in middle childhood will offer insights into what is and is not disrupted in personality development as youth transition to adolescence.

The Emergence of Agency: Goals, Values, and Coping in Middle Childhood

School-age children's personalities extend beyond personality traits to include a wide variety of individual differences. As noted earlier, McAdams (2015, 2019) has described middle childhood as the period during which children move beyond simply being actors—who display characteristic patterns of behavior—to becoming *agents* who develop a sense of their own values, pursue goals, and make choices as they work toward those goals. The changes that take place during the 5- to 7-year shift

set the stage for important new developments in these individual differences. As I noted earlier, cognitive changes enable children to imagine alternative futures, reason more about various options, and plan for themselves. Children also begin to be able to assess their own characteristics, particularly in relation to others, and to reflect on what those characteristics mean for their lives. Their skills in self-regulation improve, which gives them greater control over making choices and directing their own actions. Finally, school-age children spend their days learning the norms, skills, expectations, and roles of their societies as they spend more time outside the home at school and in interaction with peers. All of these developmental changes enable children to develop individual differences in their emerging goals and plans, a sense of overarching values, and means of coping with stress and adversity—the personality differences I review in this section.

Goals

With the emergence of capacities for future thinking, planning, and decision making in the 5- to 7-year shift, children begin to discern what is important to them as individuals and formulate some sense of what they want to strive for in particular domains of their lives—in other words, they begin to develop a stronger sense of their daily goals. It is important to note that personality traits, like goals, involve individual differences in motivation; for example, extraversion involves approach motivation, and agreeableness includes the motivation for positive relationships with other people. Relative to other motivational constructs, goals are characterized by several distinctive features: They are focused on a particular object and on the future; people use them to direct or guide their behavior, either by approaching or avoiding something; and they are internally represented (Elliot & Fryer, 2008). Goals thus have a narrower focus than other motivational constructs. Not surprisingly, most of the research on goals in middle childhood has explored goals related to two of the central developmental tasks in this period: academic achievement and peer relationships.

Because academic achievement is such an important developmental task in middle childhood, children's achievement motivation has been a topic of research focus for many decades. This research has addressed multiple questions children may ask about their own academic achievement: Can I do the task? Do I want to do the task? Why am I doing the task? What do I need to do to succeed? (Wigfield et al., 2015, p. 657). The question that is particularly important for children's emerging personalities is "Why am I doing the task?"; this focuses on children's achievement goal orientations or children's aims in doing their academic work. In different domains of their lives, children may be relatively intrinsically motivated—finding inherent enjoyment and interest in the task itself—or relatively more extrinsically motivated, performing tasks for reasons extrinsic to the task (e.g., winning others' approval of others, avoiding punishment) (Ryan & Moller, 2017). Intrinsic motivation for academic tasks decreases modestly from late childhood through adolescence, particularly in specific academic subjects such as math, and it shows a pattern of rank-order stability similar to personality traits at this age, namely, moderate to strong stability by middle childhood and increasing stability over time (Gottfried, Fleming, & Gottfried, 2001). Thus, intrinsic academic motivation, like the trait of openness (which shares a focus on curiosity and intellectual engagement) declines from middle childhood through adolescence.

Children's achievement goal orientations can be broken down into more fine-grained dimensions as well. Perhaps the most well-studied taxonomy for achievement goal orientations is a 2 (*mastery*, or learning material and improving, versus *performance*, or demonstrating one's competence for others) $\times$ 2 (*approach*, or moving toward some desired end, vs. *avoidance*, or moving away from a nondesirable end) model (Elliot & Hulleman, 2017). Thus, children may pursue *mastery-approach* goals (learning and improvement), *mastery-avoidance* goals (pursuing perfection or avoiding losing one's abilities), *performance-approach* goals (demonstrating one's competence, or trying to do better than others), and *performance-avoidance* goals (trying to avoid looking

incompetent) (Elliot & Hulleman, 2017). Having mastery-approach goals, at least in childhood, increases self-efficacy, improves learning, and increases intrinsic motivation for learning; performance-approach goals predict better academic self-concept and achievement, whereas performance-avoidance goals are associated with lower achievement and higher anxiety (Wigfield et al., 2015). These goals have only low to moderate stability in late childhood and adolescence, and like intrinsic motivation, both mastery and performance goals decrease from the end of childhood into adolescence (Wigfield et al., 2015; Zheng et al., 2019). There is some preliminary evidence that individual differences in mastery goals may be shaped more by environmental factors in middle childhood and more by genetic influences by high school (Zheng et al., 2019). Although it is clear that children vary on these important goals by the end of middle childhood, these goals remain a relatively understudied topic in childhood, with only 20 studies examining them in elementary schoolchildren until around 2010 (Hulleman, Schrager, Bodmann, & Harackiewicz, 2010). Furthermore, because they are typically assessed using self-report questionnaires, most childhood studies have focused on older children who can complete these measures, and far less is known about them at the start of middle childhood.

School-age children also vary widely in goals for their relationships with peers. Crick and Dodge (1994) offered a highly influential model of children's individual differences in social information processing that included youths' social goals as an important component; according to this model, after youth take in relevant information about social situations, they formulate goals for these interactions that guide their behavior. Several recent studies have suggested that children may have general tendencies in the social goals that they typically pursue with peers. These social goals are similar in structure to three of the achievement goal orientations described earlier—specifically, they include how much youth want to improve their social skills and relationships (mastery-approach goals), impress others with their popularity (performance-approach goals), and avoid feeling embarrassed or rejected

(performance-avoidance goals) (Rodkin, Ryan, Jamison, & Wilson, 2013). Or, in other words, children vary in how much they aim at “developing relationships, being cool, and not looking like a loser” (Rudolph, Abaied, Flynn, Sugimura, & Agoston, 2011, p. 1518). Children also vary in how much they pursue *communal* goals that are aimed at developing positive relationships with others and *agentic* goals focused on obtaining status and power (Caravita & Cillessen, 2011). All of these social goal orientations have important implications for children's peer relationships, including their experiences with bullying, responses to peer aggression and aggressiveness, popularity, and likability (Caravita & Cillessen, 2011; Rodkin et al., 2013; Rudolph et al., 2011), and are worthy of far more investigation.

Values

As noted previously, during middle childhood, children are expected to learn about the values of their particular families, cultural groups, and broader societies, and they begin to establish their own values as well. In a special issue on the development of values in childhood and adolescence, Döring, Daniel, and Knafo-Noam (2016) described values: “Values convey what is important to a person; they express the key goals that guide us in life” and “Values are at the core of person's self-concept and identity, as they define who somebody is” (p. 472). Thus, values are broader than the specific goals described in the previous section; they express people's most important motivations across situations. Research on attachment, achievement motivation, and moral development has explored aspects of children's values to some extent (Killen, 2016), but individual differences in the full range of children's values have not been studied empirically within psychology until recently, perhaps because measures were not available for assessing them in children.

A couple of different measures for assessing values in childhood—one based on pictures and another using simplified text—have recently been developed (Döring et al., 2015; Kandler, Gottschling, & Spinath, 2016), enabling exploration of this important individual difference earlier in life.

These measures have adopted Schwartz's (1992) model of universal values, which has been widely studied in adults and, to a lesser extent, in adolescents. Research on children as young as age 7 years indicates that children's values largely share the same basic structure as those of adults (Cieciuch, Davidov, & Algesheimer, 2016; Döring et al., 2015; Kandler et al., 2016; Uzefovsky, Döring, & Knafo-Noam, 2016; Vecchione, Döring, Alessandria, Marsicano, & Bardi, 2016). The Schwartz (1992) model includes 10 values, each arranged in opposite pairs that have consequences that conflict with each other (e.g., values of power over others inherently conflict with universalism values that involve concern for all others and for nature). These five opposite pairs of values form a circular structure with two axes: one ranging from *self-enhancement* (concern for self) to *self-transcendence* (concern for others) and the other ranging from *conservation*, or preservation of the status quo, to *openness to change*. The basically similar structure of values in childhood and in adulthood speaks to the fundamental nature of these value dimensions.

Preliminary research on children's values has explored stability and change in these values, effects on behavior, and genetic influences. In terms of rank-order stability, children's self-reported values seem to be moderately stable by middle childhood and the middle school years, with increasing stability with age (Cieciuch et al., 2016; Vecchione et al., 2016). In terms of mean-level change, a single study (Cieciuch et al., 2016) revealed that, over the middle childhood years from ages 7 to 11, mean levels of conservation values decreased, while mean openness to change values increased; self-transcendence increased, slightly decreased, and then increased, whereas self-enhancement followed the opposite pattern. Children's values seem to predict their value-relevant behaviors (e.g., conservation values predict active avoidance of dangerous places) over short periods of time, whereas those same behaviors predict later values, but to a lesser degree (Vecchione et al., 2016). Finally, in terms of the causes of values in childhood, there is evidence for genetic influences on most of the overarching values, with the possible exception of openness to change

(Uzefovsky et al., 2016); moreover, genetic factors account for most of the similarity between children and parents on values (Kandler et al., 2016). Children's nonshared environments, or child-specific experiences, account for the largest portion of the variation in children's values, however, which suggests that these kinds of experiences will be important targets of future research on this topic.

Coping Strategies

As children pursue their goals and develop a stronger sense of their personal values, they face daily stresses and sometimes more significant adversity. Children develop different *coping strategies* for handling these stresses. Although definitions of coping differ, coping is typically seen as a strategy enacted in response to acute or chronic stress; it is viewed as a controlled, conscious, and goal-directed process; and it involves self-regulation of behavior, cognition, emotion, physiology, or the environment (Compas et al., 2014).

Children use a variety of strategies, depending on the particular situations they are facing (Seiffge-Krenke, Aunola, & Nurmi, 2009). The cognitive, social-emotional, and contextual processes that change during the 5- to 7-year shift shape the coping strategies that children may adopt during middle childhood. Like adults, children use *primary control* strategies (approach-oriented, active strategies for directly addressing the source or stress or one's own emotions; e.g., problem solving, supportseeking, and emotion expression), *secondary control* strategies (changing one's relationship to the stressor; e.g., acceptance, reappraisal, distraction) and *disengagement* strategies (avoidance-oriented attempts at distancing oneself from the stressors or one's emotions; e.g., withdrawal, denial) (Compas et al., 2017).

Children's and adolescents' repertoires of coping strategies develop over time. Among preschool- and school-age children, the predominant forms of coping are support seeking, problem solving, escape, and distraction (Skinner & Zimmer-Gembeck, 2007). As children move into adolescence, their coping strategies become more complex and cognitively advanced. Although the negative strategy of withdrawal increases during

early adolescence, youth increasingly use the more mature strategies of engagement and internal cognitive coping across the adolescent years (Seiffge-Krenke et al., 2009). There is evidence that different coping strategies are associated with lower or higher levels of psychological symptoms concurrently, but in a recent meta-analysis, Compas et al. (2017) found surprisingly little evidence that youths' coping strategies predict psychological symptoms across time. Despite the large number of studies on children's coping strategies, surprisingly little is known about their developmental course, so much remains to be learned about their emergence, stability, and change over time.

Conclusion and Directions for Future Research

Two decades ago, I posed the question "How shall we speak of children's personalities in middle childhood?" (Shiner, 1998). I proposed a tentative answer organized around a set of personality traits identified in multiple research programs spanning temperament and personality: sociability, social inhibition, dominance, negative emotionality, aggressiveness, prosocial disposition, persistence/attention, mastery motivation, inhibitory control, and activity. Today it is clearer that these more narrowly defined personality traits are structured as the "Little Six," including the Big Five plus Activity. In the two decades since that review was published, it has also become clear that school-age children's personalities extend beyond these traits to include a wide variety of other individual differences, including children's goals in specific domains of their lives, their overarching values, and their capacities for coping with stress and regulating their emotions. In this chapter I have tried to convey the breadth of these personality differences—their structure, as well as their patterns of rank-order and mean-level change.

Although much has been learned over the past two decades about children's personalities in middle childhood, some foundational questions still remain unanswered. First, basic research on the structure of these individual differences remains important. For

example, in the case of personality traits, although there is good reason to be optimistic that we have the broad outlines of the traits right, at least in middle childhood, there is still much to be learned about how the manifestations of each trait change over time and how they differ from the manifestations in adulthood. As I mentioned previously, we also do not know the full structure of temperament and personality traits earlier in childhood, because most research on temperament has restricted the content of traits being measured based on researchers' definitions of what constitutes temperament. Furthermore, some widely used childhood temperament measures are problematic from a psychometric perspective (Kotelnikova et al., 2016; Kotelnikova, Olino, Klein, Mackrell, & Hayden, 2017), leaving the structure of temperament still unclear.

Intriguing studies on early and middle childhood suggest that temperament and personality questionnaire measures each offer important, nonoverlapping information about children's individual differences (De Pauw et al., 2009; Tackett, Kushner, De Fruyt, & Mervielde, 2013), so work on structure from early childhood through adolescence may benefit from the inclusion of descriptors from both the temperament and the personality traditions. Additional structural work on children's goals would also be helpful; although research on children's goals has identified several important individual differences in achievement and social goals, children surely have goals beyond the ones identified thus far. The rapid developmental changes taking place in childhood make this an especially informative period for testing hypotheses about the mechanisms underlying the observed structure of personality and the normative patterns of change in those traits over time.

A second, related direction for future work is both identifying the age at which children can provide self-reports of their personalities and developing measures to enable children to do so. Despite the rich variety of personality differences evident in school-age children, there is relatively less personality research conducted on this period of life, likely in part because of the measurement challenges during middle childhood. It is possible to obtain information about the

traits of younger children through a variety of means—parent and teacher reports, behavioral observations, and laboratory tasks. But some of these methods may pose challenges in middle childhood. Parents and teachers may have less insight into some aspects of school-age children's personalities as their personalities become more complex (e.g., adults may have difficulty with rating children's neuroticism accurately), and school-age children may sometimes be too self-conscious to be observed or to complete lab tasks. In adolescence, it is easier to turn to self-reports to assess youths' personalities.

Thus, research on middle childhood would benefit from the development of new self-report measures to fill this gap. Children can provide self-reports of the Big Five traits by around the age of 5, using a one-on-one puppet procedure (Measelle, John, Ablow, Cowan, & Cowan, 2005; see also, Coughlin, Robins, & Ghetti, 2019). Children as young as age 7 can also report on their social goals when assisted with reading and completing measures (Rudolph et al., 2011), and on their values when presented with a simplified picture-based version of a values scale (Döring, Blauensteiner, Aryus, Drogekamp, & Bilsky, 2010; Uzefovsky et al., 2016). The creative development of new methods for children's self-reports of their personalities has the potential to significantly advance this area of research.

Third, basic questions remain about how personality differences in middle childhood are related both to each other and to earlier traits. A meta-analysis of the associations between traits and coping in youth and adults (Connor-Smith & Flaschbart, 2007) revealed only modest associations between the two domains; traits were more strongly related to coping strategies in younger samples than older ones, perhaps because children have less well-developed strategies that they can use to overcome their temperamental responses to stress. At this point, there is little known about how children's personality traits concurrently relate to their goals and values, however. It is also largely unknown whether children's earlier temperament traits shape the emergence of their later goals, values, and coping strategies. Al-

though I have suggested in Figure 12.1 that earlier temperament traits are likely to play a part in shaping children's later goals, values, and coping strategies, few studies have investigated whether temperament does play a role in the development of these other aspects of personality. There is also much more to learn about how children's personality differences set the stage for their changing personalities in adolescence.

Finally, I have focused throughout this chapter on the first two levels of McAdams's personality model—the individual as actor and agent. The third level—the individual as *author*—does not emerge in full form until adolescence, when youth begin to create life narratives for themselves (McAdams, 2015, 2019). Although the process of developing life narratives does not develop in full form until adolescence, children begin the process of co-narrating their experiences with their parents and other adults earlier in childhood (Fivush, Reese, & Booker, 2019); this is an important process through which children learn about themselves within their broader sociocultural context. Already by age 8, children are able to tell single-event stories (Bohn & Berntsen, 2008) and tend to pick a similar set of important life stories over a short time interval (Köber & Habermas, 2017), but it is not until the transition to adolescence that youth begin to acquire cultural life scripts that enable them to weave these stories together into more coherent life narratives (Bohn & Berntsen, 2008; Köber & Habermas, 2017) and to interpret the significance of their life stories (Pasupathi & Wainryb, 2010). Nonetheless, there is still much to learn about children's individual differences in their storytelling about their lives, even in middle childhood.

In contrast to views of middle childhood as a relatively stagnant period in personality development, the research reviewed in this chapter portrays this period of life as an especially dynamic time for development in personality traits, goals, values, and coping. Children enter the broader world in new ways in middle childhood, and researchers would do well to take notice of how children's personalities reveal themselves in this process.

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CHAPTER 13

Personality in Adolescence

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The domain of individual differences in youth has traditionally been studied by temperament researchers. *Temperament differences* were generally defined as biologically based differences in formal aspects of behavior (Strelau & Zawadzki, 2012) that are observable early in development (Thomas, Chess, Birch, Herzig, & Korn, 1963) and show a substantial rank-order stability across time (Karevold, Mathiesen, Baardstu, & Sanson, 2018; Thomas & Chess, 1977). In contrast, the term *personality* referred mainly to individual differences in behaviors, feelings, and cognitions in adulthood, resulting from the interaction between the formal characteristics of temperament with different environmental influences, crystallized into personality traits. In this conceptualization, temperament traits are seen as a starting point of a series of developmental and interactive processes with the environment (Karevold et al., 2018) that ultimately form an individual's personality, that is, how he or she perceives him- or herself (identity) or is perceived by others (reputation).

Nowadays, however, the terms *temperament* and *personality* are used more and more interchangeably (Shiner & Caspi, 2003). There is substantive evidence, for example, that personality traits are also observable

early on in development and have biological underpinnings, two defining features of temperament traits (De Fruyt & Van Leeuwen, 2014). At an operational level, items to assess temperament constructs are difficult to distinguish from those used to indicate personality traits. Finally, the dimensions put forward in models advancing a conceptual distinction between temperament traits on the one hand and character/personality traits on the other, such as Cloninger's temperament and character model (Cloninger, Svrakic, & Przybeck, 1993), were shown to have strong associations with the personality dimensions Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness of the five-factor model (FFM; De Fruyt, Van de Wiele, & Van Heeringen, 2000). Together, these multiple sources of evidence suggest that the concepts of temperament and personality have much in common, and are probably more alike than different, and that temperament is a subordinated concept of personality.

These conceptual and empirical convergences (Mervielde & Asendorpf, 2000) have been well established in the study of adolescent individual differences, in which personality traits and personality development were studied in their own right, but also in

their relationships with different forms of adaptive and more maladaptive functioning. Perspectives on individual differences, in association with environmental models of change, are extremely helpful in understanding why not all adolescents behave and develop alike, and may follow different developmental pathways. These various trajectories may lead to not only more adaptive outcomes, such as well-being, interpersonal connectedness, social-emotional skills or educational achievements, but also to more maladaptive outcomes, including different forms of psychopathology.

We begin this chapter with a brief historical review of trait research spanning pre- to late adolescence, including an overview of current knowledge on gender and age differences. This is followed by a more applied section on the significance of traits to understand various consequential outcomes in adolescence. We close the chapter with recommendations on how personality research can advance knowledge of adolescent development and functioning.

Discovering and Measuring the Big Five

Research on personality traits in adolescence is nowadays well established. Its origins go back to John Digman (1963) who was the first to demonstrate that broad personality dimensions, like the ones we know today as the Big Five (Goldberg, 1990), could be retrieved in *teacher* ratings of students as early as the first and second grade. Initially Digman (1963) used a *Q-sort* procedure with 39 items and retained way too many factors (11 factors based on only 39 items). However, in subsequent work, Digman and Inouye (1986) analyzed teachers' *Q-sort* ratings of 499 sixth-grade children on 43 scales and extracted fewer (seven) factors: Five resembled the Big Five as we now know them, namely, Introversion–Extraversion (Surgeny), Considerate and Conscientiousness (Agreeableness), Will (to Achieve), Emotional Stability, and Intellect (including also items related to Openness to Experience), whereas the two surplus factors were marginally loaded by verbal expression items or loaded by imaginative and aesthetically sensitive items, respectively. Although Dig-

man and Inouye (1986) used different labels at that time, in hindsight, clear correspondence can be noted between their “Surgeny” factor and Extraversion, “Considerate and Conscientiousness” and Agreeableness, and “Will to Achieve” and today’s Conscientiousness component; “Emotional Stability” is labeled identically in contemporary FFM research, and finally ‘Intellect’ corresponds with references to Openness to experience. It is further worth mentioning that part of the content of one of their additional factors would be nowadays classified under the Openness factor (i.e., items referring to imagination and aesthetics), whereas also the blend of Considerate and Conscientiousness can be observed in contemporary FFM research, where traits such as “respect” usually are located at the intersection of Agreeableness and Conscientiousness, creating such a blending factor.

Continued Top-Down Research

Digman’s pioneering work was followed by research of a more *top-down nature*, in which measures primarily developed for adults were, often after small modifications, used to describe personality differences in children and adolescents. John, Donahue, and Kentle (1991) carefully reviewed all the available Big Five research on youth and adults, then identified core elements shared across studies and represented this content in their Big Five Inventory (BFI) consisting of 44 short personality descriptive items that are understandable by fifth graders (John & Srivastava, 1999). Soto, John, Gosling, and Potter (2008) showed that the Big Five factor structure emerged by age 10, but only after they corrected for acquiescence.

Mervielde, Buyst, and De Fruyt (1995) proposed the Big Five Bipolaire Beoordelingschalen-25 (B5-BBS25; Mervielde, 1992) and investigated the structure and validity of teacher ratings of 4- to 12-year-olds to predict school grades. For kindergarten-age children, evidence for a four-factor structure was found, with conscientiousness and intellect/openness items blending into a single factor. When students entered primary school, however, a distinct five-factor structure emerged, with a clear split of openness and conscientiousness items. At the age that

most students are assumed to have attained school readiness, teachers distinguished a creative (openness) from a hard-working child (conscientiousness). Mervielde et al. (1995) further showed that predictive validities of the personality scales for grades increased throughout primary school.

Barbaranelli, Caprara, Rabasca, and Pastorelli (2003) revamped the adult version of their Big Five Questionnaire (BFQ; Caprara, Barbaranelli, Borgogni, & Perugini, 1993), including trait adjectives and short behavioral items applicable to describe children, into the Big Five Questionnaire—Children version (BFQ-C; Barbaranelli et al., 2003). They analyzed descriptions provided by multiple sources, including self-reports and reports from parents and teachers, and showed that four of the Big Five could be retrieved across all informant types. In line with Mervielde et al. (1995), conscientiousness was a consistent predictor of academic achievement. Externalizing problems, assessed with the Child Behavior Checklist (CBCL; Achenbach, 1991) correlated negatively with conscientiousness and emotional stability, and emotional stability was also negatively associated with internalizing problems. Finally, John, Caspi, Robins, Moffitt, and Stouthamer-Loeber (1994) developed a set of markers for the FFM relying on Block and Block's (1980) California Child Q-Set (CCQ). John et al. convincingly showed that Big Five scales could be constructed from the CCQ items, labeling these as the "Little Five" factors. They also identified two additional factors, namely, *irritable distress* and *positive activity*, which they tentatively interpreted as (1) error factors due to spurious intercorrelations among small sets of items, (2) CCQ-specific factors, through the overrepresentation of specific content, (3) facets of broader domains (e.g., neuroticism and Extraversion, respectively), or (4) factors beyond the Big Five, specific for adolescent boys. John and colleagues further examined relationships with teacher-reported school performance and IQ. Conscientiousness and Openness were almost equally correlated with performance in the areas of reading, writing, spelling and math, and only openness was correlated with verbal and performance IQ. They also examined CCQ FFM differences between boys with and without

internalizing and externalizing problems, relying on teacher CBCL ratings. Externalizing boys were less agreeable, less conscientious and more extraverted than nonexternalizing boys, paralleling findings on the same sample between those who reported delinquent acts versus those who did not report delinquency. Internalizing boys were more neurotic and less conscientious than their noninternalizing peers.

Bottom-Up Research

Additional evidence for the validity of the FFM in younger age groups came from a *bottom-up approach* toward personality description. During the mid-1990s, a group of developmental and personality psychologists teamed with temperament researchers (Kohnstamm, Halverson, Mervielde, & Havill, 1998) to examine the content and structure of parental free descriptions of children's personality. They started to collect personality descriptions of children ages 3, 6, 9, or 12 years in multiple countries, including Belgium, China, Germany, Greece, the Netherlands, Poland, and the United States. Researchers simply asked parents to describe what they found characteristic for their child, and recorded and later transcribed verbatim their answers. All personality descriptive utterances were classified in a lexical database, structured in terms of the Big Five and major temperament model categories. This database, representing the active personality descriptive language of parents, formed the starting point for the development of two inventories to assess personality of children: the Hierarchical Personality Inventory for Children (HiPIC; Mervielde & De Fruyt, 1999; Mervielde, De Fruyt, & De Clercq, 2009), constructed in the Belgian (Flemish) language domain, and the Inventory for Children's Individual Differences (ICID; Halverson et al., 2003), representing the personality descriptive language provided by American parents. In contrast with previous top-down approaches that slightly amended items so these became useful for children and adolescents, the current approach started bottom-up, without any a priori model, and tried to find the best representation of the content enclosed in what parents found characteristic of their chil-

dren. Hence, this approach formed a strong cross-cultural test for the validity of the Big Five framework applied to children of different ages.

For the construction of the HiPIC, the content of the free description database was represented in large item sets for ages 6, 9, and 12, respectively, presented to large samples of parents and teachers to rate children. Relying on these ratings, items were grouped into homogeneous item clusters and subsequently subjected to structural analyses. Given the large similarities across ages, one common inventory was proposed showing a clear five-factor structure, with higher-order factors labeled as emotional stability, extraversion, imagination, benevolence and conscientiousness (De Fruyt, Mervielde, & De Clercq, 2007). Four of these directly translate into the Big Five, with imagination covering fantasy, creativity, and intellect, whereas the benevolence factor has a much broader nature than the agreeableness factor in traditional Big Five/FFM research, also including facets such as *dominance* and *irritability*, in addition to *altruism*, *ego-centrism*, and *compliance*. In other words, benevolence reflects more the “easy versus difficult-to-handle” construct, prominent in the temperament literature (Thomas & Chess, 1977), potentially also reflecting a “manageability” bias due to working with parents or teachers as prime informants. Similar structural analyses were conducted, with the American free description material also resulting in a clear five-factor structure, with factors given labels similar to those in the FFM for adults. Together, these two free-description lines of research provided clear support for the structural validity of the Big Five model, supporting findings from previous top-down work. This, the observed structure was not a function of the item set that was provided by researchers but could be clearly retrieved from the active personality descriptive language that caregivers use to denote differences in their offspring.

An additional advantage of the free-description approach is that it also provided the opportunity to empirically derive a facet structure from the specific personality descriptive content. The issue on the optimal number and nature of facets structured under the Big Five higher-order factors was not adequately addressed at that time, and

is currently still under debate in the personality description of adults (DeYoung, Quilty, & Peterson, 2007; Soto & John, 2017). Mervielde and colleagues (Mervielde & De Fruyt, 1999; Mervielde et al., 2009) proposed 18 lower-order traits in the HiPIC that are listed in column 1 of Table 13.1. The facets proposed in the ICID are listed in column 2. It is clear that the active personality descriptors in the two language groups translate into a common set of facets (e.g., HiPIC: Anxiety matching ICID: Fearful/insecure; HiPIC: Energy with ICID: Activity level; HiPIC: Intellect with ICID: Intellect; HiPIC: Compliance with ICID: Antagonism; and HiPIC Concentration with ICID: Distractibility), with subtle differences, reflected in different facet labels or extra facets (e.g., ICID distinguishes a negative emotionality facet from Fearful/insecure and shy; whereas the HiPIC has only two neuroticism facets: anxiety and self-confidence). These divergences may reflect sampling differences, cultural differences, or rater biases. Tackett, Kushner, De Fruyt, and Mervielde (2013) empirically examined convergence between the HiPIC and the short version of the ICID (Deal, Halverson, Martin, Victor, & Baker, 2007), further examining their validity to predict internalizing and externalizing psychopathology syndromes. Since its inception, the HiPIC has been translated into different languages, including Australian English (Watt, Hopkinson, Costello, & Roodenburg, 2017), Brazilian Portuguese, Estonian (Laidra, De Fruyt, & Konstabel, 2017), French (Bouvard, Denis, & Roulin, 2015), German (Bleidorn & Ostendorf, 2009), Italian (Di Blas, d’Orlando, & Pruneddu, 2014), Japanese, Korean, Norwegian (Vollrath, Hampson, & Torgersen, 2016), Romanian (Iliescu, Dimache, & Zankirescu, 2016), and U.S. English (Tackett et al., 2013). Table 13.1 further includes a conceptual classification of the facet scales of the BFI-2 (Soto & John, 2017), matched to those of respectively the HiPIC and the ICID.

Person-Centered Research

The availability of well-designed instruments to assess personality traits in adolescence has led to a flourishing line of research on how a particular trait develops and how it

TABLE 13.1. Broad and Mid-Level Constructs of Childhood and Adolescent Personality

HiPIC	ICID	BFI-2
<u>Neuroticism</u>	<u>Neuroticism</u>	<u>Neuroticism</u>
Anxiety	Fearful/insecure	Anxiety
Self-confidence	Negative emotionality	Depression
	Shy	Volatility
<u>Extraversion</u>	<u>Extraversion</u>	<u>Extraversion</u>
Energy	Activity level	Energy
Expressiveness	Positive emotionality	Sociability
Optimism	Considerate/Sociable	Assertiveness
Shyness	Openness	
<u>Imagination</u>	<u>Openness</u>	<u>Openness</u>
Creativity	Intellect	Creative imagination
Intellect		Intellectual curiosity
Curiosity		Aesthetic sensitivity
<u>Benevolence</u>	<u>Agreeableness</u>	<u>Agreeableness</u>
Altruism	Strong willed	Compassion
Dominance	Antagonism	Trust/forgiveness
Egocentrism		Respect
Compliance		
Irritability		
<u>Conscientiousness</u>	<u>Conscientiousness</u>	<u>Conscientiousness</u>
Concentration	Distractible	Productivity
Persistence	Organized	Organization
Orderliness	Achievement orientation	Reliability
Achievement		

Note. HiPIC: Hierarchical Personality Inventory for Children (Mervielde & De Fruyt, 1999); ICID: Inventory of Child Individual Differences (Halverson et al., 2003); BFI-2: Big Five Inventory-2 (Soto & John, 2017).

advances in association with other variables such as well-being, psychopathology, and performance at school or at work. This primarily variable-oriented research stream can be supplemented by more person-oriented approaches that do not consider each trait in isolation from the others but focus on configurations of multiple traits, that is, particular sets or groupings of traits that meaningfully interact within the individual and jointly affect particular outcomes.

This is the function of personality types or, more accurately, personality *prototypes* (York & John, 1992) that group individuals into person factors depending on the similarity (or dissimilarity) of their personality profiles; each person has a loading (or similarity coefficient) on each of the putative personality prototype factors. Using the 100 items of the California Q-sort, Robins, John, Caspi,

Moffitt, and Stouthamer-Loeber (1996) discovered three major configurations of personality traits in a sample of adolescents in Pittsburgh, which were consistent with results in two other samples they considered for comparison. Most important, the same three personality prototypes were also found in several European samples, such as preschool German children (Asendorpf & van Aken, 1999) and 7- to 15-year-old Belgian youth (De Fruyt, Mervielde, & Van Leeuwen, 2002; Van Leeuwen, De Fruyt, & Mervielde, 2004), using different measures and methodological approaches.

Across studies, the *resilient* personality prototype captures adolescents with generally healthy functioning and is defined by high scores on four of the FFM dimensions when keyed in the well-adjusted direction, namely, average to high values on emotional

stability, extraversion, agreeableness, and conscientiousness. Individuals showing this personality profile tend to experience more adaptive life outcomes both in the short run (Robins et al., 1996) and in the long run (Caspi, 2000). Persons resembling the *over-controlled* trait configuration score high on neuroticism combined with lower scores on extraversion, and represent a kind of internalizing trait profile, with an increased risk for anxiety related problems later in life. Finally, individuals showing the *undercontrolled* trait profile score low on agreeableness and conscientiousness, and have an increased risk of showing conduct disorders and various externalizing problems in adolescence, and antisocial problems, violent, and dark triad behaviors as young adults (Alessandri et al., 2014; De Clercq, Rettew, Althoff, & De Bolle, 2012; Pilarska, 2018; Robins et al., 1996).

Although replicable and appealing, the person-centered approach and its resulting prototypes have had a limited impact on the development of the personality field due to multiple reasons. First, researchers preferred the more continuous Big Five constructs instead of working with categorical prototype membership to preserve predictive validity of personality. Second, the individuals assigned to a particular cluster type still demonstrate substantial variability; in other words, not every cluster member resembles the prototype equally well or to the same extent. Particularly for adolescents under development, using potentially stigmatizing categorical labels, such as over- or undercontrolled, is to be avoided. Third, and finally, both theorists and practitioners remained interested in the constituting building blocks of the prototypes, hence requiring a description of the adolescent in terms of their standing on the Big Five.

Personality Development and Sex Differences

The idea that traits are not fixed, but naturally develop through maturation and environmental influences, brought a more dynamic perspective to the psychology of individual differences. Age and sex differences have been adequately described for adults

(Costa, Terracciano, & McCrae, 2001; McCrae et al., 1999; Srivastava, John, Gosling, & Potter, 2003), but were only recently systematically and comprehensively addressed for children and adolescents.

Soto, John, Gosling, and Potter (2011) looked at patterns for age and gender in a cross-sectional sample of 1,267,218 residents of English-speaking countries who voluntarily provided personality self-descriptions on the BFI (John et al., 1991). The sample was quite diverse in terms of ethnicity, nationality, and socioeconomic status, though it was constrained to people filling out the BFI online. Age of participants ranged from 10 to 65 ($M = 25$ years, 7 months, $SD = 10$ years, 9 months). They further grouped items into two facets per domain (Soto & John, 2009) to be able to examine age and gender differences at a more fine-grained level than the broad Big Five domains, distinguishing the facets self-discipline and order for conscientiousness, altruism, and compliance for agreeableness, anxiety and depression for neuroticism, assertiveness and activity for extraversion, and ideas and aesthetics for openness to experience (Soto et al., 2011). Overall trends are considered in this review, but special consideration is given at the facet level for the age group 10–20 years.

Conscientiousness showed rather identical change patterns for males and females, with a considerable drop from ages 10 to 13–14, followed by a gradual and steep increase until young adulthood. Pronounced sex differences in conscientiousness emerged at the beginning of young adulthood, and these continued over the lifespan. Conscientiousness levels further increased throughout the lifespan. Especially scores for self-discipline showed this steep declining pattern in mid-puberty, followed by a steep increase toward young adulthood, whereas the decreasing pattern for order was less steep, and sex differences for order could be observed already across puberty, with girls being more orderly than boys. Females scored higher on agreeableness, and this personality domain showed a rather similar pattern as conscientiousness before young adulthood, with a decrease curve pointing in midpuberty, then increasing toward young adulthood, with a slower pattern of increase toward age 60. Sex differences were already there before age 20,

though they gradually increase toward age 50. Developmental patterns for altruism and compliance seem to follow this pattern, with more outspoken sex differences for altruism (with females consistently higher), already present during puberty. Neuroticism showed opposite developmental patterns for boys and girls before age 20, with a steeply increasing pattern for neuroticism in girls and a decreasing pattern for boys, showing the largest difference between genders between ages 16 and 25. Neuroticism scores of females start to decrease after age 16 and further decrease at a faster rate after their 30s. Males age 20 show the lowest neuroticism scores, followed by a slow increasing to stable levels, with an additional decrease after age 50. Anxiety followed the general pattern described for neuroticism, but depression in boys, although lower than for girls, showed an increase midpuberty, followed by an additional increasing pattern between ages 20 and 30, leveling off after age 55. For extraversion, there is a decrease from ages 10 to 15, with an outspoken sex difference at age 15, with boys lower than girls. This pattern remains largely unchanged until 50 years of age, followed by a diminishing of sex differences. The pattern for assertiveness follows the general pattern for extraversion, whereas activity level shows a sharper decreasing trend in puberty, with sex differences diminishing after age 25. Finally, openness shows a decreasing trend for females from ages 10 to 20, whereas the decrease for boys seems to occur earlier in adolescence, with a faster increase into young adulthood. Sex differences are reversed in puberty, with boys initially scoring slightly lower than girls, and showing an outspoken sex difference at age 25, lasting until age 55, with males obtaining higher levels. Females showed higher scores on aesthetics across all age groups, with the largest differences between ages 10 and 20, but also after age 50. For openness to ideas, large sex differences were manifested from midpuberty onwards, with males higher than females.

De Bolle and colleagues (2015) used a different data source: Rather than self-reports by adolescents, they examined ratings of adolescents by informants (e.g., a 16-year-old adolescent described by an adult) from 23 different cultures ($N = 4,850$) from

around the globe. Despite the different data source and sample, they largely confirmed Soto et al.'s (2011) findings, with some notable exceptions for conscientiousness. Girls between ages 12 and 17 scored consistently higher in conscientiousness than did boys in De Bolle et al.'s (2015) study. This finding, in association with their higher scores on openness, has been suggested as an explanation for girls' higher achievement, especially in secondary education (De Fruyt, Van Leeuwen, De Bolle, & De Clercq, 2008; Voyer & Voyer, 2014). De Bolle et al.'s work (2015) showed that by the end of adolescence, individuals in various cultures increasingly converge toward adult sex difference patterns in terms of both direction and magnitude.

These developmental patterns describe the normative personality trajectories that people on average tend to follow, with various possibilities for unique developmental trajectories (for a more detailed empirical account, see, e.g., Schwaba & Bleidorn, 2018). Overall, these normative trends observed in adolescence suggest that, after the dip in midadolescence, personality development moves in the direction of greater maturity. The rate of change, however, seems to be especially pronounced in childhood and adolescence, although there are cultural differences in the rate of personality development for some personality traits. It has been suggested and demonstrated that social investments, such as moving earlier into adult work roles, may serve as an accelerator of these changes (Bleidorn et al., 2013). Yet several other studies have shown that other apparent accelerator factors, such as becoming a parent, do not necessarily affect personality in the direction of greater maturity (Bleidorn et al., 2016; Bleidorn & Denissen, Chapter 14, this volume; Van Scheppingen, Denissen, Chung, Tambs, & Bleidorn, 2018; Van Scheppingen et al., 2016). Thus, future studies need to investigate further the mechanisms behind these rate fluctuations.

Personality and Consequential Outcomes

The considerable interest in personality assessment and development in adolescence has also been driven by research on the validity of traits to shape and explain conse-

quential adaptive and maladaptive outcomes (for a more extensive overview, see De Fruyt, De Clercq, & De Bolle, 2017). Consequential outcomes in adolescence can be roughly grouped in outcomes (1) at the level of the individual adolescent (e.g., well-being or happiness, social skills, self-esteem, and different forms of psychopathology), (2) outcomes describing how adolescents relate to their interpersonal environment (e.g., relationships with parents, family and peers), and finally (3) outcomes that are exhibited in more formally organized contexts, such as behavior in class or performance at school (De Fruyt, De Clercq, De Clauwé, & Verbeke, 2017).

Individual Level

There is a broad stream of research underscoring the validity of personality dimensions to explain variables at the person level, such as happiness and well-being, quality-of-life indices, social skills, and life satisfaction across development (DeNeve & Cooper, 1998; Steel, Schmidt, & Shultz, 2008). From a temperamental approach, for example, low levels of shyness in childhood predicted better social skills in late adolescence (Karevold, Ystrøm, Coplan, Sanson, & Mathiesen, 2012). In an extensive meta-analysis, Steel et al. (2008) studied links between personality measures (based on either the Big Five or Eysenck's three dimensions) and a broad set of subjective well-being indices (happiness, life satisfaction, positive affect, negative affect, overall affect, quality of life). Neuroticism (negatively) and extraversion (positively) were most strongly associated with various indicators of subjective well-being, but agreeableness, conscientiousness, and openness also showed positive relationships with well-being outcomes. Together, these personality traits explained up to 39% of the variance (63% when disattenuated for imperfect reliability), underscoring their importance to understand this individual life outcome. These meta-analytic findings also generalized to children and adolescents ages 6–16 (De Bolle, De Clercq, De Fruyt, & Benoit, 2008).

Personality traits have been further assigned a pivotal role in the understanding of adolescents' identity development. Klimstra, Luyckx, Goossens, Teppers, and De Fruyt

(2013) described the relationships between FFM traits and Luyckx, Goossens, Soenens, and Beyers's (2006) multidimensional model of identity formation, and examined what FFM traits contribute to identity formation processes. This model is an elaboration of Marcia's (1966) identity status paradigm, distinguishing five identity dimensions: *commitment making* (making choices about identity-defining life domains), *identification with commitment* (feeling confident and internalizing choices), *exploration in breadth* (searching for alternatives), *exploration in depth* (continuously reflecting on these choices), and *ruminative exploration* (individuals getting stuck in the exploration process). Conscientiousness was significantly correlated with commitment and the two adaptive exploration dimensions (with r 's between .25 and .36), whereas agreeableness was only slightly correlated with all three exploration dimensions, including ruminative exploration. Stronger associations (ranging from .20 to .35) between the exploration dimensions and openness were observed. Ruminative exploration correlated more strongly (.29) with neuroticism, and neuroticism also correlated with exploration in depth (.14) and negatively with identification with commitment. Finally, extraversion correlated positively with the first four identity dimensions, though negatively with ruminative exploration. At the FFM facet level, for example, Klimstra et al. (2013) found that the associations reported for neuroticism and exploration in depth were mainly driven by the anxiety facet, whereas four FFM neuroticism facets were related to ruminative exploration. The negative association between extraversion and ruminative exploration was mainly due to negative associations with gregariousness and assertiveness.

Personality traits are also implicated in maladaptive outcomes. There is convincing evidence that personality traits are substantially related to a broad range of psychopathologies across different developmental stages (Mathiesen, Sanson, & Karevold, 2018; Tackett, 2006). For example, De Pauw, Mervielde, Van Leeuwen, and De Clercq (2011) examined parent-rated Child Behavior Questionnaire (Putnam & Rothbart, 2006) and HiPIC ratings (Mervielde et

al., 2009) in a sample of children assessed with the Social Communication Questionnaire (Rutter, Bailey, & Pickles, 2003) to screen for autism spectrum symptoms. A comparison among 81 children classified in the low-symptom autism spectrum, with 94 children identified as having high autism spectrum symptoms, and 500 children drawn from the general population, showed that the high-symptom group scored significantly lower than the general population group on all three temperament (negative affect, surgency, and effortful control) and all five FFM dimensions, with systematically less favorable trait scores for the high-symptom group. Cohen's d effect size differences between the high-symptom versus the general population group were all between -1.22 (effortful control) and -1.91 (extraversion), with the lowest value (-0.87) for conscientiousness. In a similar vein, the trait of impulsiveness has been systematically linked to adolescents who not only risk injury to themselves or others but also to get involved in small crime activities (Pechorro, Ayala-Nunes, Ray, Nunes, & Goncalves, 2016). Likewise, the tripartite trait dimensions of positive affect, negative affect, and physiological hyperarousal have been proposed to help us understand and differentiate anxiety from depression in youth (Clark & Watson, 1991; De Bolle, Decuyper, De Clercq, & De Fruyt, 2010).

More recently, however, there was a paradigm shift from categorical clinical diagnoses, such as Axis I disorders described in the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; American Psychiatric Association, 1994), to more dimensional operationalizations of psychopathology. Especially with respect to the characterization of psychopathology in childhood and adolescence, the seminal work of Achenbach (1991) showed the importance of two conceptually distinct dimensions we discussed earlier in the section on the three major personality prototypes, namely, internalizing and externalizing pathology (Achenbach et al., 2008). Investigating the impact of emotionality, activity, and sociability (EAS) temperament traits (Buss & Plomin, 1984) in a population-based longitudinal sample of 921 Norwegian children studied from 18 months to

4.5 years, Mathiesen, Sanson, Stoolmiller, and Karevold (2009) found that high levels of child activity and emotionality predicted undercontrolled, externalizing problems in early childhood, while high levels of child emotionality and shyness and low levels of sociability predicted internalizing problems. Using the same sample at later time points, Karevold, Røysamb, Ystrøm, and Mathiesen (2009) found that higher levels of shyness and emotionality in childhood predicted increased levels of internalizing problems in early adolescence.

De Bolle, Beyers, De Clercq, and De Fruyt (2012) examined different conceptual models outlining how dimensional traits could be related to these internalizing and externalizing pathology dimensions in childhood and adolescence. In a combined sample of community ($N = 571$) and clinically referred ($N = 146$) children and adolescents, they examined the validity of continuity, pathology, and complication models to describe associations between general personality traits and changes therein, assessed with the HiPIC (De Fruyt et al., 2007), and the Internalizing and Externalizing syndrome scales of the CBCL (Achenbach, 1991). They first controlled for item overlap between the personality and psychopathology item sets. De Bolle and colleagues (2012) found strong support for the continuity model, showing dynamic change between personality and psychopathology dimensions across time. Change in emotional stability and benevolence was negatively related to change in both internalizing and externalizing syndromes, whereas change in extraversion was negatively related to change in internalizing and to a lesser extent in externalizing pathology. Changes in conscientiousness and imagination were exclusively associated with change in the externalizing dimension. Emotional stability and extraversion showed stronger continuity associations with internalizing than with externalizing problems, whereas benevolence was more negatively associated with externalizing problems than with internalizing ones. De Bolle et al. further found support for more specific *pathology effects*, that is, personality traits and change therein affecting psychopathology. Change in benevolence negatively affected change in internalizing problems. They also

observed complication model effects, with changes in externalizing problems affecting scores on benevolence, conscientiousness, and imagination, whereas changes in internalizing problems were positively related to changes in imagination, conscientiousness, and negatively related to changes in emotional stability.

The dimensional perspective on psychopathology further expedited the search for the developmental antecedents of personality disorders. This domain was almost entirely ignored in DSM-IV (De Fruyt & De Clercq, 2014). Except for antisocial personality disorder, personality disorders were only considered from the age of 18, because personality was assumed to be still under construction before reaching adulthood. Moreover, assessment psychologists wanted to be cautious and avoided using diagnostic labels with a strong negative connotation for young people. Early indicators and dimensions useful for the description of personality pathology, however, turned out to be already present before young adulthood (Cohen, Crawford, Johnson, & Kasen, 2005; De Clercq, De Fruyt, Van Leeuwen, & Mervielde, 2006; De Fruyt & De Clercq, 2014), opening a challenging research agenda for clinical psychologists to look for developmental antecedents of personality pathology in childhood and adolescence. Research by De Clercq, Hofmans, Vergauwe, De Fruyt, and Sharp (2017) used such an early-trait indicator approach in a five-wave, multi-informant investigation spanning 10 years of childhood, adolescence, and emerging adulthood to describe the dark triad traits of narcissism, Machiavellianism, and psychopathy.

Relationship Level

Personality was also studied in relation to the development of personal relationships, especially how adolescents build and maintain interpersonal relationships and networks with friends and peers. Traits such as shyness and traits from the interpersonal circumplex and the FFM have been studied in conjunction with phenomena such as loneliness. Vanhalst, Goossens, Luyckx, Scholte, and Engels (2013), for example, described five different trajectory classes in the devel-

opment of loneliness from mid- to late adolescence ($N = 389$), showing that three of the FFM dimensions assessed at age 15 helped to differentiate trajectories. Adolescents in the stable low-trajectory class were characterized by the highest levels of extraversion, agreeableness, and emotional stability. Those with chronically high levels of loneliness reported the lowest levels of agreeableness, and adolescents in the moderate decreasing-trajectory class scored lowest on extraversion and emotional stability.

Neal, Durbin, Gornik, and Lo (2017) examined in detail and through observational measures how the temperament traits of positive emotionality, negative emotionality, and effortful control of preschoolers are affected by their social interactions and peer play relationships across an entire school year. Besides rank-order stability for observations across the year, the research showed how children's traits affected their play relationships, with those exhibiting high levels of negative affectivity showing a decreased likelihood of building play relationships. Participants' positive affectivity and effortful control levels converged towards those they frequently interacted with across the year. No such codevelopment effects were observed in a Dutch study of adolescents transitioning into young adulthood by Borghuis and colleagues (2017). They analyzed seven-wave longitudinal data obtained on a sample ($N = 2,230$) from ages 12 to 22, and found no dyadic codevelopment effects with friends and siblings, which suggests that developmental personality processes tend to change independently of contacts with peers during adolescence, and that shared experiences do not necessarily have the same effects on friends and sibling personalities.

One specific type of interpersonal relationship is how adolescents interact with their parents and vice versa. How children and adolescents' (from ages 5 to 15 years) personality traits interact with parenting behavior and associates with internalizing and externalizing behaviors was extensively examined by Van Leeuwen et al. (Van Leeuwen, Mervielde, Braet, & Bosmans, 2004; Van Leeuwen, Mervielde, De Clercq, & De Fruyt, 2007) and how these associations develop over time by Prinzie and colleagues (de Haan, Deković, Van den Akker, Stoltz, &

Prinzle, 2013, following cohorts ages 9–12 years across 5 years; Prinzle et al., 2003, 2004). Adolescents' personalities showed systematic associations with specific parenting behaviors, such as positive and harsh parenting, suggesting mutual influencing effects. Both traits and parenting showed main effects explaining internalizing and externalizing outcomes, but adolescents' traits and parenting behaviors also interacted, demonstrating enhancing effects. For example, for those scoring lower on benevolence (agreeableness) and conscientiousness, harsh parenting seemed to have detrimental effects on externalizing behavior (De Clercq, Van Leeuwen, De Fruyt, Van Hiel, & Mervielde, 2008; Van Leeuwen, Mervielde, et al., 2004), whereas no such effects were observed for those with moderate to high scores on agreeableness and conscientiousness.

Finally, traits of the FFM have also been used to study bullying and describe the personalities of bullies, bullies-victims, defenders, and bystanders. De Bolle and Tackett (2013) examined maternal personality ratings of bullies and victims in a sample of 660 children (mean age = 11, $SD = 0.62$), of which 178 were classified as uninvolved, 45 were classified as pure bullies, 67 as pure victims ($N = 67$), and 23 as bully victims. Low agreeableness and low conscientiousness were both linked to not only enacting more bullying but also to being more victimized, as rated by the children themselves, their parents, and their teachers. High levels of imagination (openness) were linked to lower self- and parental ratings of bullying and to lower teacher ratings of victimization. Neuroticism (or negative emotionality) was positively related to victimization across raters, indicating that anxious adolescents are more likely to be picked on by bullies. Finally, extraversion did not show any major associations with either bullying or victimization. In summary, those low on emotional stability have an increased risk for being victimized, whereas those low on agreeableness and conscientiousness have an increased likelihood to end up as either bullies or victims (or being both bullied and bullying other children). Alonso and Romero (2017) further examined personality profiles of bullying as well as cyberbullying in a

sample of 910 adolescents ranging from ages 12 to 19. They found that all of the FFM dimensions were involved in describing differences among bullies, victims, and bully/victim groups.

Class and School

Traits not only impact upon individual level and relationship variables, but they have also been also studied in their connection to understanding school behavior, learning, and educational achievement. The meta-analytic work by Poropat (2009) has shown that all personality traits predict academic performance in primary education, with conscientiousness being predictive across primary ($\rho = .28$), secondary ($\rho = .21$) and tertiary ($\rho = .23$) education, equaling the validity of intelligence in secondary ($\rho = .24$) and tertiary ($\rho = .23$) education. Openness predicted academic achievement in primary education ($\rho = .24$), but its effect decreased by almost half in secondary ($\rho = .12$) and to near a fourth ($\rho = .07$) in tertiary education. MacCann, Lipnevich, Poropat, Wiemers, and Roberts (2015) analyzed both self- and parent-reported conscientiousness, differentiating approach-related facets (industriousness, perseverance, proactivity, task planning) and avoidance-related facets (cautiousness, control, perfectionism, tidiness) in 410 high school students. They found that parental reports of personality showed higher validities for predicting grade point average (GPA) than did self-reports, and this parental-report advantage held also for predicting school life variables such as number of club memberships, discipline infractions during the previous year, absenteeism during the previous month, holding school office, and being on the honor roll. Differences in reporting biases are explained in terms of the different types of information that adolescents and parents are relying on to make personality descriptions.

Poropat (2016) updated his meta-analysis on traits and academic performance with observer reports of personality, showing that not only observer reports on all FFM traits predicted academic performance in primary school, but also observer ratings of agreeableness (.10), emotional stability (.18) and extraversion (.05) were predictive in sec-

ondary/tertiary education. Observer-rated conscientiousness (.50) not only predicted academic achievement strongly during primary school but also observer-rated openness (.43); in secondary/tertiary education, validities were lower though still substantial, with values of .38 for conscientiousness and .28 for openness to experience. Therefore, observer ratings also show validity to predict academic performance, though whether they predict beyond self-ratings remains a subject for further investigation.

During the previous decade, there has been growing attention for personality traits as building blocks for social-emotional competencies or skills (also called 21st-century skills) in students (John & De Fruyt, 2015; Kankaras, 2017). Primi, Santos, John, and De Fruyt (2016) analyzed the items of a series of measures that were frequently used to assess social-emotional skills in elementary or secondary school students and demonstrated that their content could be classified according to the broad dimensions of the FFM. Abrahams et al. (2019) discussed how the FFM facilitated the construction of social-emotional skills frameworks and brought useful knowledge from the field of developmental personality psychology to education to enhance our understanding of the development of social-emotional skills. Chernyschenko, Kankaras, and Drasgow (2018) and Abrahams et al. (2019) recently proposed more elaborate frameworks, building on the FFM, distinguishing a more-fine-grained set of skills. In these models, personality traits function as social-emotional resources that directly affect students' performance at school (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Taylor, Oberle, Durlak, & Weissberg, 2017), but are also considered as important outcomes of education themselves that students need to develop.

New Directions

We have stressed in this review that the field of personality research in adolescence has made rapid progress during the past decade and has attracted considerable attention from multiple applied fields such as clinical psychology, forensic practice, and educa-

tion. The field is now moving toward a more dynamic approach to personality, considering not only stable elements but also the propensity of traits to change (Specht et al., 2014). This switch marks the start of innovative research to examine how personality matures and is affected, in conjunction with how traits affect consequential outcomes. Especially the notion of malleability of traits has attracted the interest of a broad group of researchers and practitioners, with adolescence and young adulthood identified as sensitive periods of change.

Today we know the importance of personality constructs for understanding how students achieve at school (Borghans, Duckworth, Heckman, & ter Weel, 2008; Cunha, Heckman, & Schennach, 2010; Heckman, Stixrud, & Urzua, 2006), how young adults approach the labor market (De Fruyt & Mervielde, 1999), how people navigate and built their careers and are affected, in turn, by those experiences (Wille & De Fruyt, 2014; Wille, Hofmans, Feys, & De Fruyt, 2014; Woods, Lievens, De Fruyt, & Wille, 2013), how people become happy in their personal lives, and how traits contribute to explaining mental disorders (Laceulle, Ormel, Vollebergh, van Aken, & Nederhof, 2014). It is likely that this more dynamic view of youth-personality will continue to benefit further from research innovations and methodologies increasingly used in adult personality research. Two clear and promising advances are already well-established in studies of adults: (1) the renewed interest in person-situation interactions and (2) the study of within-person variability over time. However, these two advances still need to be transferred to the study of personality differences in adolescence.

First, the study of the development of personality in the past suffered from the lack of an agreed-upon *taxonomy of situations* to examine trait-environment interactions. So far, researchers have mainly examined the impact of more easy-to-get and demographic-type characteristics of personality, such as growing up in a single-parent family and being first or last in sibling birth order (Jefferson, Herbst, & McCrae, 1998). In addition, researchers have also investigated the impact of behaviors of significant others on personality development, such as

parenting (Van Leeuwen et al., 2007), or relationships with peers (Borghuis et al., 2017). Although this research has flourished, there is no consensus on a model describing the psychologically meaningful characteristics of environments.

More recently, however, independent research groups have started to examine the defining characteristics of environments to be in a better position to study trait–situation transactions. There is now starting convergence on situational models such as the Situational Eight DIAMONDS (Rauthmann et al., 2014) or CAPTION (Parrigon, Woo, Tay, & Wang, 2017) models that may help to identify psychological attributes that in association with trait-based characteristics may advance our understanding of how development occurs and influences important outcomes in life. The DIAMONDS model distinguishes eight dimensions to describe situation perceptions: Duty, Intellect, Adversity, Mating, pOsitivity, Negativity, Deception, and Sociability. The CAPTION model includes seven: Complexity, Adversity, Positive Valence, Typicality, Importance, humOr, and Negative Valence. More recently, Rauthmann and Sherman (2018) reported convergent correlations between .47 and .69 for five replicable dimensions across the two models: I. Negative Valence (CAPTION) versus Adversity (DIAMONDS); II. Adversity (CAPTION) versus Negativity (DIAMONDS); III. Importance (CAPTION) versus Duty (DIAMONDS); IV: Complexity (CAPTION) versus Intellect (DIAMONDS); and V. Positive Valence (DIAMONDS) versus pOsitivity (CAPTION). Including short measures of these situational characteristics in longitudinal research on personality, and especially during adolescence, is likely to enrich our knowledge on how personality traits develop.

A second innovation that is likely to impact personality studies in adolescence is the study of *within-individual trait variability*. Until a decade ago, research on personality variability was almost exclusively oriented toward the investigation of between-person differences (Fleeson & Jayawickreme, 2015; Jayawickreme, Zachry, & Fleeson, 2019). Nowadays, it is also clear that in addition to between-individual differences, there are also substantial and important differences

within the person, that is, how the individual is changing or fluctuating feelings, thoughts, and behaviors during the day, also called *personality states*. This kind of variability has been largely ignored in previous research and has typically been treated as error—that is, in personality assessment, researchers usually aggregate scores across different items, using this aggregate (typically a mean) as an indicator of the trait. Variation in responses across individual items (or over time) is not used. This practice has been quickly changing in the study of traits in adults, which typically demonstrate that half of the variance is situated within the person (Debuscher, Hofmans, & De Fruyt, 2016; Minbashian & Luppino, 2014). These innovative methodologies have also quickly found their way to the study of personality pathology given that core features of the borderline personality disorder, for example, have a substantial within-person affective dynamic.

The study of within-individual trait variability in adolescents, using experience-sampling designs or alternative item response theory (IRT)-based methods to delineate trait variance within the person from Likert-based assessments conducted at a single moment in time (Lang, Lievens, De Fruyt, Zettler, & Tackett, 2019), will dramatically change our thinking about personality in adolescence. Questions at stake are how within-person variability in traits develops across time, how much of the variance is within the person relative to between-person differences, what are the determinants of within-personal variability, and finally how such within-person variability connects to outcomes that matter for adolescents, ranging from quality of life to educational achievement. The increasing possibilities provided by different forms of ambulatory assessments (Carpenter, Wycoff, & Trull, 2016; Trull & Ebner-Priemer, 2013; see also Mehl & Wrzus, Chapter 39, this volume) will dramatically advance our knowledge on the within-person dynamics of personality over short periods. Wearable electronic devices, for example, may on a daily basis directly register activity level and record neurophysiological indicators of personality constructs, whereas cameras and/or audio devices may capture random samples

of the environments in which adolescents act and behave. As in the study of adult personality, it is to be expected that investigating interactions with the environment and within-person variability will add a more dynamic perspective to personality research in adolescence.

In summary, this review has made clear that the field of personality research in adolescence is flourishing and has promising prospects. We have shown that traits play a major role in the explanation of important outcomes throughout life, making this field of study attractive for researchers and policymakers interested in real-world consequences and outcomes. Personality constructs have been found to be partly stable, but we know today that they also show changes in terms of normative development, as well as individual development, as a considerable number of individuals deviate from the general normative patterns and follow their unique developmental paths. Further understanding of these individual developmental trajectories is a key challenge for the entire field of individual differences.

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CHAPTER 14

Personality and Life Transitions in Young Adulthood

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For most individuals, young adulthood is an exciting time. It is a time of exploration and profound changes, some of which have lasting consequences for the remainder of their lives. Young adulthood—perhaps more than any other stage in life—is also a time of personality change. The direction of change is generally positive. Most young adults increase in traits that reflect greater social maturity, improved interpersonal functioning, and openness to experience (Bleidorn, 2015; Bleidorn & Hopwood, 2019; Roberts & Nickel, Chapter 11, this volume). The pronounced changes in personality during young adulthood have led to a great deal of speculation about the conditions and causes of these changes. Why do personality traits change more in young adulthood than in any other period of life? Why do most young adults change in the direction of greater psychological maturity, while some fail to conform to this trend?

While virtually all major theories of personality development emphasize the importance of genetic influences, they differ in the role given to environmental influences and life experiences. Current theories of personality development stress the importance of age-graded life transitions, such as graduating from school, marrying, or becoming a

parent, over and above genetic maturation processes (Bleidorn, Hopwood, & Lucas, 2018; Denissen, Luhmann, Chung, & Bleidorn, 2019; Hutteman, Hennecke, Orth, Reitz, & Specht, 2014; Kandler, Bleidorn, Riemann, Angleitner, & Spinath, 2012; Roberts & Nickel, Chapter 11, this volume). These life transitions presumably impact personality, because they are often associated with shifts in social roles and relationships. As such, these transitions could modify, interrupt, or redirect life trajectories by altering individuals' feelings, thoughts, and behavior (Orth & Robins, 2014; Pickles & Rutter, 1991). For example, the birth of the first child is a life transition that often requires sudden and dramatic changes in individuals' daily behavior, routines, and relationships, which, over time, may translate into personality trait changes (Belsky & Rovine, 1990; Bleidorn et al., 2016; Jokela, Kivimäki, Elovainio, & Keltikangas-Järvinen, 2009; Van Scheppingen, Denissen, Chung, Tambs, & Bleidorn, 2018).

In this chapter, we review the current state of scientific evidence regarding the impact of major life transitions on personality change in young adulthood. Our review focuses on the Big Five personality trait domains of neuroticism, extraversion, open-

ness to experience, agreeableness, and conscientiousness, which represent an optimal balance between conceptual breadth, descriptive fidelity, and generalizability across samples and measures (John, Chapter 2, this volume).

We begin by reviewing the literature on personality trait stability and change in young adulthood. We next discuss findings from longitudinal studies that have investigated whether and to what degree personality traits change in response to major life transitions in the domains of love and work. Specifically, we focus on studies that have examined either of three life transitions that normatively occur during the period of young adulthood: the first romantic relationship, graduation from school/college, and parenthood. Before reviewing these studies, we first define life transitions and propose a general model to explain why and how these life events may impact personality traits. We conclude by outlining important areas for future research on personality change in young adulthood.

Personality Trait Stability and Change in Young Adulthood

Most studies on personality development have focused in two indices of change: rank-order stability and mean-level change (for reviews, see Bleidorn & Hopwood, 2019; Roberts & Nickel, Chapter 11, this volume; Specht et al., 2014). *Rank-order stability* refers to the relative ordering of individuals in a population over time, commonly quantified as a test–retest correlation (r) across two assessment waves. One robust finding to emerge from this literature is that the rank-order stability of personality traits increases during young adulthood. Specifically, meta-analytic findings suggest that the rank-order stability of personality traits increases from $r = .51$ at age 18 to $r = .62$ at age 39 (Roberts & DelVecchio, 2000). These results seem to hold for men and women, and across different assessment methods and trait domains. More recent large-scale longitudinal studies and meta-analyses have replicated this finding across different samples, measures, and cohorts (Briley & Tucker-Drob, 2014; Ferguson, 2010; Lucas & Donnellan, 2011;

Specht, Egloff, & Schmuckle, 2011). The increase in rank-order stability has at least two important implications for personality development theories. First, the rank-order stability of all Big Five traits is far from perfect, implying that personality traits are generally open to rank-order change during young adulthood. Second, the overall trend toward more stability is consistent with the increasing influence of stabilizing environments on personality traits (e.g., stable social roles, stable living environments) over the course of young adulthood (Briley & Tucker-Drob, 2014).

Mean-level change reflects the degree to which a population decreases or increases in a personality trait over a specific period, typically quantified as a standardized mean difference between two time points (e.g., Cohen's d). Numerous longitudinal studies have investigated the degree and shape of personality mean-level changes in young adulthood. These studies converge on the finding that young adults experience substantial normative gains in those Big Five domains that mark greater social maturity. Specifically, the average young adult shows increases in emotional stability, conscientiousness, and agreeableness (Roberts et al., 2006). These mean-level trends generalize across cohorts, genders, and, to some extent, different cultures (Bleidorn et al., 2013; Roberts & Nickel, Chapter 11, this volume; Wortman, Lucas, & Donnellan, 2012). Alluding to young adults' seemingly increasing capacity to become productive contributors to society, this pattern has been labeled the *maturity principle* of personality development (Roberts & Mroczek, 2008).

Less consistent results have been reported for mean-level changes in openness to experience and extraversion. Depending on the study, these traits have been found to increase (Neyer & Lehnart, 2007; Roberts, Walton, & Viechtbauer, 2006; Schwaba, Robins, Grijalva, & Bleidorn, 2019), or decrease (Wortman et al., 2012), or show little or no change across young adulthood (Lucas & Donnellan, 2011; Schwaba, Luhmann, Denissen, Chung, & Bleidorn, 2018; Specht et al., 2011). One potential explanation for this mixed pattern of results is that different facets of extraversion and openness show distinct developmental patterns. Supporting

this hypothesis, the social vitality facet of extraversion increases during emerging adulthood (between ages 18 and 22), followed by decreases during middle and late adulthood, whereas the social dominance facet of extraversion shows gradual increases until age 40 (Roberts et al., 2006).

In summary, personality traits undergo systematic mean-level changes during young adulthood. The most robust trends are normative gains in emotional stability, agreeableness, and conscientiousness. These changes are consistent with the idea that individuals develop a more socially mature personality profile as they navigate the developmental tasks and life transitions that characterize young adulthood. In what follows, we provide a more formal definition of life transitions and present a general framework to explain how life transitions may lead to changes in different personality traits.

Life Transitions and Personality Development

Life transitions can be defined as “time-discrete transitions that mark the beginning or the end of a specific status” (Luhmann, Hofmann, Eid, & Lucas, 2012, p. 594), with *status* referring to a certain position, rank, role, or condition. The transition from one status to another usually requires new behavioral, cognitive, or emotional responses. Theory and research suggests that those life transitions that involve clearly defined and unambiguous sets of behavioral, cognitive, or emotional demands are most likely to lead to enduring personality changes (Caspi & Moffitt, 1993; Kandler et al., 2012; Luhmann, Fassbender, Alock, & Haehner, 2020; Neyer, Mund, Zimmermann, & Wrzus, 2014; Roberts & Jackson, 2008; Specht et al., 2011).

For example, the transition to a committed romantic relationship usually requires certain behavioral changes, such as making plans and coordinating one’s daily life with one’s partner’s schedule. In these respects, people are required to act conscientiously in a serious partnership. To the extent that the transition to a committed relationship indeed leads to changes in a person’s conscientiousness-related thoughts, feelings,

and behavior, and to the extent that these changes are stable and generalizable to other life domains, they should translate into broader and lasting trait changes.

The idea that life transitions affect personality traits in a bottom-up fashion through prolonged effects on an individual’s momentary feelings, thoughts, and behavior is consistent with the sociogenomic model of personality (Roberts & Jackson, 2008) and has important implications for the time course of personality trait change (Geukes, van Zalk, & Back, 2018). Specifically, to the extent that the behavioral, cognitive, and affective changes in response to life transitions unfold in a slow and incremental way, personality trait changes should unfold over relatively long periods. In contrast, if life transitions lead to abrupt and immediate changes in individuals’ behavioral, thoughts, and feelings, we would expect sudden personality trait changes that unfold over shorter time periods.

In recent years, several longitudinal studies have examined whether personality traits change during major life transitions. We next review the literature on Big Five personality trait change in response to four major life transitions in the domains of love and work that normatively occur during the period of young adulthood: the first romantic relationship, parenthood, graduation from school/college, and the first job.

The First Romantic Relationship

Several longitudinal studies have examined the impact of romantic relationships on Big Five personality trait change in young adulthood (for a review, see Bleidorn et al., 2018). These studies have typically compared the personality trajectories of young adults who entered a romantic relationship with the personality trajectories of individuals who were single and remained so throughout the study period. In an early study, Neyer and Asendorpf (2001) used data from a representative sample of German young adults (ages 18–30 years) who completed both personality and relationship measures at two measurement occasions across 4 years. They found that young adults who entered a romantic relationship for the first time showed more pronounced decreases in neuroticism and increases in extraversion and conscientious-

ness than participants who remained single across the study period.

Neyer and Lehnart (2007) followed up on and extended this study by using the same sample to examine the effects of the first romantic relationship on personality change across three measurement waves over 8 years. The inclusion of a third measurement wave allowed them to compare personality trait changes among four different groups of young adults: stable singles (participants who remained single across 8 years), early beginners (participants who were in stable romantic relationship across the 8-year research period), timely beginners (participants who entered into a romantic relationship between the first two measurement occasions), and late beginners (participants who entered into a romantic relationship between the last two measurement occasions). With one exception, the results were largely similar to the findings by Neyer and Asendorpf (2001). Early, timely, and late beginners showed decreases in neuroticism and increases in extraversion after they entered into a serious romantic relationship, whereas stable singles remained stable on these traits throughout the 8-year period. Notably, the effects of relationship formation on conscientiousness did not replicate in the group of late beginners.

The effect of romantic relationship formation on neuroticism was replicated in another 8-year study with participants from the United States. The study was comparable in terms of longitudinal design and age group but focused on changes in neuroticism only (Lehnart, Neyer, & Eccles, 2010). Compared to stable singles, young adults who entered a romantic relationship for the first time showed decreases in facets of neuroticism such as depression and social anxiety.

A potential limitation of the studies by Neyer and colleagues (and research on life transitions in general) concerns the problem that random assignment of participants to different life transitions or no transitions is usually not feasible or ethical. People typically select themselves into certain relationships, roles, and environments. In other words, the experience (or nonexperience) of most life transitions may reflect selection effects. Consequently, putative effects of the life transitions are confounded with preexisting group differences (Foster, 2010). For instance, singles and individuals who enter

a relationship have been found to differ in a number of demographic and psychological characteristics, including their personality traits (e.g., Neyer & Lehnart, 2007). To the degree that these preexisting group differences drive the observed differences in personality trait change, causal interpretations of romantic relationship effects on trait change would be compromised.

Wagner, Becker, Lüdtke, and Trautwein (2015) aimed to address this problem by providing a more rigorous test of the effects of the first partnership experience on personality change. Specifically, they used propensity score matching techniques (Rosenbaum & Rubin, 1983; Thoemmes & Kim, 2011) to integrate the information on observed covariates to create matched samples. These samples differed statistically only with regard to the experience of the particular life transition of interest. Using matched samples and 4-year longitudinal data, the results of this study only partially replicated the findings of previous research on the impact of the transition to the first romantic relationship on personality change. Specifically, the first partnership experience was related to higher extraversion and conscientiousness and to lower neuroticism only in participants who had their first partnership experience between ages 23 and 25, but not in participants who established their first partnership between ages 21 and 23.

In addition to research on personality change in the context of romantic relationship transitions, a handful of longitudinal studies has examined whether marriage stimulates changes in newlyweds' personality traits. For example, Neyer and Asendorpf (2001) compared the personality trait changes of unmarried participants who were in a romantic relationship ($N = 176$) with those who got married ($N = 67$) during the 4-year research period. This study found no differences between married participants and participants in a romantic relationship.

Specht and colleagues (2011) addressed the question whether marriage is related to personality change in a large-scale nationally representative longitudinal study. Using two-wave longitudinal data, they compared Big Five trait changes in married participants ($N = 664$) with those in participants who did not get married during the 4-year research period ($N = \sim 14,000$). They found that in-

dividuals who got married tended to show more pronounced decreases in extraversion and openness to experience as compared to those participants who did not get married during the research period. However, this study did not distinguish between first and later marriages, leaving it open as to what degree the transition to the *first* marriage drove the observed results.

More recently, Denissen and colleagues (2019) analyzed six waves of Big Five personality data collected in a nationally representative longitudinal study of Dutch adults to examine selection, anticipation (i.e., changes before the event) and socialization (i.e., changes after the event) effects of various life events including marriage. This study found several selection effects, suggesting that people who were high in conscientiousness and emotional stability and low in openness were more likely to enter marriage. However, this study found no evidence for change in any of the Big Five traits before or after the transition to a marital relationship.

In summary, longitudinal research on romantic relationships and personality trait change has frequently, but not always, indicated that the transition to the first committed romantic relationship is associated with decreases in neuroticism. Less frequently, studies indicated that entering a serious romantic relationship is associated with increases in extraversion. Across all studies, the effect sizes of partnership formation on personality traits ranged around $r = .20$. Perhaps surprising given the societal and individual importance attributed to this event, evidence concerning the effects of marriage on personality change is mixed. Indeed, recent high-powered studies with multiple assessment waves before and after the transition to marriage suggest that this life event has little impact on personality traits.

Parenthood

The transition to parenthood has been viewed as a particularly consequential turning point in young adulthood that likely triggers enduring changes in new parents' personality traits (e.g., Bleidorn, 2015; Bleidorn et al., 2018; Hutteman, Bleidorn, et al., 2014; Van Scheppingen et al., 2016; van Scheppingen, Denissen, & Bleidorn, 2019). The birth of a child is typically associated

with sudden and oftentimes intense changes in new parents' behavior, thoughts, and feelings, which may translate into both abrupt and continuous changes in their personality (Bleidorn et al., 2016).

To evaluate whether the birth of the first child triggers personality changes in young adulthood, Jokela et al. (2009) examined whether the transition to parenthood was related to changes in sociability (a facet of extraversion) and emotionality (a facet of neuroticism) across two waves in finish sample of 1,839 young adults. They found that emotionality remained relatively stable in young adults who had no children during the 9-year research period but increased in participants who had one ($d = 0.14$) or more children ($d = 0.20$). While there was no main effect of parenthood on changes in sociability, there was a three-way interaction among gender, baseline sociability, and number of children, suggesting that having children predicted increased sociability in men with high baseline sociability ($d \sim 0.30$) and decreased sociability in men with low sociability at baseline ($d \sim -0.40$). To the degree that it replicates in other samples, this finding would suggest that having a child can accentuate individual differences in sociability, leading extraverted people to become even more extraverted, and introverted people to become even more introverted.

Using data from a nationally representative longitudinal study of German adults, Specht et al. (2011) found that both men and women decreased in conscientiousness after the birth of a child compared to individuals who did not have children during the study period. This finding (recently replicated by Denissen et al. [2019]) is puzzling, because normative life transitions have been theorized to produce increases (not decreases) in conscientiousness. Moreover, the observed decrease in conscientiousness runs counter to the well-documented normative increase in conscientiousness in young adulthood. One possible explanation for this finding may be that even those parents who raise their conscientiousness to meet the demands of parenthood may not actually perceive themselves as being more conscientious, because their lives does not feel any more organized, orderly, disciplined.

Consistent with this hypothesis, Van Scheppingen et al. (2019) found decreases in

self-control during the transition to parenthood. Specifically, using prospective four-wave data from 539 Dutch young adults, they compared mean-level changes in self-control as reported by first-time parents ($n = 246$) to participants without children ($n = 293$). Although parents reported higher levels of self-control before birth, especially mothers underwent significant decreases in self-control. Moreover, pregnancy-related stress was associated with lower self-control levels during pregnancy in both first-time mothers and first-time fathers.

Like marriage and other normative life transitions, the birth of a child is not a random event. In all modern Western societies, the birth of a child is usually a planned event and reflects an individual choice. This implies that putative socialization effects of childbirth are likely confounded with selection effects (i.e., the choice to have a child). In fact, parents and individuals without children differ systematically in a large number of socioeconomic, social, and psychological characteristics, including their personality traits (Hutteman, Bleidorn, Penke, & Denissen, 2013; Jokela et al., 2009; Jokela, Alvergne, Pollet, & Lummaa, 2011). To statistically account for these selection effects, Van Scheppingen et al. (2016) used propensity score matching techniques and two-wave longitudinal data from a representative Australian panel study (HILDA) to compare personality trait changes in first-time parents and nonparents across a 4-year period. Before using propensity score matching, parents differed significantly from nonparents with regard to change in extraversion and conscientiousness. Consistent with previous studies (Specht et al., 2011), the unmatched results indicated that parents but not nonparents decreased in these two traits. However, after using propensity score matching, the differences between parents' and nonparents' trait changes were no longer significant, suggesting that some of the observed differences may be due to selection rather than socialization processes.

In summary, research on personality change during the transition to parenthood has yielded mixed results. Some researchers found positive changes, as indicated by increases in new fathers' extraversion (Jokela et al., 2009); others found negative change, as indicated by decreases in traits related to

conscientiousness (Specht et al., 2011; Van Scheppingen et al., 2019); and still others found no differences between new parents and nonparents (Van Scheppingen et al., 2016). Thus, although the transition to parenthood is one of the most salient life transitions in young adulthood, few studies indicate strong support for robust associations between this transition and maturation in personality traits.

Graduation from School and College

Graduation from some form of schooling is an almost universal life event during the transition from late adolescence to young adulthood. The experience of attending and graduating from school and/or college has been theorized to be particularly relevant for changes in young adults' conscientiousness and openness to experience (e.g., Bleidorn & Schwaba, 2017; Lüdtke, Roberts, Trautwein, & Nagy, 2011).

To examine the impact of high school attendance and graduation on personality change, Bleidorn (2012) examined a sample of German high school students in a longitudinal design with three assessment waves. Specifically, this study compared the personality trait changes in 360 high school seniors over three assessment waves before and after graduation with those observed in a comparison group of 550 high school juniors. Despite a very short observation period of only 1 year, this study revealed significant mean-level changes in different Big Five traits. Senior students experienced significant increases in conscientiousness ($d = 0.34$), agreeableness ($d = 0.24$), and openness ($d = 0.25$), and to a lesser degree also decreases in neuroticism ($d = -0.07$). Notably, these trait changes were most pronounced during the first two assessments before and immediately after graduation. The subsample of juniors who completed all measurements while still enrolled in high school showed significantly less pronounced increases in conscientiousness ($d = 0.20$) and openness ($d = 0.22$) than seniors and no changes in agreeableness and neuroticism.

A further result of this study was that, compared to their classmates, those senior students who invested more time and effort in studying showed more pronounced increases in conscientiousness and openness

and more pronounced decreases in neuroticism. This finding provided some evidence for the sociogenomic model of personality (Roberts & Jackson, 2008) and other bottom-up approaches to personality development (e.g., Geukes et al., 2018; Hennecke, Bleidorn, Denissen, & Wood, 2014) that promote the view that personality change is likely initiated by behavioral changes, typically in response to transitional changes or in pursuit of goals.

Entering university might be associated with additional gains in personality maturity. Lüdtke et al. (2011) followed German students ($N \sim 2,000$) from high school to university, vocational training, or work. They found significant mean-level changes in students' Big Five traits. Specifically, students who graduated from high school showed increases in openness ($d = 0.20$), agreeableness ($d = 0.32$), and conscientiousness ($d = 0.32$), and decreases in neuroticism ($d = -0.27$). Moreover, they found that young adults' life paths after graduation from school were distinctively associated with their personality trajectories. Individuals who chose a vocationally oriented path increased in conscientiousness at a faster rate than their peers who attended university. In contrast, young adults on the vocational path showed less pronounced increases in agreeableness than those attending university. The specific links between different life paths and changes in different trait domains may reflect the idiosyncratic nature of the cognitive, affective, and behavioral experiences associated with these different life transitions. For example, young adults who take a vocational track may face a more disciplined schedule that requires them to act more conscientiously. Conversely, students who attend college and university may face fewer demands to become more conscientious, at least compared with those transitioning to the first job.

In summary, longitudinal research indicates that attending and/or transitioning from school to university or vocational tracks is related to personality maturation in the form of increases in openness, agreeableness, and conscientiousness, and decreases in neuroticism. These changes seem to occur over relatively short time periods and show distinct relations to particular behaviors and experiences during and after graduation from school.

The First Job

Several studies have demonstrated that work experiences, such as job satisfaction, job demands, or work investment, correlate with personality trait changes and that these associations are particularly strong for conscientiousness (e.g., Hudson, Roberts, & Lodi-Smith, 2012). However, few studies have examined whether and how personality traits change during the transition to the first job. Specht et al. (2011) found that young adults who entered the labor market for the first time ($N = 456$) show more pronounced increases in conscientiousness than individuals who did not enter the labor market over a period of 4 years ($r \sim .20$). There were no effects on any of the other four Big Five traits.

Nieß and Zacher (2015) examined whether the transition to a managerial or professional position may be associated with personality trait changes. Specifically, using data from a nationally representative Australian panel study, they compared the Big Five trajectories of individuals who made an upward job change into managerial or professional positions ($N = 247$) with those of employed individuals who did not make such a change (i.e., those who remained in nonmanagerial and nonprofessional positions; $N = 1,710$). They found that, across 4 years, individuals who experienced upward job changes scored significantly higher in openness than participants who did not experience such changes ($d = 0.21$) but not in any of the other Big Five traits.

Using six-wave nationally representative data of the Netherlands, Denissen and colleagues (2019) examined selection, anticipation, and socialization effects associated with the transition to the first job. They found selection effects indicating that people with higher scores in conscientiousness and emotional stability were more likely to end up in paid employment. Moreover, in anticipation of paid employment, people tended to increase in conscientiousness and openness to experience. However, there were no socializing effects of the transition into paid employment on changes in personality traits.

In summary, only a few studies have examined the impact of job transitions on Big Five personality trait change. The current state of research suggests that the transition

to the first job may be most clearly related to changes conscientiousness and openness to experience.

Summary: Life Transitions and Personality Change in Young Adulthood

The current state of research allows for tentative conclusions concerning the impact life transitions on personality change in young adulthood. Only a handful of prospective studies have investigated the impact of life transitions on Big Five trait change in young adulthood, and most of these studies included only few personality assessments. The transitions to the first romantic relationship (decreased neuroticism and increased extraversion) and from school to college/work (increased agreeableness, conscientiousness, and openness, and decreased neuroticism) appear to positively influence young adults' personality. Consistent with the observation that personality traits are most open to change in young adulthood (Bleidorn, 2015; Lucas & Donnellan, 2011; Roberts & Nickel, Chapter 11, this volume), these life transitions seem to trigger personality trait changes in the direction of greater psychological maturity.

Life transitions in the love and work domains may have a relatively strong influence on young adults' personalities, because they are normative and relatively universal experiences in Western societies (Bleidorn et al., 2013; Rindfuss, 1991). In contrast to other non-normative or less scripted life events (e.g., unemployment), graduation from school, the first job, and the first romantic partnership may be characterized by transparent behavioral scripts, relatively clear affective reactions, and cognitive demands. For example, behavioral and cognitive demands associated with graduation from school include being task- and goal-directed, organized, delaying gratification, and following prescribed norms. To the extent that these behaviors can be translated into trait terms (e.g., increases in conscientiousness), attending and graduating from school should form a strong reward structure for personality trait change (Roberts & Wood, 2006).

Perhaps surprisingly, research on the transition to parenthood and personality change provided results that are more mixed. The

transition to parenthood is one of the most salient normative life events in young adulthood that comes with highly scripted behavioral expectations. However, few studies have found strong evidence for an association between this transition and maturation in personality traits. The lack of clear evidence for or against the hypothesis that parenthood is associated with positive personality change may be partly due to limitations of previous study designs. It might also be that parenthood is less scripted and normative than previously considered. For example, people may differ in both their parenting goals and values and their engagement in the parent role. Moreover, the personality of the child might shape the degree to which the transition to parenthood leads to personality trait change in young adults (Jokela, 2010). In other words, the transition to parenthood may not produce normative change in personality, but it may lead to idiosyncratic trajectories that depend on the role-specific experiences that new parents encounter. A more general conclusion to emerge from this mixed pattern of results is that we need to gain a better understanding of the processes of personality change to isolate the conditions under which major life transitions may or may not lead to change in personality traits.

Processes of Personality Change during Life Transitions

More research at the interface of life transitions and personality trait change is needed to understand when and how life transitions may lead to change in personality traits (Bleidorn, Hill, et al., 2019). In particular, a better understanding of the preconditions, mediators, and moderators of personality trait change during major life transitions is required to predict when and how traits change in the context of transitional experiences.

Preconditions of Personality Change

Hennecke et al. (2014) outlined a three-part framework to understand the preconditions of self-regulated personality change in adulthood. The first precondition is that change must be a goal for the individual. Such a goal

can be a result of direct social “press” from the outside environment (e.g., in school, teachers enforce students’ silence during lectures). However, the adoption of goals might also be more indirect, for example, when individuals gradually internalize social roles related to a life transition (e.g., how to be a good parent). This might even happen before a life transition has occurred, in the sense of anticipatory goal setting (Roberts, O’Donnell, & Robins, 2004).

A second precondition outlined by Hennecke et al. (2014) is that the new behaviors, thoughts, and feelings associated with personality change are feasible. This feasibility has both an objective (a behavior that is impossible will not occur) and a subjective (a behavior that is deemed too difficult by the individual will be unlikely to occur) component. Adjustment to a new role can require a complex set of new behavioral, affective, and cognitive responses, some of which might be more feasible than others. For example, when entering the job market, an individual needs to learn to get up on time, take care of the proper business attire, navigate social interactions with colleagues and supervisors, keep track of relevant professional developments, and so forth. In addition, there might be industry-specific expectations (e.g., acting very friendly is expected of waiters but not of bouncers) (Denissen, Ulferts, Lüdtke, Muck, & Gerstorf, 2014). Individuals might differ in their ability to perform these different behaviors in response to a major life transition.

A third precondition of Hennecke et al. (2014) is that cognitive, affective, and behavioral changes need to become habitual to become part of personality. Such habituation processes can occur as an automatization of correlated behaviors that are related to one particular goal or expectation. For example, when entering the job market, an individual could try to meet the goal of “acting in a professional manner” by interacting politely, courteously, and confidently with customers. Over time, the behaviors necessary to implement this goal will become increasingly effortless and no longer require a conscious level of goal access. In such a situation, merely entering the building in which one works might be sufficient to trigger the once-conscious goal and its associated behaviors (cf. Custers & Aarts, 2010).

Mediators of Personality Change

Modern theories of personality development have emphasized the role of momentary behavioral, cognitive, and affective changes as mediators of personality trait change (Geukes et al., 2018). For example, sociogenomic personality theory (Roberts & Jackson, 2008) proposes that continuous changes in individuals’ affective, cognitive, and behavioral states can translate into subsequent personality trait changes. In a somewhat similar vein, Fleeson (2001) has argued that personality traits are density distributions of states, and that the frequent display of event-correlated behaviors (e.g., caring for one’s children) might over time become perceived as trait relevant (e.g., a caring person). Wrzus and Roberts (2017) have proposed a general framework of personality trait change that attributes long-term personality development to repeated short-term sequences of triggering situations, expectancies, states, and reactions through associative and reflective processes.

To better understand how behavioral, cognitive, and affective short-term processes are linked to long-term changes in personality traits, longitudinal designs including frequent assessments of states and traits would be needed that assess personality traits longitudinally as well as the relevant short-term processes repeatedly during the experience of major life transitions (Geukes et al., 2018). To illustrate, in a longitudinal study on self-esteem development during an academic exchange year, Hutteman, Nestler, Wagner, Egloff, and Back (2015) attempted such a design to examine the impact of short-term state changes on long-term trait changes in a sample of German university students. They found that increases in state self-esteem during an academic exchange year predicted differential changes in trait self-esteem over 1 year and that the experience of greater social inclusion prospectively predicted higher state self-esteem and vice versa. Presumably, social inclusion and social activities during the academic exchange year triggered changes in state self-esteem, which in turn led to changes in individuals’ trait self-esteem. Similar research designs are needed to gain more knowledge about the short-term processes during major life transitions and their

distinctive effects on long-term changes in different personality traits.

Moderators of Personality Change

Various accounts of personality development have stressed the role of moderators of personality change in the context of major life transitions. According to Caspi and Moffitt (1993), a life transition's impact on personality change is likely moderated by the degree to which (1) previous behavior is discouraged and (2) clear information on how to behave is provided. Surprisingly little is known about these moderating variables, and much of current theorizing appears rather speculative. For example, it is possible that past behavior (e.g., partying a lot) would be discouraged after the birth of a child. However, the extent to which this behavior will be discouraged likely differs between individuals because of different social norms or personal circumstances (e.g., if parents can afford a babysitter, they might occasionally go to parties). Moreover, to the extent that there are no clear and unambiguous normative scripts for appropriate responses, changes associated with a life transition might accentuate existing individual differences rather than triggering changes in personality traits (Caspi & Moffitt, 1993).

According to social investment theory (Roberts, Wood, & Smith, 2005), another important moderator of personality change concerns the degree to which the individual actively endorses the changes associated with a life transition. In particular, social investment theory proposes that personality change resulting from role transitions is most likely to occur if an individual psychologically commits to the role in question. For example, whereas parenthood might generally be perceived as favorable for many individuals, some individuals might be less committed to the parent role and might perceive the associated demands and challenges as an involuntary burden (e.g., in case of unwanted pregnancies). Researchers should therefore more actively investigate the quality of the life transition, and whether it is perceived negatively or positively, as a possible proxy for commitment (Lodi-Smith & Roberts, 2007).

Implications for Future Research on Life Transitions and Personality Change

In this chapter, we have discussed the findings of longitudinal research on life transitions and personality trait change in young adulthood. These studies yielded mixed and sometimes conflicting results concerning the nature and direction of personality trait change in response to different life transitions in young adulthood. The somewhat inconclusive nature of the current state of research may be partly explained by the scope and methods of previous studies, many of which were not explicitly designed to examine personality change in response to major life transitions (Bleidorn et al., 2020). In view of both the recent accomplishments and the existing constraints of previous research, we conclude with several recommendations and open questions for future research on personality change and life transitions in young adulthood.

First, most previous studies were restricted by two-wave designs, which limit the analyses to linear change models. In the case of many life transitions, however, nonlinear or discontinuous change models might be more suited to describe how change in personality traits unfolds before, during, and after a life transition (Luhmann, Orth, Specht, Kandler, & Lucas, 2014; Schwaba & Bleidorn, 2019). These models require longitudinal data with more than three measurement occasions, a requirement that has been rarely met in previous research on life transitions and personality trait change.

Second, a key question concerns the timing of personality trait change during major life transitions (Luhmann et al., 2014). Change in personality traits may already have occurred before the initiation of a major life transition. For example, the critical affective, behavioral, and cognitive changes associated with parenthood may occur long before the actual birth of a child. Forming the decision to have a baby or experiences during pregnancy may potentially have a stronger influence on young adults' personalities than the responsibilities of parenthood (but see Van Scheppingen et al., 2016). Other life transitions may have delayed effects on personality traits that unfold in a slow or incremental way. If

behavioral, cognitive, and affective changes associated with a life transition occur in an incremental way, then we would expect personality trait changes to unfold over longer periods following the transitional experience. Consequently, longitudinal studies that begin shortly before a transition and include only one or few follow-ups after the transition may mistake preevent changes for stable preexisting differences and/or fail to detect temporally delayed effects. To detect possible pre- and postevent changes and to locate critical periods of change surrounding a transition, prospective studies are needed that measure personality multiple times before, during, and after a major life transition.

Third, because experimental designs are not feasible, researchers must rely on other research designs that use additional pieces of information to test personality trait change in response to life transitions, while ruling out potential confounds. Recently, researchers have begun to include matched control groups that did not experience the life transition of interest (e.g., Wagner et al., 2015; Van Scheppingen et al., 2016). These designs allow researchers to account for the confounding influence of *measured* control variables. A particularly well-matched control group that would allow researchers to also control for *unmeasured* influences would consist of monozygotic twin siblings. Monozygotic twins share both a common genotype and a similar rearing environment. Hence, longitudinal co-twin control studies on monozygotic twins who are discordant on exposure to certain life transitions would combine the advantages of observational studies and experimental designs, because monozygotic twins are matched on a multitude of known and unknown potential confounding factors, including their genetic background (McGue, Osler, & Christensen, 2010). Strong support for the effect of life transitions on personality trait change would thus be provided by a prospective co-twin control study showing that monozygotic twins who differ in the timing of specific life transitions also differ in their personality trajectories.

Fourth, in most studies, personality traits were assessed with self-reports, which may be prone to biases that distort conclusions regarding the impact of life events on person-

ality trait change. Multimethod approaches using informant reports, behavioral data, or other kinds of assessments would enrich research on life events and personality trait change. Discontinuities in the patterns observed across assessment methods might also be illuminating (Bornstein, 2012). Also, as outlined previously, experience-sampling or event-sampling designs have rarely been used to study personality trait change during the experience of major life transitions (Wrzus & Roberts, 2017). These approaches, while often still relying on self-report, have the advantage of illuminating the underlying short-term processes of personality trait change as they occur during the experience of life transitions (Fleeson & Jolley, 2006; Wrzus & Roberts, 2017).

Fifth, as mentioned earlier, the vast majority of studies has examined the impact of life transitions on rank-order change or mean-level change in personality traits. These two types of change describe changes in individual personality traits at the population level. However, changes at the population level may not always reflect changes at the individual level. In particular, more research is needed to understand when and how (1) individuals deviate from the general population trends (i.e., individual-level change) and (2) how the configuration of traits within an individual changes (i.e., ipsative personality change) in response to a specific life transition (Robins, Fraley, Roberts, & Trzesniewski, 2001).

Sixth, large sample sizes are needed to detect the presumably small effects of life transitions on personality trait change. Many previous studies compared relatively small subsamples of participants who had or had not undergone a particular life transition. Until replicated in larger samples, the results of these studies should be interpreted with caution. Moreover, virtually all previous studies on personality trait change have examined samples from the United States or other Western, educated, industrialized, rich, and democratic (WEIRD; Henrich, Heine, & Norenzayan, 2010) nations. A systematic longitudinal examination of personality trait change and life transitions across a large and diverse set of cultures has yet to be undertaken. Such an analysis is needed to test whether the reported effects of life transitions on personality traits represent cross-cultural uni-

versals or culture-specific phenomena (Henrich et al., 2010). Moreover, a cross-cultural examination can provide important information about universal and culture-specific mechanisms that might drive changes in personality (Bleidorn et al., 2013).

Seventh, we have focused in this chapter on the broad Big Five domains. Personality involves more concepts than these broad traits. Possible discontinuities in stability and change at narrower levels of the personality hierarchy merit closer examination. Developmental patterns of other important aspects of personality, such as goals, interests, values, problems, or narratives, are less well understood than patterns of traits, and deserve greater attention.

Conclusion

The current state of research provides some evidence that major life transitions in young adulthood can lead to changes in Big Five personality traits. The most consistent findings emerge for the transition to the first romantic relationship and the transition from school to college/work, both of which have been found to be related to positive personality trait changes. However, a more general conclusion emerging from our review of past research is that evidence for the nature, shape, and timing of personality trait change in response to life events is still at a preliminary stage. Future work should use multimethod assessments across multiple waves in large samples, with designs capable of ruling out potential confounds and uncovering underlying processes of change. We hope that this chapter inspires new longitudinal research that uses such designs to illuminate how personality trait change in young adulthood occurs in the context of major life transitions.

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CHAPTER 15

Personality Development in Adulthood and Later Life

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Clyde Kluckhohn and Henry Murray's (Kluckhohn, Murray, & Schneider, 1953, p. 358; we take note of the outdated sexist language of the 1950s) famous maxim about personality (we are all "like all men, like some other men, like no other man") essentially argues for a general level of similarity, a middle level, and a specific or idiosyncratic level where there is little similarity. The course of personality development in adulthood can be described in parallel terms. Personality trajectories, whether they track traits or other aspects of personality (personal action constructs, life narratives, etc.; McAdams, 2015) are manifested at these three tiers of similarity. First, there is a general, overall population-level trajectory that describes the movement of a personality construct across all people. Second, there are trajectories specific to a given subgroup. These "middle trajectories" can correspond to a country, a demographic group, or a sample or study. Often, they diverge from the overall (population) trajectory, and in multistudy analyses, it is frequently observed that there is a great deal of variation in these sample-level trajectories (e.g., Gra-

ham et al., 2020). Third and last, there are personality trajectories at the level of the individual. Within any study or sample, these are captured by estimates of individual variation in level (intercept) and rate of change (slope) and, theoretically, illustrate the lifespan principle of individual differences in intraindividual change (Baltes, 1987; Mueller, Wagner, & Gerstorf, 2017). The Kluckhohn et al. (1953) idea of individual differences being organized around a (1) general or population level, (2) a subgroup level, and (3) an individual level can inform how we think about personality development in adulthood.

Hence, we use this concept of nested trajectories as an overarching organizational theme in this chapter. In the following pages, we first describe our own three-level framework of personality trajectories (population, subgroup, individual), describing methodological issues that touch on the ability to estimate high-quality trajectories, replicability of trajectories, and the notion of heterogeneity in trajectories over subgroups. We then summarize the empirical evidence regarding personality change in adulthood,

emphasizing empirical advances that are change- or trajectory-oriented. With respect to the former, we describe recent efforts to predict trajectories, focusing on naturally occurring factors (life or health events, social role changes), as another chapter in this handbook addresses interventional or volitional factors that bring about change in personality (Chapter 38, this volume; see also Roberts et al., 2017). Then, we flip the outcome variable and describe efforts that used personality change to predict other outcomes later in life (Allemand, Job, & Mroczek, 2019; Steiger, Allemand, Robins, & Fend, 2013; Mroczek & Spiro, 2007; Allemand & Flückiger, 2017). We end by describing several theoretical advances in adult personality development since publication of the previous handbook.

It may seem strange that we relegate theory to the end, when most authors would lead off with it. However, we feel the empirical work in this area is of such high quality that it makes sense to place it first. Leading off with data and considering theory afterward also permits a better sense of what theoretical notions align most closely with current empirical knowledge. We are particularly sensitive to the latter, for the recent replication crisis in psychology (Simmons, Nelson, & Simonsohn, 2018) has highlighted the danger of theory getting too far out ahead of data. When everyone has a theory and most of those theories are based on one or two underpowered studies, and when additional theory is built on top of this sparse edifice, a shaky house of cards is inevitably the result. This dismal state of affairs luckily does not characterize the area of adult personality development, in large part due to a long-term emphasis on longitudinal studies with large sample sizes and an appreciation of appropriate and sophisticated modeling techniques. Theory in this area tends to be well-grounded in data. It is still useful, however, to be on guard for theoretical overstepping. Constant comparison of the best available data with the most current theory, with frequent expunging of theory that does not match empirical knowledge, is necessary for keeping the area of personality development rigorous, robust, and replicable.

That said, trajectory models are not as easily carried out as correlation coefficients

between two measurement occasions (assessing rank-order stability) or comparisons of means over time (assessing mean-level stability). Data and modeling requirements are more considerable when estimating trajectories. This has made such models less widespread and presents challenges with regard to replicability of findings. In the next section, we address these methodological and replicability issues.

Three Levels of Trajectories

To estimate individual trajectories, multiple waves of data are needed, along with use of an appropriate modeling technique, such as latent growth curves or the multilevel model for change. Once multiple waves are available for a given personality characteristic, it is easy to imagine fitting a line or curve to the various time points, especially for a given person. Person *A* has a certain pattern, and his or her own intraindividual curve; person *B* has a different pattern, and thus a differently shaped curve. Each individual in a sample or population has his or her own trajectory for that personality characteristic. This leads to the first and bottom level of our own three-tier framework, that of the individual trajectory. For any personality characteristic, everyone has his or her own unique trajectory defined by level (intercept), rate of change (linear slope), and curvature (quadratic slope, cubic slope, and beyond). For a given personality characteristic, picture 7.7 billion of these trajectories for each person alive in the world at present. Imagining this gargantuan plot of unique curves allows us to grasp another powerful phenomenon in personality development research, one that is also a cornerstone of lifespan developmental theory (Baltes, 1987). This is the concept of individual differences in intraindividual trajectories. Evoking Murray and Kluckhohn, Oliver's trajectory is like no other person's trajectory.

Imagine a second level, representing a grouping of trajectories. The individual-person-level trajectories can be averaged into a group-level trajectory. Picture trajectories for particular subgroups, such as extraversion trajectories of women, neuroticism trajectories of adolescents, or conscientiousness

trajectories of Australians. In empirical research, these higher-level trajectories often represent different samples. When placed alongside one another, they can tell us if samples that are similar in other ways but simply contain different people show the same pattern of personality change. In this sense they can address issues of replicability and reproducibility (Condon, Graham, & Mroczek, 2017; Graham et al., 2017; Graham et al., 2020). Longitudinal studies are not amenable to quick replication. One cannot simply read an original study that itself may have required only a few weeks of data collection, then reel off a replication in a short period of time. This is impossible for longitudinal studies with duration of 20 or 30 years (longer in some case; the Terman sample was followed from the 1920s to the late 1990s by three generations of researchers; Friedman et al., 1993). Moreover, a second study “does not a replication make.” With a minimum of four possible results for any hypothesis—incorrectly rejecting the null (type 1 error), correctly rejecting the null, incorrectly retaining the null (type 2 error), and correctly retaining the null—two studies seems quite inadequate.

However, at this interesting middle level of group- or sample-level trajectories lies a potential solution to the vexing issue of replication in longitudinal studies. Coordinated analysis is a novel methodological approach designed to enhance replicability (Hofer & Piccinin, 2009), especially with respect to longitudinal research questions. It is a form of multistudy design that carries out identical (or near identical) modeling of a given research question within multiple (not just two or three) existing studies, then synthesizes and integrates these models using meta-analytic tools such as forest plots, summary effect sizes, heterogeneity statistics, and so forth. This form of separate, but coordinated, modeling within a set of studies is a type of integrative data analysis (IDA; Curran & Hussong, 2009) and produces a group of replications that otherwise would be very difficult to obtain due to the inconvenience nature of long-term longitudinal samples. In some cases, 15–30 studies can be included in such an IDA (Graham et al., 2017; van den Berg et al., 2014). Returning to our tra-

jectories theme, we can imagine an array of sample-level trajectories of a given trait that either heavily overlap with one another or are heterogeneous. In the former, different samples are congruent, indicating robust trajectories that appear regardless of sample. In the latter, sample-level trajectories vary from each other (heterogeneity), indicating possible substantive or methodological differences among samples. In either case, they can be illuminating. Heterogeneous trajectories across samples (or even well-defined subgroups; e.g., ethnic categories, age strata, or gender) raise the possibility that personality change may look different for some people versus others, and that a particular form of change (e.g., declining neuroticism) may not hold for all groups, just as it does not hold for all individuals. As Kluckhohn et al. (1953) would put it, Oliver is like some other people.

Last, at a very high level, we can imagine metatrajectories that define personality change (or stability, if the curve is flat) for a given characteristic for an entire population. At this macro level, we can picture a world population metatrajectory for generativity or agreeableness. Many people are not described well by the metatrajectory. Even many samples and groups may diverge quite a bit from the metatrajectory (Graham et al., 2020). Practically, there is no way to measure everybody in the world anyway, and even measuring everyone in a given country is unrealistic. Yet there is a metatrajectory for each of these large groups, even if there is no practical way of directly measuring it, and some people will track the population meta-trajectory fairly well. However, it is here that Kluckhohn et al. (1953) metaphor breaks down. Those whose personal trajectories overlie neatly with a metatrajectory can be thought of as being “like all other people.” Yet can the metatrajectory really be said to describe all people? Not quite. It abstracts a population in the way the arithmetic mean characterizes a population or subgroup. It says nothing about the variation around it, and as individual differences researchers, we have an acute understanding that arithmetic means are limited in usefulness. Nonetheless, the idea of a metatrajectory is still a valuable one.

Empirical Work on Personality Development in Adulthood

Speculating about world or national meta trajectories of personality is splendid academic fun, but all of the empirical work is at the two lower tiers of our framework: person-level and sample-level trajectories. What does that work tell us? Since the turn of the millennium, there have been a number of studies utilizing Big Five traits that have used some form of trajectory model (latent growth or multilevel change models), and all have identified individual differences in not only level but also rates of change (Kandler, Kornadt, Hagemeyer, & Neyer, 2015; Mroczek & Spiro, 2003; Terraciano, Costa, & McCrae, 2006), illustrating the bottom tier of our framework: person-level trajectories. In addition, the middle tier of the framework, sample-level trajectories, illustrated by many researchers, have either plotted means over different ages (Bleidorn et al., 2013; Robins, Fraley, Roberts, & Trzeszniewski, 2001) or carried out longitudinal multilevel modeling (MLM) or latent growth models to estimate sample-level trajectories. These researchers have found that during emerging adulthood and midlife, agreeableness, conscientiousness, openness, and extraversion tend to increase, and neuroticism tends to decrease (Jones & Meredith, 1996; Lucas & Donnellan, 2011; Marsh, Nagengast, & Morin, 2013; Roberts & Mroczek, 2008; Roberts, Walton, & Viechtbauer, 2006; Terraciano, McCrae, Brant & Costa, 2005; Vaidya, Gray, Haig, Mroczek, & Watson, 2008). Interestingly, Srivastava, John, Gosling, and Potter (2003) largely found these same patterns, but identified evidence for accelerations (e.g., agreeableness) or decelerations (e.g., conscientiousness) in different segments of early adulthood.

After midlife, these overall trajectories shift somewhat, with various studies showing decreases in all of the Big Five traits (Berg & Johansson, 2014; Asendorpf, Denissen, & van Aken, 2008; Kandler et al., 2015; Lucas & Donnellan, 2011; Möttus, Johnson, & Deary, 2012; Roberts & Mroczek, 2008; Terraciano et al., 2006; Wagner, Ram, Smith, & Gerstorf, 2016). These findings imply curvilinearity over the course of

adulthood, with many traits undergoing two distinct bends in the lifespan curve. Early adult increases and late life decreases are also consistent with two theoretical perspectives we discuss below (the maturity principle and the selective optimization and compensation effect; Roberts, Wood, & Caspi, 2008; Kandler et al., 2015; Mueller et al., 2016; Marsh et al., 2013).

These findings also align with the most comprehensive meta-analysis of mean-level change in traits (Roberts et al., 2006), which indicated that certain traits (e.g., openness and conscientiousness) do seem to show a lifespan curvilinear effect, with peak at midlife or, in some cases, a quadratic effect in which increases decelerate or even flatten in older adulthood. The empirical work on traits seems to argue for increases in the earlier part of adulthood, perhaps followed by midlife stability, but then decreases in older adulthood (Specht et al., 2014).

Outside of the personality trait domain, there are fewer examples of trajectory models, with the most notable exceptions in the areas of life satisfaction (Mroczek & Spiro, 2005), affect (Charles, Reynolds, & Gatz, 2001; Griffin, Mroczek, & Spiro, 2006; Orth, Robins, & Soto, 2010), and self-esteem (Orth & Robins, 2014; Mund & Neyer, 2016; Trzeszniewski, Donnellan, & Robins, 2003; Wagner, Lüdtke, Jonkman, & Trautwein, 2013). Most other types of personality variables—coping styles, narrative constructs, goal striving, preferences and interests—have not been studied in a long-term longitudinal manner in adulthood, with studies that obtain multiple measurement occasions. This will likely be corrected in the coming years with the use of online, device-based data collection methods lowering the cost of expensive longitudinal research designs.

In addition, the coming years are likely to see new trajectory models of personality trait facets. There have been remarkably few such studies, with Jackson et al. (2009) being one of the few (they evaluated change in conscientiousness facets). The Big Five has had a good run and will still play a central role in personality development research, but there is growing recognition that a finer-grained set of subtraits (facets, nuances,

items) is needed (Condon, 2014; McCrae, 2015; Möttus, 2016; Soto & John, 2017). Broad bandwidth traits such as the Big Five can sometimes be clumsy when predicting specific outcomes. A new interest in facets is growing. We do not know much about how lower-bandwidth constructs change in adulthood, as only one major trajectory (growth curve) investigation has been published (Bleidorn, Kandler, Riemann, Angleitner, & Spinath, 2009). Many more studies of facet change will be required in the future.

Note that in discussing the empirical literature on personality change, we did not mention studies of rank-order stability at all. Such work is typically considered a key component of the body of work on personality development in adulthood (e.g., Roberts & DelVecchio, 2000). However, we believe the longitudinal correlation coefficient, or stability coefficient, which is the main tool researchers have used for evaluating rank-order (or relative) stability, has perhaps outlived its usefulness. We say this because of two inherent flaws. First, they make use of only two measurement occasions at a time. Second, correlations conceal any individual differences in change. With so many extant datasets with multiple waves, and the availability of sophisticated modeling techniques that maximize use of many waves (MLM, latent growth), it may be time to retire the stability coefficient, along with the concept of rank-order stability.

Naturally Occurring Predictors of Personality Change

Earlier we discussed individual differences in change, noting that it is consistent with a fundamental tenet of lifespan developmental theory. However, it is important in another way. Evidence of variation in rate or direction of personality change opens the door to prediction and explanation of those individual differences. If everyone changes at the same rate (or if everyone is stable), then there is no need to identify factors that account for change.

The existence of individual variation in personality change has spurred the rise of many research programs worldwide that have attempted to account for these individ-

uals differences. What are the factors that predict personality change? The majority of these studies have focused on naturally occurring factors (noninterventional, non-pharmacological), such as stressful events, life transitions, social roles, and changes in roles. This, along with a greater understanding of intervention-based personality change, has been one of the most significant developments since the previous handbook (for intervention-based change, see Jackson et al., Chapter 38, this volume; see also Bleidorn et al., 2019). There had been some early attempts around the turn of the millennium that looked at early adult (Neyer & Asendorpf, 2001; Robins, Caspi, & Moffitt 2002), and older adult (Mroczek & Spiro, 2003) relationship changes as predictors of subsequent trait change. Entering a romantic relationship was associated with decline in neuroticism in the former study, whereas experiencing the death of spouse was associated with increases in neuroticism in the latter study (but remarriage was related to a decline in that trait). More recently, due to greater availability of personality studies with multiple measurement occasions, a richer examination of predictors has blossomed.

A plurality of these investigations has focused on social and romantic relationships as the central predictors. For example, following Neyer and Asendorpf (2001), Neyer and Lehnart (2007) found that entering a romantic relationship for the first time was associated with decreases in neuroticism, a finding that was later replicated (Lehnart, Neyer, & Eccles, 2010). Peer relationships also influence personality changes (Reitz, Zimmermann, Hutteman, Specht, & Neyer, 2014), and Mund and Neyer (2014) have found both romantic and peer relationships, as well as changes in those relationships, are associated with trait changes (see also Neyer, Mund, Zimmermann & Wrzus, 2014).

Work and career-oriented predictors have formed another major effort at personality change prediction. Lüdtke, Roberts, Trautwein, and Nagy (2011) found that vocational career paths are associated with greater increases in conscientiousness and a less steep increase in agreeableness than university-oriented career paths. Jackson, Thoemmes, Jonkman, Lüdtke, & Traut-

wein (2012) documented long-lasting (negative) changes in agreeableness after military training, arguably a unique form of work experience. Greater investment in career and work also seems to be associated with personality changes, particularly growth in conscientiousness (Hudson, Roberts & Lodi-Smith, 2012).

A third line of research has focused on life events and life transitions as predictors of subsequent personality change. These have identified a host of factors related to personality change, ranging from cultural activity (predicting openness; Schwaba, Luhmann, Denissen, Chung, & Bleidorn, 2018) to positive and negative life events (Ludtke et al., 2011), to transitions of various types, such as high school graduation (Bleidorn, 2012), retirement (Löckenhoff, Terraciano, & Costa, 2009; Schwaba & Bleidorn, 2019; Specht et al., 2011), and becoming a parent (Jokela, Kivimäki, Elovainio, & Keltikangas-Järvinen, 2009; Specht et al., 2011).

However, each of these three lines of research on predictors of personality change is replete with null findings (Bleidorn, Hopwood, & Lucas, 2018). For example, Mroczek and Spiro (2003), in contrast to Schwaba and Bleidorn (2019), did not find retirement to be associated with trait change. Specht et al. (2011) examined a variety of life events, finding only limited effects on trait change, with conscientiousness having the strongest associations with life events.

There certainly appears to be more than reasonable evidence for various external factors driving personality change, with relationships perhaps exerting the strongest effects. Yet there are reasons to believe that the picture is far more complicated than these findings suggest. We point to three bodies of literature.

First, longitudinal twin designs, a small number of studies have offered evidence that genetic factors are a key driver of individual differences in personality change (Bleidorn et al., 2009; Blonigen, Hicks, Krueger, Patrick, & Iacano, 2006; McGue, Bacon, & Lykken, 1993), and that these genetic effects are often larger than environmental effects (Kandler, Bleidorn, Riemann, Angleitner, & Spinath, 2012). The extent to which we experience trait change may have its source

within us, in our inherited biology, and only partly sourced to our relationships with other people or the external events that pepper our lives.

Second, a handful of studies has demonstrated transactional or bidirectional relationships between personality traits and many other kinds of variables, some of which are regularly considered outcomes or endpoints. Jackson (2011) discovered that conscientiousness and academic engagement reinforce each other in a transactional manner, such that increases in conscientiousness lead to increases in academic behaviors (studying, going to class), which in turn lead to further increases in conscientiousness, which lead to even further increases in academic behavior. Essentially, a bidirectional relationship operated, making the real determinant of personality change much less clear—or academic behavior change for that matter. Which was the predictor, and which was the outcome? The picture is blurred, calling into question our traditional beliefs of what is causal and what is caused, and what is internal to the person and what is external. Lest we take this line of reasoning toward *argumentum ad absurdum*, there are obviously some outcomes that are true endpoints, such as divorce, disease onset, and mortality. However, many variables related to personality are ones that continually change over the lifespan or segments of the lifespan: health status, relationship and work success, cognitive functioning, happiness and life satisfaction, and so forth. These variables comprise the most likely candidates for entry into bidirectional (or tridirectional, or multidirectional) feedback loops with personality, thereby making opaque the predictor–outcome association.

Since Jackson (2011), other researchers have provided evidence consistent with personality-related bidirectionality in the domains of work experiences (Le, Donnellan, & Conger, 2014), living arrangements (Jonkman, Thoemmes, Ludtke, & Trautwein, 2014), relationships (Mund & Neyer, 2014; Robins et al., 2002) and life events (Denissen, Luhmann, Chung, & Bleidorn, 2019; Kandler, Zimmermann, & McAdams, 2014). Additional work has shown that even changes among traits (as well as cognitive ability) can be subject to bidirectional pro-

cesses, which means that change in one trait can lead to changes in others traits, feeding back on the first trait (Klimstra, Bleidorn, Asendorpf, van Aken, & Denissen, 2013). These correlated change models or coupled change models, sometimes estimated with autoregressive latent trajectory (ALT) or autoregressive crosslagged (ARCL) models (Allemand, Zimprich, & Martin, 2008; Bollen & Curran, 2004), can help establish evidence of bidirectionality, as well as other relevant concepts such as the “corresponsive principle” (Roberts & Wood, 2006) which holds that people’s personality traits lead them to seek out experiences that reinforce those very traits.

As we argued earlier, these ideas and bodies of evidence may require us to give up traditional notions of causality. These traditional notions may not model reality very well. Discarding them is probably good, for psychology is far too infused with simplistic ideas of stimulus–cause relationships. Both bidirectionality and “corresponsiveness” (Roberts & Wood, 2006) imply ongoing feedback loops in which cause and effect are impossible to disentangle (this is often how “transactional processes” are described in the developmental literature), as we noted earlier. That said, most bidirectional processes probably have some sort of beginning, and thus a distal “cause.” Yet once a process is set into motion, feedback loops take over, and traditional causality is very difficult to determine. This is likely how many developmental processes work. It is also very far away from the simplistic independent variable–dependent variable mindset espoused in much of the rest of psychology.

Third, the very idea of a clean separation between the internal (e.g., personality traits, genes) and external (life events, relationships) is false. Recent work in epigenetics (Petrone, 2010) promotes the notion that genes and environments are entwined in complicated ways. Environmental factors can activate genetic factors (e.g., methylation), but, importantly, genetic factors as manifested in phenotypic expressions (e.g., personality) can shape and select the environments in which we later find ourselves (Roberts et al., 2008; Caspi & Shiner, 2008). Extraverts choose to go to parties. Introverts choose to stay home. Contexts do not just happen to

us. People are highly active agents who select themselves into situations, mold contexts, and create new environments (Bell, 1968). Roberts et al. (2008) echoed this view, noting that people’s personality characteristics are “evocative,” leading to construction of new contexts to suit one’s gregarious or shyness, whichever the case. In turn, these contexts often reinforce existing trait levels, as shown by Jackson (2011).

What does this mean for the study of predictors of personality change? These three—genetic factors underlying some portion of personality change, bidirectional processes between personality and context, and the person as an active agent—would seem to limit the appeal of searching for predictors of personality change. If a certain factor, say, a relationship variable, predicts personality change, we are justified in then asking how prior personality influenced the entry into that relationship in the first place. We might also ask how relationship and personality variables may influence each other in a transactional or bidirectional fashion. Last, we may question how largely that predictor influences personality change relative to genetic factors. It would seem that the search for predictors is ultimately a circular task, due to personality effects on many contextual predictors prior to the assessment of the “predictor.” However, we end this section by encouraging the continued study of personality change predictors.

Even if there are strong personality-based selection effects on the environments, groups, and relationships in which we find ourselves, those contexts still retain a considerable degree of independence from the person. Yes, our profile of personality characteristics may play a big role in our selection of whom we choose in a romantic partnership, but it does not mean that we fully control what that other person does. The other actor is still a different organism and is part of an abstract “external” context. He or she can and will do things that are far out of our control, and we in turn are shaped by these uncontrollable circumstances. This is perhaps best seen when individuals become parents. Even though parents share a great deal with their children, they are independent beings and have the power to shape parents in ways they do not expect. Children evoke

behaviors in parents in ways that are often unexpected. Other events, such as natural disasters and wars, present an even greater challenge to the ability of individual personality traits to shape contexts. As Abraham Lincoln (2001) said in 1864, “I claim not to have controlled events, but confess plainly that events have controlled me.”

Lest we sound like radical behaviorists, we reiterate that the weight of the evidence shows that personality characteristics play a major role in the selection of people into contexts, how they behave once they are in in such contexts, and how they ultimately change or grow as a result of being in a given context (e.g., Jackson, 2011; Kandler, Zimmermann, & McAdams, 2014). Yet the context retains some independence from the person, too. Thus, it remains useful for personality development researchers to continue carrying out studies of predictors of personality change.

Personality Change as a Predictor

Does change in personality itself predict outcomes we care about (Mroczek, Spiro, Griffin, & Neupert, 2006)? This is more than an academic question given the importance of personality traits for a considerable array of consequential life outcomes, such as earnings and net worth, relationship success, educational attainment, health, and longevity (Allemand et al., 2019; Allemand & Flückiger, 2017; Ozer & Benet-Martinez, 2006). Much of the interest in interventions is driven by the possibility of altering these personality-predicted outcomes.

A small number of researchers has looked at naturally occurring personality change and used that change as a predictor, in and of itself, of later outcomes. Such a study requires a unique longitudinal design (Mroczek et al., 2006). Enough measurement occasions on a personality characteristics on the front end are needed to carry out trajectory models (latent growth or multilevel change). Then, outcome measurement needs to occur after all or most of the personality measurement occasions. It is often desirable to have least some temporal separation between the end of all or most individual trajectories and the occurrence of the outcome (which can

happen at different times and ages for different people). Given these requirements, it is not surprising that there are very few studies of personality change as a predictor, but there are some. Mroczek and Spiro (2007) documented that MLM-estimated changes in neuroticism, but not extraversion, were predictive of mortality risk over an 18-year period (increasing neuroticism predicted earlier mortality). Steiger et al. (2014) found that decreasing self-esteem in adolescence predicts depression in midadulthood, and Allemand et al. (2019) found that increases in self-control in adolescence are related to better work and interpersonal outcomes in middle adulthood. Although this chapter focuses on adulthood, one additional study is worth mentioning. Hampson, Tildesley, Andrews, Luyckx, and Mroczek (2010) found that increasing rates of growth in childhood hostility predicted substance use in midadolescence.

Other investigations have made use of two-occasion studies. Turiano et al. (2012) found that increases in agreeableness, extraversion, and conscientiousness over 10 years were predictive of later self-rated health, and that increases in conscientiousness were additionally related to few days lost to work due to physical health reasons. Magee, Heaven, and Miller (2013) found that increases in extraversion and conscientiousness were related to better physical and mental health, and increases in neuroticism were associated with worse physical health. These two-occasion studies do not estimate change as well as multiple-occasions studies, but often pre- and posttreatment data are all that is available. Nevertheless, these studies supplement the others with several occasions to provide an initial fragment of evidence that personality change is associated with outcomes, sometimes distal outcomes.

Of course, the bidirectional issues we discussed earlier must be considered again. To what extent was the mental health outcome in Magee et al. (2013) already “set in motion” before the two assessments of personality even occurred? As novel as it was, Magee et al. may simply have caught a section of a bidirectional process that was already in place beforehand, and would remain so afterward.

This is another reason why studies with an outcome representing a clear endpoint (onset of substance use: Hampson et al., 2010; mortality: Mroczek & Spiro, 2007) can help sort out causal direction, as we mentioned earlier. Studies of personality change may benefit in particular from use of a clear endogenous variable, as it strengthens the argument that the personality change that preceded it played some role in the outcome actually being triggered.

Recent Theory in Adult Personality Development

We end where most other authors begin. However, it is useful to assess what the data say first, before considering theory. This is especially true at present, when many large-scale longitudinal datasets have finally accrued multiple waves of measurement, permitting better data-based inquiries than were possible in years past. Yet the last decade has been a period of fertile theorizing as well.

Perhaps the most prominent conceptual framework to emerge in last 10–15 years is the neo-socioanalytic theory (Roberts & Wood, 2006). Social roles form the centerpiece of this theory, along with the identity expectations that come with adopting particular roles. Roles also have reputational characteristics that impact on personality development, thus involving interactions with observers and other people external to the actor. Social role changes drive personality change, but such change is not limitless and is bounded by genetic and physiological factors. It is a comprehensive theory, taking into account nearly all of the known influences on lifespan personality development. It also contains certain ideas that have been shown to be mostly consistent with available data, most notably the corresponive principle (e.g., Jackson, 2011) and the social investment principle (e.g., Bleidorn et al., 2013). We described corresponiveness earlier. *Social investment* refers to age-graded changes, or investments, in social roles (parent, worker, partner) that lead to personality changes. There are studies that show no support for social investment, especially with respect to parenting roles (Mund, Zimmer-

man, & Neyer, 2018), but in general the social investment principle seems to align with data. Among lifespan personality development theories, the neo-socioanalytic theory probably enjoys the largest base of confirming evidence.

However, many of the trait changes predicted by neo-socioanalytic theory (increasing conscientiousness, extraversion, openness, and agreeableness in young and midadulthood; declining neuroticism in young and midadulthood) are not consistent once older adulthood arrives. After midlife, there is evidence for decreases in all or nearly all of the Big Five traits (Berg & Johansson, 2014; Kandler et al., 2015; Lucas & Donnellan, 2011; Möttus, Johnson, & Deary, 2012; Roberts & Mroczek, 2008).

One of the more theoretically compelling explanations for these reversals in later life is Baltes's (1997) concept of selective optimization with compensation (SOC), which holds that development includes both gains and losses across the entire lifespan, whereas older adulthood is usually defined mostly by losses. In order to optimize development in older adulthood, individuals compensate for these losses and also engage in selection behaviors by restricting goals and activities in domains where functionality has become impaired (Baltes, 1997). As noted by Kandler et al. (2015) and Mueller et al. (2016), SOC theory may be applied to personality development to explain trait trends that appear to decelerate or even reverse in older adulthood. For example, developing and maintaining work and career goals, along with relevant skills, may become less of a priority or drop out entirely as a priority in later life, thereby exerting downward pressure on trait conscientiousness. In another example, the need to be on guard regarding health and financial risks in older adulthood may bring SOC process to bear on trait neuroticism. SOC, in combination with neo-socioanalytic theory (especially its maturity principle), may provide the most comprehensive explanation for how personality changes and develops throughout the full lifespan.

A number of other recent theories are centered on dynamic regulatory mechanisms that govern personality development. Denissen, van Aken, Penke, and Wood (2013) have proposed a theory of self-regulated

personality change, arguing that change (and stability) revolves around reference values that are usually concepts at McAdams's second level (PAC), such as goals, but also by more biological dimensions such as affect or traits. Homeostasis is maintained by regulating behavior to stay consistent with the reference values (which, of course, can course change over time). Denissen et al.'s theory extends to childhood, so like neo-socioanalytic theory, it is lifespan in nature.

Dynamic equilibrium theory (Ormel, Riese, & Rosmalen, 2012), mentioned earlier, is another regulatory theory modeled after well-being set-point theory (Headey & Wearing, 1989). It draws more heavily from work on the genetic basis of personality (e.g., McGue et al., 1993) than do other theories and maintains that these genetic factors establish set points for traits and other personality dimensions. Contextual factors may push personality away from these set points temporarily, but genetically influenced physiological mechanisms will eventually return a personality characteristic back to its original set point.

Dynamic interplay, but not regulation per se, is a cornerstone of the personality and social relationship (PERSOC) framework (Back et al., 2011). PERSOC holds that social relationships and interpersonal behaviors exist in a dynamic tension with personality characteristics, with each influencing the other over time. It is consistent with the bidirectionality concepts we discussed earlier, and like neo-socioanalytic theory, focuses heavily on social aspects of human behavior. It can be regulatory, in that social relationships can put brakes on personality change, depending on the circumstances, but is just as likely to promote personality change. In this sense, PERSOC embodies dynamic principles, but regulatory processes only peripherally.

A newer framework, TESSERA (Wrzus & Roberts, 2017), also gives a central role to dynamic, regulatory processes. Triggering, Expectancies, States/State Expressions and Reactions (TESSERA), like PERSOC, is narrower in scope than comprehensive theories such as neo-socioanalytic theory. Whereas PERSOC specifically focuses on dynamic interplay between social interactions and personality, TESSERA is more ab-

stract, arguing that any kind of short-term experience (social or otherwise) triggers a chain of reactions that ultimately can lead to personality change. It draws on work that emphasize daily experiences and similar "micro" behavioral processes (Mroczek & Almeida, 2004). Short-term situational reactions and other state mechanisms all build toward long-term personality development. In this sense, TESSERA unites "process" approaches to personality, which generally center on short-term phenomena, (e.g., Fleenor & Jaywickreme, 2015) with long-term approaches to personality development, such as those discussed earlier that emphasize trajectories and growth curves.

In addition to the full-fledged theories (neo-socioanalytic, dynamic equilibrium) and somewhat narrower frameworks (PERSOC, TESSERA), the last decade has seen a number of freestanding concepts that have high relevance for personality development in adulthood. Roberts et al. (2008) and Caspi and Shiner (2008) put forth a number of very interesting theoretical concepts, such as *reactance* (selective attention to stimuli based on personality), *attrition* (leaving contexts or environments due to a personality characteristic, or leaving because it calls for too much personality change), and *filibustering* (resisting change in the hope that the change agent will exit from one's life). Similarly, Shanahan, Hill, Roberts, Eccles, and Friedman (2014) offered an extensive catalogue of theoretical concepts aimed at explaining how conscientiousness might change over the lifespan, and how these changes may impact health and optimal aging. For example, *amplification* refers to the social context increasing (amplifying) or decreasing the effect of a personality dimension on some other variable, in ways that are age-graded.

Shanahan et al.'s (2014) group of concepts varies from the others we have considered so far, in that it explicitly takes into account the broader societal context, and not just narrower social contexts such as relationships or social interactions. The principle of *cumulative disadvantage* states that the effect of certain traits on outcomes such as health will be much greater in some people than in others because they have not endured adverse life circumstances. In a sense, the influence

of traits on health is a privilege, enjoyed by people who reside in social strata that have good access to health care and other health resources. If you have poor access to health resources, in a sense, your personality will not matter much. When infectious diseases are pervasive, with few doctors or hospitals around, it will not matter how conscientious you are. Polio will not discriminate among those with different personality trait levels. Thus, effects of personality on outcomes, and personality change itself, should vary across socioeconomic strata. Shanahan et al. hypothesizes that the effect of traits in health will diminish when resources that promote health are absent. They also theorize that certain processes may hold in some parts of the lifespan but not others. Coping, planning, and risk avoidance process (related both to neuroticism and conscientiousness, and to personal goals) may be more salient in adolescence and young adulthood than in midlife or older adulthood. They call these “phase-specific models,” because the mechanisms and processes are more relevant during some phases of life than others. The Shanahan et al. proposal is inspired in its theoretical richness, but it remains more of a collection of fascinating concepts than a theory or even a framework. In addition, not many of the Roberts et al. (2008) or Shanahan et al. (2014) ideas have been verified empirically. A number of multiyear research programs could be sustained by carrying out such verification.

In considering these new ideas, it is often valuable to look back. All of the aforementioned theories, frameworks, and concepts have roots in a well-known older model, lifespan developmental theory (Baltes, 1987), which itself was grounded in an even older theory that emphasized individual differences in change throughout life (Thomae, 1968) but was not widely known outside Germany. Additionally, neo-socioanalytic theory is also partly based on Helson’s social roles and social clock theory (Helson, Mitchell, & Moane, 1984), which itself is based on older theories. Many of these theories also make use of elements found in even older theories that have considered the topic of personality development in adulthood, notably, those of Allport and Murray. Allport’s concept of the cardinal trait, for

example, can be integrated with newer concepts, such as the idea of traits being evocative. The evocation of contexts may occur mainly for a given person’s cardinal traits. Extraversion in Oliver is cardinal and evokes all manner of responses from the environment. Yet conscientiousness is less cardinal and therefore less evocative. Future theorists of lifespan personality development would do well to blend some of this old wine with new, borrowing from some of the best ideas of the past.

Conclusion

Theory in the social and life sciences is mostly concerned with generalizing across people. Yet scholars of individual differences are mainly interested in variation across people. Theory pulls us toward Kluckhohn et al. (1953) statement, “We are like all others,” but the central idea that animates personality science is individuality, exemplified by the complementary statement that “we are like no other person.” Any of the theories we mentioned earlier may apply to some people, but probably not to all people.

Therein lies the challenge for any theory of personality development. Individuality in trajectories will be abundant and defy efforts to generalize through a theory or even a framework. This is why stage theories, once so popular (e.g., those by Erikson and Kohlberg) fell out of favor by the 1990s. They tried to be too universal, arguing that all or most people pass through the various stages. Yet the recognition that individual differences are powerful and many people are not adequately described by rigid stage structures led to their demise.

The theories offered today need to be understood in the same light. If we know anything as individual differences researchers, we know that there is wide variation among people and that a given theoretical principle may not hold for some individuals. Theories that incorporate this fact in a deep manner are likely to not only impart fundamental knowledge but also survive the dive into irrelevance that characterizes much of psychological theorizing. We offer two examples of successful theories. Lifespan developmental theory placed the notion of individual dif-

ferences in intraindividual change at its center. Darwin, in evolutionary theory, placed individual variation in physical traits at the center of natural selection. This is not to say that either theory does not acknowledge the idea of a universal general design. Both do. As noted by McAdams (2015), all humans share a general physical form, but there are infinite variants on that form. Personality science, and the science of personality development, is uniquely able to acknowledge a general principle (e.g., social investment), along with a parallel acknowledgment of the individual differences that surround that general pattern. Not everyone will adhere to a given theoretical concept, or adhere to it in the same manner. This brings us full circle, back to Kluckhohn et al. (1953), and their dictum that in some ways, each one of us is like no others. In the realm of adult personality development, one major way this is manifested is in the unique trajectory each person possesses, irrespective of the shape of the population metatrajectory. A theory can generalize across people only so far. Once it reaches its boundary, individual differences remain. This notion forms the core of personality science and of the study of adult personality development.

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CHAPTER 16

Personality and Parenting

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In the 1990s classic movie *Home Alone*, Kevin McCallister is a young boy grappling with finding his place as the youngest child in a large family. Kevin is accidentally forgotten and left home alone during Christmas vacation. At first, Kevin gleefully celebrates “making his family disappear,” but by the end of the movie, he tells Santa’s helper that instead of presents, all he wants is his family back. For the first two decades of life, the primary socializing agent for most children is their parents (Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000). Researchers generally agree that parenting behaviors can be subsumed under three superordinate dimensions: *responsiveness* (i.e., emotional climate—warmth, acceptance vs. hostility, rejection), *demandingness* (i.e., structure—regulation, monitoring, consistent discipline), and *autonomy granting* (i.e., support for individuation—low psychological control, encouragement of independence; Maccoby & Martin, 1983; Ryan, Deci, & Grolnick, 1995). These three parenting dimensions are typically positively correlated, although the associations often break down at the high ends of the distributions (e.g., parents who are responsive to the point of enmeshment are not often demanding to the point of being controlling and abusive). Genetically informed research (e.g., twin

studies) has not yet estimated heritability for autonomy granting but typically finds moderate heritability for responsiveness and low heritability for demandingness (Oliver, Trzaskowski, & Plomin, 2014), which suggests that variation in parenting is predominantly environmental, malleable, and due, in part, to the child’s personality (Ayoub et al., 2019). Thus, a better understanding of how parenting contributes to personality differences provides one potential avenue through which personality can be changed via intervention.

Measurement of Parenting

If we wanted to know whether Kevin’s mother is responsive, who would we ask? Parenting researchers use a wide range of measures, including self-reports from the parent, informant reports from the partner/coparent or child, ratings of behavior during parent–child interactions, and analogue laboratory tasks that mimic parenting situations. Each of these sources of information about parenting behavior has strengths and weaknesses, which means the best approach to the measurement of parenting is to collect more than one source of information. The most highly regarded single source of par-

enting data is independently rated observed parenting behavior. These observation-based measures involve the parent and child interacting with each other in semistructured or structured tasks. Similar to work showing that observed personality has lower heritabilities than informant-reported personality (Borkenau, Riemann, Angleitner, & Spinath, 2001), observed parenting shows less heritability than informant-reported parenting (Kendler & Baker, 2007).

Although observation-based assessments of parenting are highly regarded and some analogue measures of parenting exist, parenting is commonly measured with self- and informant reports collected from family members. Aware of the need to account for measurement error across these multiple measures of parenting (e.g., Westfall & Yarkoni, 2016), many studies of parenting explicitly model error with latent variables. Multiple perspectives of the parent's behavior produce a measure of parenting with higher content and criterion validity than any single measure on its own, so most high-quality research on parenting incorporates information from multiple reporters. One complication is that the correlation across different measures of parenting is modest, typically around .20 to .30. Consequently, when information from different reporters of parenting is forced onto a single latent factor, the modest degree of correspondence across reporters results in poor model fit and low factor loadings (e.g., Esposito, Servera, Garcia-Banda, & Del Giudice, 2016). Furthermore, studies that separate trait and method factors show the magnitude of the method factors to be larger than the magnitude of the trait (i.e., parenting) factors (e.g., Bauer et al., 2013), which implies the portion of information that is shared across reporters is relatively small. And, in fact, recent research indicates that the "storm and stress" of personality development in adolescence is evident for parent reports of personality, but not for adolescent self-reports of personality, suggesting that parents and children are witnessing changes in personality at different rates (Göllner et al., 2017). Finally, reporter-specific parenting information (i.e., method factors) appears to include more true score than measurement error (Schofield, Parke, Coltrane, & Weaver,

2016). In summary, the portion of variance in parenting that is shared across all reporters is (1) relatively low and (2) missing much of the true score, so traditional approaches of forcing information from different reporters onto a single factor compromise both reliability and (far more importantly) validity.

To get a well-rounded understanding of whether Kevin's mother is responsive, researchers should use multiple sources of information for measurement (i.e., observational data, family reports, and self-reports), but how would they model them? One approach that satisfies concerns regarding both reliability and content validity involves distributing information from each reporter across the indicators, so that the latent factor includes the rater-specific variance, as well as the common variance across raters (e.g., Schofield et al., 2009). When making measurement and data-analytic choices, researchers should take into account issues of reliability (e.g., factor loadings), validity (e.g., the need to model all true score variance, using information from all available raters), and feasibility (e.g., a measurement model simple enough to enable longitudinal structural models that can provide support for causal inference).

Parental Socialization of Personality Traits

After decades of challenges from various disciplines that claimed development is mostly due to genetics, peers, or various other extra-familial environments (i.e., everything *but* parenting), it is now well-established that parenting affects child development (e.g., Cowan, Cowan, Pruett, Pruett, & Wong, 2009; Spoth, Redmond, & Shin, 1998). Consequently, parenting is also believed to affect offspring personality beyond shared genetic inheritance. For example, Mrs. McCallister's consistent and responsible parenting behavior may have positively influenced Kevin to be more conscientious (e.g., he needed an American Dental Association-approved toothbrush). One prevalent explanation for the effect of parent behavior on offspring personality is that parents teach children how to behave through explicit and implicit socialization. For example, parents who are warm and supportive toward their child are modeling behaviors related to high

agreeableness. This socialization process is probably most effective when the parenting behaviors are aligned with the child's inherent propensities.

Consistent with this reasoning, many researchers find significant correlations between parenting and offspring personality. However, there are three different ways to explain this basic correlation: socialization, passive gene–environment correlation, and evocation. In addition to the hypothesized socialization effects of parenting, a portion of the correlation between parent behavior and offspring traits is due to shared genetic propensities (i.e., Kevin's propensity to be responsible may be, in part, due to a genetic inheritance he receives from his parents; Ayoub et al., 2019). The ability of children to evoke parenting responses (Avinun & Knafo, 2013) is an additional reason why correlations between parent behavior and offspring traits are difficult to interpret. However, studies that indicate parenting predicts *changes* in offspring personality (e.g., Halverson & Deal, 2001; Hipwell et al., 2008; Jaffari-Bimmel, Juffer, Van IJzendoorn, Bakermans-Kranenburg, & Mooijart, 2006) provide more compelling evidence, because shared genetic or evocative effects are less likely to cause a prospective prediction from parenting to change over time in offspring traits. Research examining the effects of a parenting intervention on personality change provides the strongest evidence that parenting behaviors actually cause personality change, independent of shared genes or child evocation, but there are few studies of this kind. Consequently, in the following review, we focus on evidence of parent behavior predicting *change over time* in offspring personality. We include studies in which both parenting behavior and offspring personality are reported by the same informant, with the caveat that shared method variance renders those results less interpretable than findings based on independent assessments of parenting behavior and offspring traits.

Parenting Effects on Personality Traits

In this section, we do not distinguish between temperament and personality traits because of their high level of conceptual and

empirical overlap (e.g., Shiner & DeYoung, 2013; Zentner & Bates, 2008). The temperamental traits of effortful control, negative emotionality, and positive emotionality typically map onto the Big Five traits of conscientiousness, neuroticism, and extraversion/agreeableness in adolescence and adulthood (Soto & Tackett, 2015). Researchers have also found evidence for the “Little Five” (John, Caspi, Robins, Moffitt, & Stouthamer-Loeber, 1994) and “Little Six” (Soto & John, 2014; Soto, 2016) dimensions of personality in childhood and adolescence, which converge with both temperament and personality traditions.

Parenting is a biologically and culturally reinforced mechanism for socialization. Digman (1997) characterized three of the Big Five (i.e., conscientiousness, emotional stability (low neuroticism), and agreeableness) as representing the end goals of successful socialization. Not surprisingly, these three personality domains have received considerable attention in both the socialization and personality development literatures. We first review the hypothesized effects of parenting on conscientiousness, emotional stability, and agreeableness (or related traits), then briefly discuss the few studies that have examined how parenting might influence extraversion and openness to experience (or related traits).

Of the Big Five domains, perhaps the most widely studied in the parenting literature is conscientiousness and related traits (e.g., self-regulation, effortful control, and self-control). Observed maternal sensitivity predicts decreases in a composite of child reactivity, restlessness, and aggression (Jaffari-Bimmel et al., 2006). Parental warmth predicts relative increases in childhood effortful control (Klein et al., 2018) and adolescent conscientiousness (Schofield et al., 2012), after accounting for prior levels. Additionally, a general measure of “positive” parenting predicts increases in child task persistence (Halverson & Deal, 2001). On the other hand, parent-reported punitive responses to child misbehavior predict decreases in conscientiousness (Van den Akker, Deković, Asscher, & Prinzie, 2014). Parental hostility, intrusiveness, and impatience predict ego *overcontrol* among daughters, whereas parental hostility, frustration, competitive-

ness, and impatience predict ego *undercontrol* among sons (Kremen & Block, 1998). Moreover, greater *increases* in parental hostility are related to greater *decreases* in effortful control during adolescence (Atherton, Lawson, & Robins, 2020), and maternal negativity at age 3 predicts decreases in child effortful control across 2 years (Klein et al., 2018). Finally, intervention effects on offspring effortful control are mediated by intervention-induced changes in negative and inconsistent parenting (Elizur, Somech, & Vinokur, 2017).

The effect of parenting on neuroticism and related traits (e.g., negative emotionality, anxiety, depression, worry, and fearfulness) has also received considerable empirical attention. High observed parental warmth and low observed parental harshness negatively predict adolescent neuroticism after accounting for prior neuroticism (Schofield et al., 2012), and negatively predict adolescent depressive symptoms after accounting for prior depressive symptoms (Ge, Best, Conger, & Simons, 1996). Parent-reported warmth also predicts decreases in adolescent depressive symptoms (Hipwell et al., 2008), whereas observed nonsupportive parenting predicts increases in adolescent depressive symptoms (Luby, Gaffrey, Tillman, April, & Belden, 2014). Parent-reported punitive responses to child misbehavior predict decreases in emotion regulation (Eisenberg et al., 1999), and insensitive, controlling maternal behavior predicts increases in negative affectivity (Bandon, Calkins, Keane, & O'Brien, 2010). Maternal negativity toward children at age 3 predicts increases in children's frustration tendencies at age 54 months (Klein et al., 2018). Observed parental aggression predicts increases in adolescent depression and anxiety, whereas observed parental positivity predicts decreases in depression (Schwartz et al., 2012). Parent self-reported punitive reactions to child misbehavior predict increases in negative emotionality (Eisenberg et al., 1999), and parental rejection predicts increases in fear and irritability (Lengua, 2006).

Parenting also predicts changes in agreeableness and related traits (e.g., positive emotionality–affiliation, warmth, kindness, and prosociality). High observed parental warmth and low observed parental harsh-

ness positively predict adolescent agreeableness, after accounting for prior agreeableness (Schofield et al., 2012). Children with parents who model prosocial behavior by treating them with warmth, support, and positivity are more prosocial and altruistic (Eisenberg, Fabes, & Spinrad, 2006; Padilla-Walker, Carlo, Christensen, & Yorgason, 2012). In contrast, after accounting for child difficulty at age 4, mother self-reported warmth toward the child at age 8 does not predict offspring agreeableness at age 16 (Bardstu, Karevold, & Von Soest, 2017).

Very little attention has been directed toward studying how parenting behavior influences changes in extraversion or related traits (e.g., surgency, sensation seeking, and sociability) and openness to experience or related traits (e.g., creativity, imagination, and intellectual curiosity). The few prospective, longitudinal studies show that observed maternal warmth and responsiveness and observed maternal positive affect and responsiveness lead to decreases in surgency (Bandon et al., 2010). Additionally, parental warmth and autonomy support predict increases in creative potential (Harrington, Block, & Block, 1987), yet neither warmth nor restrictiveness predict increases in creativity into adulthood (Koestner, Walker, & Fichman, 1999).

In general, negative parenting behavior predicts maladaptive trait change, and positive parenting behavior predicts adaptive trait change. Even so, the relation between parenting behavior and offspring trait development is likely more nuanced and context-dependent. It would not be adaptive for parents to reinforce a given trait (e.g., agreeableness) or pursue any other socialization goal without regard for how adaptive it might be in the offspring's current or future environment. Traits that are adaptive in one environment may not necessarily be equally adaptive in another environment (Dodge, McLoyd, & Lansford, 2005; Kelley, Power, & Wimbush, 1992), and traits typically considered limiting may be assets in extreme environments (Del Giudice, 2009). It is important to view personality traits as tools that vary in their environmental utility because it can help researchers to address the nuances of when, where, how, and why “negative” parenting practices can benefit

youth functioning (Belsky, Hsieh, & Crnic, 1998).

Given the well-documented links between psychopathology and personality (see Widiger & Oltmanns, Chapter 36, this volume), it is also reasonable to expect parenting practices to influence *changes* in offspring psychopathology. For example, recent studies have shown that parent hostility and low monitoring both predict increases in adolescent exploitativeness, a facet of narcissism (Wetzel & Robins, 2016), and parent hostility predicts increases in adolescent psychopathic personality traits (Tuvblad, Bezdjian, Raine, & Baker, 2013). Authoritarian, permissive, or controlling parenting each positively predict borderline features in adolescent females, after accounting for previous relational aggression (Nelson, Coyne, Swanson, Hart, & Olsen, 2014). In contrast, positive observed maternal behavior (i.e., support, validation, communication, autonomy support, and positive affect) reduces borderline personality disorder severity scores (Whalen et al., 2014). Finally, intervention-induced reductions in callous-unemotional traits during adolescence are mediated by intervention-induced reductions in negative and inconsistent parenting (Elizur et al., 2017).

The research reviewed in this section suggests that parenting practices predict offspring personality development in important ways (see Table 16.1 for a summary). However, other ways in which parenting and offspring personality may be related are shown in Figure 16.1. First, parenting may be influenced by the personality traits of the parent (path A) or the offspring (path B). Second, offspring personality may mediate the influence of parenting on offspring outcomes (paths C and D), above and beyond any direct influence of parenting behavior on offspring outcomes (path E). Last, offspring personality may moderate the effects of parenting on offspring outcomes (paths E and F).

Both Parent and Child Personality Predict Parenting Behavior

Does Mrs. McCallister’s level of conscientiousness influence whether she leaves Kevin at home? And does Kevin’s level of conscientiousness evoke certain parenting behaviors from Mrs. McCallister? Parent personality traits are central to many theoretical models of parenting behavior (Belsky & Jaffee, 2006) and are consistently correlated with multiple domains of parenting behavior

TABLE 16.1. Summary of Longitudinal Research on Parenting Practices and Offspring Personality Development

	Responsiveness (i.e., emotional climate)	Demandingness (i.e., structure)	Autonomy granting (i.e., support for individuation)
Temperament/personality traits			
Effortful control/conscientiousness	+	+	+
Negative emotionality/neuroticism	–	–	–
Positive emotionality/agreeableness	+	?	?
Surgency/extraversion	–	?	?
Creativity/openness to experience	+	?	+
Personality pathology			
Callous–unemotional traits/psychopathy	–	–	?
Aggression/conduct problems	–	–	?
Narcissism	–	–	?
Borderline personality	–	–	–

Note. + indicates that higher levels of the parenting dimension predicts *increases* in personality trait; – indicates that higher levels of parenting dimension predicts *decreases* in personality trait; ? indicates no research has been done on the longitudinal associations between parenting dimension and personality trait.

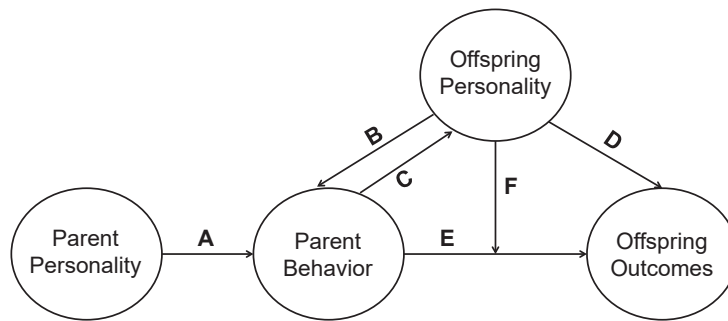


FIGURE 16.1. Pathways linking parenting and personality.

(see path A in Figure 16.1; for a review, see Prinzie, Stams, Deković, Reijntjes, & Belsky, 2009). However, only one of the studies described in the review by Prinzie and colleagues actually examined change over time in parenting behavior (Michalik, 2005), which reflects the dearth of research on how parent personality predicts *changes* in parenting behavior. Although Michalik did not find parent personality to predict relative changes in observed parenting, more recent work shows that parent personality does predict relative changes in observed parenting (Schofield et al., 2012) and informant-reported parenting (de Haan, Deković, & Prinzie, 2012).

The hypothesis that child personality also leads to certain parenting responses (path B in Figure 16.1) has strong empirical support (e.g., Avinun & Knafo, 2014; de Haan, Soenens, Deković, & Prinzie, 2013; Klahr & Burt, 2014). For example, babies born with a tendency to smile elicit more positive responses from others than do subdued, unresponsive infants (LaFreniere, 2000; Plomin, 1995). In one study of children's ability to evoke parenting behavior among a sample of more than 1,000 5-year-old twins, parents' physical punishment was strongly influenced by the children's genetic predispositions to be antisocial and defiant. Links between parents' punishment and children's antisocial tendencies were higher among pairs of monozygotic twins than among pairs of dizygotic twins (Jaffee et al., 2004). Higher behavioral inhibition at child age 3 was associated with more structured parenting when the child was age 5 (Liu, Kryski,

Smith, Joanisse, & Hayden, 2019). Within a different sample, researchers found a high correlation between mothers' negativity directed toward one identical twin adolescent and antisocial behavior shown by the other identical twin adolescent ($r = .62$); the same correlation was much lower for fraternal twins ($r = .27$) and approached zero ($r = .06$) for genetically unrelated stepsiblings (Reiss, Neiderhiser, Hetherington, & Plomin, 2000; Reiss, 2005). Likewise, children with lower effortful control assessed at age 10 also had greater *decreases* in parental monitoring from ages 10 to 16, which suggests that parents may become tired of trying to control their child's dysregulated tendencies and, as a result, stop trying to monitor or regulate their child's behavior and whereabouts (Atherton et al., 2020). These studies exemplify strong evidence that the same set of genetic predispositions influence children's antisocial behavior and provoke their parents' negative behavior, leading to increased adolescent antisocial behavior over time. Consistent with this work, parent-reported child callous-unemotional traits predict changes over time in parent-reported inconsistent discipline, punishment, and parental involvement (Hawes, Dadds, Frost, & Hasking, 2011). Williams, Ciarrochi, and Heaven (2012) found that adolescent self-reported psychological flexibility predicted decreases in authoritarian parenting and increases in authoritative parenting (both reported by the adolescent). In summary, the hypothesis that offspring personality predicts changes in parenting behavior has considerable support (Hawes et al., 2011; Lengua & Kovacs,

2005; Pettit, Keiley, Laird, Bates, & Dodge, 2007; Salihovic, Kerr, Özdemir, & Pakalniškiene, 2012; Scaramella, Sohr-Preston, Mirabile, Robison, & Callahan, 2008).

Personality as a Mediator of the Association between Parenting and Offspring Behavior

It is generally accepted that an offspring's personality influences his or her behaviors and life outcomes (path D in Figure 16.1), including academic achievement (Duckworth & Allred, 2012; Nofhle & Robins, 2007), income (Schofield et al., 2011), employment (Viinikainen & Kokko, 2012), health (Atherton, Robins, Rentfrow, & Lamb, 2014; Bogg & Roberts, 2004), and relationship satisfaction (Schaffhuser, Allemand, & Martin, 2014). The influence of parenting practices on a wide range of offspring developmental outcomes (path E in Figure 16.1) is also generally accepted (Collins et al., 2000). These research questions have often been studied in isolation, and few researchers have addressed the degree to which offspring personality traits mediate the relation between parenting and offspring behavior (paths C and D in Figure 16.1).

Bronfenbrenner's (1979) ecological systems model provides support for a parenting → offspring personality → offspring behavior process. In the ecological model, individual-level factors such as personality traits are most proximal to the child and therefore may have the largest effects on offspring behavior. Distal features of the environment (i.e., parents, peers, siblings) may affect offspring development through more proximal factors. Therefore, we might expect a mediation process in which parenting behavior predicts offspring behavior (in part or in full) because of its effect on offspring personality traits.

In other words, it is possible that Mrs. McCallister's parenting behavior influences Kevin's level of conscientiousness, which then leads Kevin to do well in school. In fact, empirical research on this mediating pathway supports this notion. Autonomy-supportive parenting influences children's academic achievement, in part through the child's improved executive functioning and self-regulation (Bindman, Pomerantz, & Roisman, 2015), and overcontrolling parenting in toddlerhood was associated with

later adjustment outcomes in childhood, both directly and indirectly through the child's self-regulatory tendencies (Perry, Dollar, Calkins, Keane, & Shanahan, 2018). Inconsistent discipline and positive parenting both have indirect influences on child and adolescent attention-deficit/hyperactivity disorder (ADHD) symptoms via offspring conscientiousness (Ullsberger, Nigg, & Nikolas, 2016). Among adults, the influence of parental socialization of responsibility on offspring health behaviors is fully mediated by offspring conscientiousness (Takahashi, Roberts, & Hoshino, 2012).

Although these are only four empirical examples of how parenting influences behavior through offspring trait characteristics, it is notable that these processes are being examined across different parenting dimensions (support, discipline, socialization) and multiple conceptualizations of the same broader trait of self-regulation (executive functioning and conscientiousness), spanning multiple behaviors/outcomes (academic achievement, psychopathology, and physical health). Given that we know relatively little about the degree to which offspring trait change links parenting practices and other domains of offspring development, well-designed longitudinal research with multiple reporters is needed in this area.

Offspring Personality as a Moderator of Parenting Influences

A core theoretical concept in personality and developmental psychology is that behavior is shaped by a dynamic interaction between environmental conditions and individual characteristics (e.g., Conger & Donnellan, 2007; Magnusson & Stattin, 1998; Sameroff, 2010), otherwise known as *person-environment interactions*. If we consider parenting behavior as an "environmental condition," we can better understand the ways in which an offspring's personality either *exacerbates* or *diminishes* the effect of parenting practices on how the offspring actually behaves (paths E and F in Figure 16.1).

Research on how traits interact with the environment to influence behavior has increased in recent decades, with studies ranging across many different aspects of parenting (i.e., control and discipline, warmth and sensitivity, monitoring) and many different

traits (i.e., fearfulness, negative emotionality, self-regulation, self-esteem, aggression) during both childhood and adolescence (Bates & Pettit, 2007; de Haan, Prinzie, & Deković, 2010). In fact, a recent meta-analysis demonstrates that children's temperamental traits lead them to be more (or less) susceptible to certain kinds of parenting behaviors (Slagt, Dubas, Deković, & van Aken, 2016). Specifically, across 84 studies, researchers found that children with difficult temperamental traits (i.e., negative emotionality) were more likely to be susceptible to negative parenting behaviors (though they also benefited more from positive parenting behaviors). On the other hand, there was no consistent evidence to suggest that surgency and effortful control moderated the influence of parenting behaviors on adjustment outcomes.

To provide a more concrete example, a more recent study illustrates the interactive effects of the parenting environment (i.e., lack of parental supervision) and adolescent trait characteristics (i.e., an aggressive temperament) on changes in conduct disorder symptoms over time (Atherton, Schofield, Sitka, Conger, & Robins, 2016). Researchers have long acknowledged that the autonomy afforded by unsupervised self-care may be good (i.e., an opportunity for increased responsibility, self-reliance, and independence) or bad (i.e., increased delinquency, alcohol and tobacco use, and deviant peer affiliation; Galambos & Dixon, 1984), depending on how the child perceives, reacts to, and evokes responses from the situation. Similar to what transpires in *Home Alone*, being left without parental supervision is not always detrimental. Atherton et al. (2016) found that low parental supervision led to increases in conduct disorder symptoms, but only when adolescents had more aggressive temperamental characteristics.

Within the person–environment framework, there are three non-mutually exclusive explanations for a given interaction: *selection* (i.e., the child selects into particular environments), *evocation* (i.e., the child evokes responses or changes in the environment), and *reaction* (i.e., the child reacts to different environments). Continuing with the previous example of unsupervised self-care and aggressive temperament, we might not expect *selection* processes to be impor-

tant, because it is typically the parent who chooses whether the child spends time in unsupervised self-care (i.e., it was Mrs. McCallister who left Kevin alone at home). However, children do have some leeway in choosing how, and with whom, they spend their time in unsupervised self-care. For example, aggressive children might be more likely to choose to spend their unsupervised time with deviant peers and engage in antisocial behavior, whereas Kevin is more likely to go grocery shopping and maintain good personal hygiene. A second explanation involves an *evocative* person–environment interaction. According to this second perspective, the aggressive child may elicit more antisocial behaviors from others in unsupervised time, whereas the nonaggressive child (e.g., Kevin) elicits conversations from his neighbor about salting the sidewalks. Finally, aggressive youth may *react* differently to the environmental context of unsupervised self-care than less aggressive youth. Kevin was more likely to react to this unstructured situation in an adaptive way because he was a responsible child, whereas youth with aggressive temperaments may interpret the lack of adult supervision as conveying the message that they can do whatever they want, including engagement in antisocial acts.

One final illustration of the person–environment framework is how parent and offspring *personality traits* have interactive effects on parenting behavior. Using parent-reported data, Hong and colleagues (2015) found that child temperament moderated several of the links between parent personality traits and parenting behavior. For example, mothers' openness was related to relative increases in positive support toward the child, but only when the child was relatively high on effortful control. In contrast, Karremans, van Tuijl, van Aken, and Deković (2008), found that parent personality was most predictive of parenting behavior when parenting a child with low self-regulation. Clearly, more research is needed in this area.

Developmental Change in the Effect of Parenting on Personality

In recent decades, researchers have directed attention toward studying changes in the parent–child relationship over the life course, and have begun to examine how the

antecedents and consequences of personality traits change at different points in the lifespan (Wrzus, 2019); however, to date, there have been no studies examining whether the influence of parenting on offspring personality changes over time. In other words, will the influence of Mrs. McCallister's parenting behavior on Kevin's personality change as Kevin grows up? Most previous work has examined the effects of parenting in childhood, which is logical, because the family is the first, and arguably, the most foundational source of socialization throughout development (Maccoby, 2007). Not only are there fewer sources of socialization in childhood, but children also spend the majority of their time in the home, so parents have the greatest number of opportunities to influence the child (Kuczynski & Grusec, 1997). Personality traits are also the most plastic in childhood relative to other developmental periods (Roberts & DelVecchio, 2000), which implies that parents' capacity to influence trait development during childhood may be larger than the capacity to do so in emerging adulthood (when traits become increasingly stable). Additionally, the reciprocal influence of the offspring's personality on parenting practices (i.e., path B in Figure 16.1) may be weaker in childhood than it is in adolescence and adulthood (Kuczynski, 2003). Therefore, it is reasonable to conclude that the effects of parenting on personality development may be strongest and most pervasive in childhood relative to later developmental stages.

As children transition into adolescence, they not only continue to encounter additional socializing agents that influence trait development, including peers and teachers, but there is also a gradual decline in the amount of time the parent and the adolescent spend together (Collins & Madsen, 2003). However, most importantly, the adolescent becomes an increasingly proactive agent in the parent-child relationship, which may have the largest influence on developmental shifts in parents' impact on personality traits. As adolescents develop complex cognitive, emotional, and behavioral skills, they become an "active perceiver and agent" in the parent-child relationship, with growing expectations and goals of how interactions should be (Lundell, Gru-

sec, McShane, & Davidson, 2005). This increase in adolescent agency can weaken the effects of parenting practices on personality development (path C in Figure 16.1), in part because of the increasingly strong reciprocal effects of adolescent personality on parenting behaviors (path B in Figure 16.1; Kuczynski & Parkin, 2007). As demonstrated by the *dialectical* model of bidirectionality, reciprocal influences are rooted in how parents and offspring interpret each other's behaviors, construct meanings from their interactions, and anticipate or accommodate each other's perspectives and goals (Grusec, Goodnow, & Kuczynski, 2000; Kuczynski, 2003). For example, adolescents can facilitate or thwart parents' attempts to monitor them effectively by communicating with the parent about their activities (Kerr & Stattin, 2000). Adolescents have the ability to understand complex rationales for parenting behavior but, at the same time, privately reject those behaviors (Grusec & Goodnow, 1994). Moreover, adolescents' perceptions of what honors or infringes on their rights as autonomous individuals differ from their childhood perceptions, when they were more likely to perceive parents' efforts to direct their behavior as warranted (Siegal & Cowen, 1984; Smetana, 1988). Similarly, parents also recognize this newfound agency and are more likely to view their offspring's misdeeds as intentional, then respond accordingly (Dix, Ruble, Grusec, & Nixon, 1986). Thus, the influence of parenting behavior on offspring personality development may become weaker, because the adolescent, who is newly equipped with intentional and goal-directed actions (Kuczynski & Parkin, 2007), has stronger reciprocal influences on parenting behavior.

As adolescents transition into adulthood, the typical assumption is that parents no longer matter in influencing personality development. After all, by this point, offspring should possess the basic skills necessary to function as part of society, eliminating the need for parental socialization. There is no research that directly addresses the influence of parenting on personality development during adulthood, but we have reason to suspect there may be effects (albeit small) given that some research indicates that parents continue to influence their offspring's

well-being into adulthood (path E in Figure 16.1; Knoester, 2003; Umberson, 1992). Although parent–offspring relationships typically improve in adulthood (which could open doors for socialization) (Arnett, 2004), an even wider set of conditions can weaken parents' influence on offspring traits. For example, time spent with parents becomes voluntary (i.e., adult offspring can choose whether their parents have the proximity or possibility of socialization) (Larson & Richards, 1994). Moreover, although youth in industrialized countries are experiencing more delayed transitions into adulthood (Arnett, 1998; Bleidorn et al., 2013), the transition to adult life has benefits for personality development—most notably, increases in conscientiousness (Bleidorn, 2012). However, for some emerging adults who continue to live in the home, parents feel the need to regulate for them (Dubas & Petersen, 1996), which can maladaptively influence subsequent trait maturity. Additionally, personality traits become increasingly stable in adulthood and have clear mean-level trends (Roberts & Nickel, Chapter 11, this volume) that are widely influenced by close others (e.g., spouses), social roles, and life events (Bleidorn, Hopwood, & Lucas, 2018).

Conclusion

Parenting practices have widespread effects on offspring personality development. Moreover, the pathways in which parenting behaviors influence offspring personality traits and life outcomes are multiply determined (as shown in Figure 16.1). It is evident that a parent's own personality traits influence which parenting practices he or she chooses. These same parenting behaviors, however, are also shaped by the offspring, in that offspring personality traits evoke certain behaviors and responses from the parent. Furthermore, there is some evidence that offspring personality mediates and moderates the influence of parenting behavior on offspring life outcomes, which helps researchers and practitioners understand *how* and *why* parenting and personality are related. However, beyond childhood and adolescence, we know little about the parent–offspring relationship and whether parent-

ing behaviors continue to shape personality development into adulthood.

Moving forward, the study of personality and parenting needs more longitudinal research that includes multiple measures of parenting, especially observational measures. There is also a need for more formal tests of the degree to which parenting behavior influences development by changing offspring trait characteristics, as well as increased attention to second-order effects between parenting and personality. Null effects need to be reported in order to prevent publication biases. This is especially true in an area of research in which our intuitions tell us that parenting *should* matter, because confirmation bias may make us more distrustful of findings in which it does not. Finally, this research will advance as context is given proper consideration; not all parents may agree that a particular trait will benefit their child in the present environment, making studies that do not account for person–environment fit incomplete.

Although the influence of parenting has been of long-standing interest and has accumulated vast amounts of empirical research, the field has much to learn beyond the basic associations between parenting and personality. Parents are the first, and possibly the most important, socializing agents for adaptive development, which makes it crucial to continue to push research forward in this area. As the film *Home Alone* shows, it is possible to physically survive a vacation without family, but the influence of parents on offspring endures.

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PART IV

COGNITIVE AND MOTIVATIONAL PROCESSES

CHAPTER 17

Cognitive Approaches to Personality

Michael D. Robinson

Mid-20th-century personality psychologists had a broad view of what comprises personality and how one might assess it. Measures of perception, reaction time, and task performance coexisted with the more familiar methods of self-report and peer-report (Cattell, 1946; Eysenck, 1952). As psychology became more specialized, the experimental and personality branches parted ways and started to focus on different questions. Experimental psychology focused on normative phenomena within particular paradigms (Posner, 1973), whereas personality psychology concerned itself with structural questions (Goldberg, 1993). Now that the structure of personality is fairly clear (see John, Chapter 2, this volume), we can return to integrating trait- and process-based views of the individual (Cattell, 1946; Eysenck, 1952).

One reason for doing so is that there will always be questions about self-report. There are limitations to what people know about themselves, such as what sorts of information they attend to or how their self-concepts are structured (Greenwald & Banaji, 1995). Motivational factors almost certainly influence what people say about themselves, such that systematic distortions can be expected (Robins & John, 1997). And there is a level of abstraction to trait self-reports, which essentially means that people are reporting on

long-standing beliefs about the self rather than their recent behavioral or emotional tendencies (Klein, Loftus, & Kihlstrom, 1996). In this context, more objective probes of personality, using cognitive methods, can be viewed as helpful supplements. This is particularly true because they capture tendencies that are more online or *in vivo* than do self-reports of personality (Robinson & Wilkowski, 2015).

Cognitive approaches are also valuable in testing theories of personality. As an example, Gray suggested that the trait of extraversion could be aligned with the behavioral activation system and the trait of neuroticism could be aligned with the behavioral inhibition system (Corr, 2004). These process-oriented ideas lend themselves to specific hypotheses about how reward and punishment should affect performance in cognitive-experimental tasks (Leue & Beauducel, 2008). Similarly, we might propose that agreeable people are nicer to others because they have learned how to self-regulate, or control, their hostile thoughts. Theories of this type can be tested by priming hostile thoughts to see how they affect subsequent performance as a function of agreeableness (Wilkowski & Robinson, 2008a). Cognitive approaches, in other words, can be used to test and refine our thinking about how particular personality traits operate.

Cognitive approaches can also be used to reveal tendencies that are not necessarily captured by personality trait measures. As an example, biases to attend to threatening information are thought to play a role in the genesis of anxiety and fear (Beck & Clark, 1997). If so, we should be able to predict people's vulnerability to such states on the basis of whether they attend to threats within attentional paradigms (MacLeod, 1999). Furthermore, a number of theories converge on the idea that people have unconscious associations to the self that are likely to guide their choices and behaviors in profound, yet implicit, ways (Greenwald & Banaji, 1995). Such unconscious associations cannot be measured by self-report, but they can be measured using other, more cognitive techniques (Greenwald & Farnham, 2000). In summary, it is plausible that there are implicit forms of personality that matter in everyday life despite weak or nonexistent correlations with explicit measures of personality (Robinson & Wilkowski, 2015).

This chapter focuses primarily on the utility of cognitive approaches in understanding how (self-reported) personality traits operate. In this connection, I review some evidence for the idea that extraversion can be understood in terms of individual differences in reward sensitivity and/or reactivity. I then review more extensive lines of work seeking to understand the cognitive-affective processes that vary by neuroticism and agreeableness. Subsequently, the review touches on three classes of implicit personality measures. Altogether, my aim is to show how cognitive approaches can enrich our understanding of personality both in combination with, and sometimes independent of, self-reports about personality.

Extraversion as Reward Reactivity

The purported processing basis of extraversion has shifted over the years. Whereas Eysenck's arousal theory of extraversion once dominated the field, reward processing theories now do (Smillie, 2013). According to these theories, many of the correlates of extraversion—such as excitement in goal pursuit—can be understood in terms of greater levels of reward sensitivity or reac-

tivity at higher levels of extraversion (Zelen-ski & Larsen, 1999). This theory has gained some support in both emotion induction studies and neurocognitive studies. A frequent finding in emotion induction studies is that extraversion predicts changes in positive affect in response to a positive induction, such that greater positive emotional reactivity is observed at higher levels of extraversion (Zelen-ski & Larsen, 1999). Canli (2004) has observed similar results in neurocognitive studies, such that extraversion predicts the extent of the brain's reactivity to positive emotional stimuli.

Efforts to develop cognitive probes of reward reactivity have comprised at least two types. In reinforcement sensitivity studies, people receive monetary or other rewards for good performance, and the question is the extent to which performance improves when rewards are present (Corr, 2004). Extraversion tends to predict reward reactivity in such paradigms (Leue & Beauducel, 2008), but a number of largely unknown task parameters appear to moderate this relationship (Matthews & Gilliland, 1999). In light of these complexities, simpler paradigms may be desirable (Robinson, Boyd, & Liu, 2013).

A very simple task, the affective priming task, asks people to evaluate positive and negative stimuli while measuring reaction time in doing so. Although extraversion does not predict how quickly positive stimuli can be evaluated, independent of priming factors (Robinson, 2007), it does predict the extent to which one positive evaluation speeds the next one, a cognitive form of reward reactivity (Robinson, Moeller, & Ode, 2010). As Robinson et al. (2013) emphasized, results of this type can help explain why extraverts react more favorably to positive inductions, in that these inductions are likely to prime positive thoughts to a greater extent among extraverted individuals.

There is also some evidence for the idea that extraverts perform better when in a positive emotional state. Specifically, in four studies, Tamir, Robinson, and Clore (2002) showed that mood states interact with extraversion to predict the speed with which people link their goals to relevant stimuli in a go/no-go task. Extraverts were faster to identify both desired (e.g., *love*) and unde-

sired (e.g., *pain*) stimuli when in a positive mood state, but introverts were faster to do so when in a negative mood state. These results suggest that positive emotional states facilitate goal-relevant processing at higher levels of extraversion. Even so, it is apparent that more work needs to be done both to evaluate and to flesh out reward processing theories of extraversion (Corr, 2004; Smilie, 2013).

Multiple Perspectives on Neuroticism

Neuroticism is the trait of the Big Five that best captures tendencies toward negative affect, emotional reactivity, self-esteem issues, and subjective health problems (John, Chapter 2, this volume; Suls & Martin, 2005). Because neuroticism is problematic in multiple ways, it (and/or the closely related trait of anxiety) has received attention from both clinical and personality psychologists (Sauer-Zavala, Wilner, & Barlow, 2017). Perhaps as a result, there are a number of promising cognitive perspectives on neuroticism.

The Role of Attending to Threat in Neuroticism

People differ in their tendency to attend to threatening information relative to nonthreatening information (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & Van IJzendoorn, 2007). These individual differences have been most clearly established with versions of the dot-probe task, which seeks to determine whether spatial attention favors threatening or nonthreatening stimuli when the two types of stimuli are presented concurrently (MacLeod, 1999). With low-intensity stimuli, people high in trait anxiety (which is highly correlated with neuroticism) tend to favor threatening information; by contrast, people low in trait anxiety often orient away from threatening information (Bar-Haim et al., 2007). Such attentional biases may contribute to, or reinforce, dispositional variations in anxiety.

Indeed, a growing body of work has suggested a causal role for such attentional factors in emotional reactivity. An influential study along these lines was conducted by MacLeod, Rutherford, Campbell, Ebswor-

thy, and Holker (2002). By random assignment, some participants were given a spatial probe task in which spatial probes neither favored nor disfavored threat stimulus locations. By contrast, others were assigned to an experimental condition in which spatial probes almost always (90% of the time) occurred in a location previously occupied by a nonthreatening stimulus. Over the course of more than 500 trials, MacLeod et al. reasoned that participants in the second condition would learn to orient away from threatening information, which would produce hedonic benefits. Although the training manipulation did not affect mood, it did affect emotional reactivity to a laboratory stressor, an effect subsequently replicated by several research groups. Current researchers are exploring the therapeutic significance of such training regimens, particularly for individuals with anxiety disorders (MacLeod, Koster, & Fox, 2009).

As should be clear, this attention-related work has primarily been conducted by clinical psychologists. Nonetheless, a meta-analysis suggests that this cognitive model of anxiety appears to apply somewhat equally well to both nonclinical and clinical populations (Bar-Haim et al., 2007). Accordingly, it is reasonable to think that attending to threat should both vary with the trait of neuroticism and potentially reduce neuroticism levels when trained (Robinson & Gordon, 2011). Nonetheless, more personality-oriented work along these lines would be valuable.

Neuroticism as a Negative Memory Network

Neurotic people react more strongly to stressors (Suls & Martin, 2005), and they ruminate more frequently (Hervas & Vazquez, 2011). Cognitively, both phenomena suggest a memory network that favors negative affect at higher levels of neuroticism; that is, negative affective thoughts are likely to be more closely interconnected among neurotic individuals, perhaps accounting for their tendency to dwell on the negative features of their lives.

Hypotheses of this type can (also) be examined using the affective priming task. In this case, though, the prediction is that negative, rather than positive, priming effects

should be more evident at higher levels of neuroticism. Robinson, Ode, Moeller, and Goetz (2007) examined this prediction in two studies and found that negative priming effects were indeed stronger at higher levels of neuroticism. By contrast, neuroticism did not predict the magnitude of positive priming effects. In our experience, however, negative priming effects are sometimes difficult to observe in the affective priming task. This suggests the potential value of other technologies in probing affective memory networks as a function of personality.

Punishment Reactivity Processes in Neuroticism

Theoretically, neuroticism has been linked to punishment sensitivity (Corr, 2004), yet there are surprisingly few basic probes of punishment sensitivity (Robinson et al., 2013). Moeller and Robinson (2010) created one in the following manner. On each of 120 trials, participants were asked to predict whether an arrow would point up or down. On 50% of these trials, they received punishment feedback in the form of an “incorrect!” error message; on the remainder of the trials, they were told that they were correct in their predictions. Moeller and Robinson defined *punishment sensitivity* as the tendency to make different predictions following error feedback (e.g., make a down arrow prediction on the trial following an up arrow prediction that received error feedback). As hypothesized, the tendency to alter one’s predictions in response to error feedback was pronounced at high levels of neuroticism. By contrast, this same tendency was absent at low levels of neuroticism. These results indicate that people high in neuroticism are more sensitive to punishment feedback, even under circumstances in which altering one’s behavior cannot improve performance.

Robinson, Moeller, and Fetterman (2010) examined the potential link between neuroticism and punishment sensitivity in a different way, namely, by examining how much people slow down following their errors in a categorization task. Slowing down following errors is normally thought to reflect adaptive attempts at self-regulation, which

should tend to improve accuracy in the long run (Holroyd & Coles, 2002). Alternatively, though, slowing down following errors could represent an emotional form of error reactivity that would not generally aid one’s performance (Bush, Luu, & Posner, 2000). Robinson, Moeller, and Ode (2010) hypothesized that the former, adaptive form of post-error adjustment would be true of people low in neuroticism, whereas the latter, less adaptive form of emotional reactivity would be true of people high in neuroticism. In four studies, neuroticism did not generally predict the extent of slowing down following errors. Nonetheless, slowing down following errors predicted worse performance at higher, but not lower, levels of neuroticism. Hence, reacting to errors appears to take a less functional, more emotional form at higher levels of neuroticism.

Neuroticism as Avoidance

Neuroticism seems to be closely related to avoidance motivation. Indeed, self-reports of avoidance motivation often correlate very highly with both trait negative affect and neuroticism (Elliot & Thrash, 2002). Avoidance motivation should, in turn, result in some detectable cognitive and perceptual signatures. Specifically, self-regulation by avoidance can be thought of in terms of a distance-increasing dynamic, whereby distance is placed between the self and objects in its environment (Carver & Scheier, 1998). Perceptually, this would result in objects that seem further away, smaller, or shrinking (Gibson, 1966).

On the basis of these ideas, Liu, Ode, Moeller, and Robinson (2013) hypothesized positive relationships between neuroticism and perceptual distancing. Studies 1 and 2 used ambiguous phrases akin to those used by Boroditsky and Ramscar (2002), who showed that the same phrases (e.g., “Next Wednesday’s meeting has been moved forward 2 days”) could be perceived in terms of events that are closer in time (e.g., Monday) or more distant in time (e.g., Friday), depending on one’s perspective. As hypothesized, people higher in neuroticism were more likely to interpret the phrases in a distance-favoring direction, such that the

events seemed further away in the future (Liu et al., 2013).

In Studies 3 and 4 they then examined these ideas in the context of visual perception tasks. In Study 4, for example, neurotic participants thought that stimuli were shrinking (thus moving away from the self) faster than they were growing (thus moving toward the self), though this was not the case. The same bias was not evident at low levels of neuroticism. Overall, this (Liu et al., 2013) program of research provided some initial support for the idea that neuroticism triggers perceptions consistent with self-regulation by avoidance, though further explications of this model would seem desirable. In addition, we need more basic evidence that neuroticism facilitates motor behaviors consistent with avoidance (Robinson et al., 2013).

Neuroticism as Conflict

Freud (1926) posited intrapsychic conflict in the genesis of neurotic symptoms. This emphasis on conflict was shared by later psychodynamic theorists as well, such as Horney (1945) and Fenichel (1945). Although these particular theories may seem outdated, it is not outdated to suggest that anxiety is almost inevitable in the context of conflicting desires and goals (Baumeister, Muraven, & Tice, 2000). From this perspective, we would expect anxious people to be more conflicted than nonanxious people.

There are sources of evidence consistent with these ideas. Emmons (1986) found that goal conflict is predictive of both anxiety and neuroticism. Similarly, King and Emmons (1990) found that conflict over emotional expression is predictive of neuroticism. Furthermore, both role conflicts (Donahue, Robins, Roberts, & John, 1993) and conflicts among sources of knowledge about the self (Colvin, 1993) are predictive of neuroticism levels. In a general sense, then, neuroticism and conflict appear to be linked to each other. It would be useful to extend this conflict-related perspective in the context of information processing or decision-making paradigms. For example, would the induction of conflict differentially slow decision making at high levels of neuroticism? We know of relatively little research of this type.

Neuroticism as Mental Noise

Neuroticism is often contrasted with stability, a nomenclature suggesting some degree of instability at higher levels of neuroticism. Consistent with this nomenclature, the thoughts and feelings of neurotic individuals do seem to fluctuate to a greater extent over time (Maples, Miller, Hoffman, & Johnson, 2014). Moreover, very high levels of neuroticism have been linked to borderline personality symptoms, with a central feature being instability in thoughts, feelings, and behaviors (Lieb, Zanarini, Schmahl, Linehan, & Bohus, 2004). Accordingly, some degree of instability may be central to the trait of neuroticism.

A portion of this instability is likely to be cognitive in nature. Neuroticism has been linked to *rumination*, a repetitive form of thinking about the past (Hervas & Vazquez, 2011), as well as *worry*, an apprehensive form of thinking about the future (Borkovec & Sharpless, 2004). Even when neurotic people think about the present, they often do so in a self-conscious way (Perkins, Arnone, Smallwood, & Mobbs, 2015). As a result, the neurotic person often loses the signal of present reality in the noise of his or her off-task thinking.

Consistent with these ideas, there is typically a fairly strong inverse relationship between neuroticism and the trait of mindfulness (Hanley & Garland, 2017). This is noteworthy in part because the items of the mindfulness scale (Brown & Ryan, 2003) do not look like neuroticism items; rather, they look like absentminded lapses of attention (e.g., “I drive places on ‘automatic pilot’ and then wonder why I went there”). Furthermore, there is evidence that mindfulness may account for, or mediate, some of the problems endemic to high levels of neuroticism. Specifically, Fetterman, Robinson, Ode, and Gordon (2010) found that both the neuroticism–impulsivity and neuroticism–self-control relationships were mediated by mindfulness. For example, neurotic people engage in impulsive behavior in part because they are not paying attention to what they are doing (Fetterman et al., 2010).

There are even more basic sources of evidence here. Mental noise can be assessed

in terms of the variability of performance across time: To the extent that the mind is noisy, higher levels of variability almost necessarily result (Slifkin & Newell, 1998). If the information processing operations of neurotic people are noisier, then, we might expect higher levels of reaction time variability across trials of a task. Robinson and Tamir (2005) investigated these ideas in three studies in which participants were asked to categorize presented stimuli as quickly as possible. Neuroticism did not tend to predict average reaction times (RTs), but it did tend to predict the variability of RTs across trials. Moreover, these relationships became stronger when researchers controlled for average categorization speed. Thus, there is some indication that neurotic people have noisier or more variable minds in a basic cognitive sense.

In the Robinson and Tamir (2005) studies, neurotic people had more variable RTs, but their average response time was not slower. This interesting pattern of findings suggests that neurotic people may tend to compensate for their lapses of attention on some (slower) trials with more vigorous responses on other (faster) trials. Just such a multiprocess result was reported by Bresin, Robinson, Ode, and Leth-Steensen (2011), who found that neurotic people are both more “driven” on their fast trials and more “distracted” on their slow trials, as reflected in the ex-Gaussian parameters of μ (mu) and τ (tau), respectively. Thus, the noise characteristic of neuroticism appears to have a particular ex-Gaussian signature.

Cognition as a Moderator of Neuroticism–Outcome Relationships

Neuroticism is a problematic trait, but it need not always be. Just as psychotherapy can mitigate some of the negative consequences of neuroticism (Sauer-Zavala et al., 2017), cognitive processing tendencies can render it more or less likely that one’s neuroticism level will result in neuroticism-consistent outcomes (Robinson & Gordon, 2011). Two pertinent lines of research are highlighted here.

Buddhist thinking contends that orienting to the present can offer a respite for distress-

prone people (Brown, Ryan, & Creswell, 2007). Consistent with this idea, one set of studies showed that neuroticism predicted anger (Study 1) and depression (Study 2) to a lesser extent among participants higher in dispositional mindfulness (Feltman, Robinson, & Ode, 2009). In fact, neurotic people who were mindful were not particularly depressed at all. Similar mitigating influences have been found for the variable of encoding speed, measured in RT tasks (Robinson & Clore, 2007). In these studies, neuroticism predicted somatic distress, negative affect, and neurotic behaviors primarily among people slow to assign meaning to events as they occur. Thus, paying attention to what is actually happening, in the current moment, appears to be beneficial at higher levels of neuroticism.

By contrast, carrying the past into the present—in the form of cognitive perseveration—appears to exacerbate the influence of neuroticism. In a series of studies, Robinson, Wilkowski, Kirkeby, and Meier (2006) measured perseveration in terms of tendencies to be faster when responses were repeated rather than switched across consecutive trials of a categorization task. Such perseverative tendencies are indicative of, or facilitate, habit formation (Norman & Shallice, 1986). As hypothesized, people more prone to perseveration were also more “traited” with respect to their neuroticism levels. Specifically, the trait of neuroticism predicted relevant outcomes (e.g., neurotic behavior) to a greater extent at higher levels of perseveration. These results suggest that we could help neurotic people by reducing their perseverative thinking tendencies, if they have them (Robinson & Gordon, 2011).

Finally, I highlight a research direction that should be of interest to both personality and social psychologists. As is well known, Mischel (1968) critiqued the idea of personality traits by stating that behavior seems to depend primarily on the situation. This viewpoint eventually became a personality theory when it was suggested that personality could be likened to if–then (situation–behavior) profiles that differ from person to person (Mischel & Shoda, 1995). For example, aggression might primarily vary by frustration for one person

but by provocation for another (Lawrence, 2006). There is a major limitation to this social-cognitive view, however: Traits exist; that is, some people are more prone to aggression than others across a variety of circumstances (Anderson & Bushman, 2002). It may therefore be useful to combine trait and social-cognitive views in order to make more precise predictions.

Moeller, Robinson, and Bresin (2010) attempted such an integration. Social-cognitive associations (Mischel & Shoda, 1995) were modeled in terms of RT priming effects. Along these lines, Study 1 assessed the extent to which stress-related primes (words like *frustration* or *problems*) activated thoughts of an aggressive nature. There was no normative effect of this type, indicating that people differ quite a bit in their stress–aggression associations. Of more importance, we then showed that neuroticism and such stress–aggression associations interacted to predict (self-reported) physical aggression. Physical aggression was particularly pronounced among people who were prone to stress due to their high neuroticism levels, and who also had strong implicit associations of a stress–aggression type. The relevant pattern, displayed in Figure 17.1, suggests that priming tasks can be used to predict the particular realms in which high levels of neuroticism are likely to manifest themselves.

Agreeableness and the Self-Regulation of Hostile Thoughts

It is generally accepted that hostile thoughts play a major role in anger and aggression (Anderson & Bushman, 2002; Berkowitz, 1993). This framework is particularly apt in thinking about the situational causes of these outcomes. Thus, we get angry at people when we have hostile thoughts (Berkowitz, 1993) and we act aggressively to the extent that the situation activates hostile thoughts (Anderson & Bushman, 2002). An important way of thinking about these influences is in terms of information accessibility (Higgins, 1996): We are far more likely to feel anger and to behave aggressively when hostile thoughts are accessible (activated, ready to use) than not (Anderson & Bushman, 2002).

Potentially independent of situational factors, personality factors are also important predictors of anger and aggression. In particular, the trait of agreeableness is a fairly strong inverse predictor of both of these occurrences (Egan, 2009). The specificity of these relationships is somewhat impressive, in that agreeableness is generally much less related to other forms of negative emotion (Watson, 2000) or impulsive behavior (McCrae & John, 1992); that is, agreeableness levels seem key to predicting whether people will become angry and aggressive (Wilkowski & Robinson, 2008a).

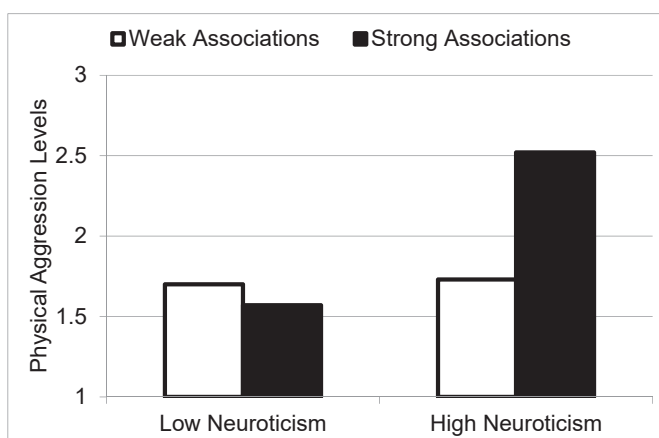


FIGURE 17.1. Physical aggression as a function of neuroticism levels and stress–aggression associations. Based on Moeller, Robinson, and Bresin (2010).

Given that accessible hostile thoughts predict anger/aggression and that agreeable people are less aggressive, it is natural to wonder whether people higher in agreeableness have less accessible hostile thoughts. This is in fact a fairly straightforward translation of social-cognitive models of aggression, which posit a kind of “chronic” (baseline) thought accessibility to account for individual differences (Anderson & Bushman, 2002; Higgins, 1996). To examine possible relations between agreeableness and hostile thought accessibility, Meier and Robinson (2004) created a categorization task that required people to recognize blame-relevant words as quickly as possible, as blame is a major predictor of anger and aggression (Shaver, 1985). In fact, agreeableness was not correlated with blame speed (controlling for a neutral task); that is, agreeable people were equally skilled blamers as disagreeable people.

Importantly, though, agreeableness interacted with the blame accessibility measure to predict everyday experiences of anger and aggression (Meier & Robinson, 2004, Study 1). At low levels of agreeableness, anger and aggression varied straightforwardly with blame accessibility: The higher the blame accessibility, the greater the anger and aggression. At high levels of agreeableness, on the other hand, there was no relationship between blame accessibility and daily

anger (see Figure 17.2) or aggression. Particularly noteworthy in the latter case was that agreeable people were low in anger and aggression even when their blame accessibility levels were very high. Furthermore, such interactions were conceptually replicated in a second study, which also included a priming manipulation of hostile thoughts: Such thoughts translated into anger for people low in agreeableness, but not high in agreeableness. These results suggest that agreeable people are capable of self-regulating the influence of their hostile thoughts, whether chronic (Study 1) or automatically activated (Study 2).

A weakness of the Meier and Robinson (2004) studies was that they did not capture self-regulatory tendencies in action. Meier, Robinson, and Wilkowski (2006) sought to do so using a sequential priming task in which the question was what would happen to the accessibility of prosocial thoughts (i.e., thoughts related to caring and helping) following hostile primes (e.g., words like *blame* or *criticize*). A straightforward prediction is that hostile primes would tend to undermine, or reduce, the accessibility of prosocial thoughts, much as hostility and warmth inhibit each other in circumplex terms (Gurtman, 2009). This pattern was evident at low levels of agreeableness. On the other hand, people higher in agreeableness were actually *faster* to recognize proso-

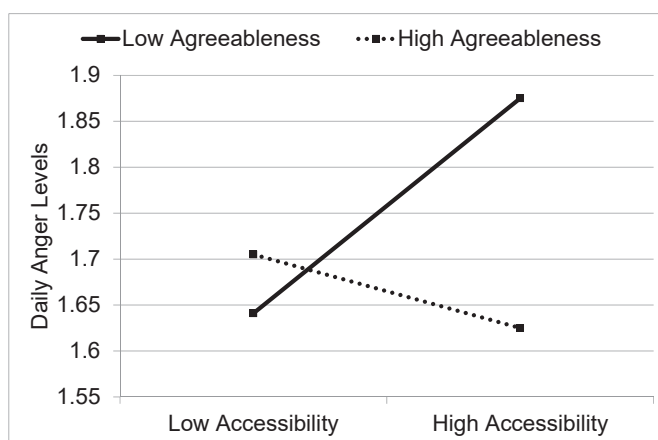


FIGURE 17.2. Daily anger as a function of agreeableness and blame speed accessibility. Based on Meier and Robinson (2004).

cial targets following hostile primes, a pattern of performance suggestive of automatic forms of self-regulation (Myrseth, Fishbach, & Trope, 2009). In other words, people high in agreeableness appear to somewhat automatically recruit prosocial thoughts as a way of combating their hostile thoughts, when they have them.

This model of agreeableness was further validated in an experimental study (Meier, Wilkowski, & Robinson, 2008). Participants were randomly assigned to one of two conditions. In the experimental, or training, condition, hostile primes were systematically paired with prosocial targets in a procedure borrowed from Baccus and Baldwin (2004). In the control condition, no such associations were trained, though prosocial targets were presented equally often. Subsequently, participants played in a competitive RT task that actually measures tendencies toward aggression. As hypothesized, training people to recruit prosocial thoughts following hostile primes reduced subsequent levels of aggression. Thus, the cognitive tendencies that agreeable people naturally exhibit (Meier et al., 2006) are efficacious in reducing aggression likelihood (Meier et al., 2008).

Agreeable people do more than control their thoughts in hostile contexts. They also control their behavior. This point was established in a set of studies by Bresin, Fetterman, and Robinson (2012). At the beginning of each trial, participants had to rehearse and memorize a word that was either neutral (e.g., *sweep*, *vacuum*) or hostility-related (e.g., *argue*, *kill*). While rehearsing the trial-specific word, participants engaged in a motor control task that required them to hold a joystick cursor as steadily as possible on a presented visual target. Joystick position was somewhat continuously sampled, and the metric was how closely participants remained to the target. Agreeableness and prime type interacted to predict motor control. At low levels of agreeableness, hostile primes undermined motor control. At high levels of agreeableness, on the other hand, motor control was actually *better* in the context of hostile primes. These results provide important insights into why there is a negative relationship between agreeableness and reactive aggression (Robinson, Klein, &

Persich, 2019). Specifically, agreeable people appear to carefully control their behavior when they have hostile thoughts.

Thus far, our focus has been on how agreeable people control their hostile thoughts once they have them. In addition, though, agreeable people may regulate their attention or the environment, so that they do not have hostile thoughts in the first place (see Gross & Thompson, 2007, for a relevant model). Consistent with this possibility, Wilkowski, Robinson, and Meier (2006) found that agreeable people shifted attention away from the location of hostile stimuli, and Bresin and Robinson (2015) found that agreeable people selected nicer, gentler media (e.g., romantic comedies rather than violent movies) when given a choice. Through their choices and cognitive habits, then, agreeable people seem to create more benevolent environmental niches for themselves, relative to disagreeable people.

In comparison to agreeableness, trait anger may be a more proximate predictor of tendencies toward anger and aggression (Wilkowski & Robinson, 2010). Thus, another body of work has focused on this more specific trait. Wilkowski and Robinson (2007) initially examined reactivity to hostile primes in a word evaluation task. Participants high in trait anger rated words more negatively following hostile primes, whereas people low in trait anger did not. Hence, it appears that people low in anger are capable of mitigating the influence of hostile primes on their subsequent (evaluative) behavior. Studies 3 and 4 then provided some evidence for the idea that these processes are self-regulatory in nature, in that they consume cognitive resources. Such results led Wilkowski and Robinson (2007) to suggest that low-anger people (but not high-anger people) spontaneously recruit self-regulatory resources in hostile contexts, cognitive habits that should be valuable in controlling unwanted forms of emotional reactivity (Berkowitz, 1993).

Direct evidence for this model was reported by Wilkowski and Robinson (2008b) in a study in which participants completed individual trials of a flanker task immediately following the activation of hostile or nonhostile thoughts. Reduced flanker costs

occur when people recruit regions of the frontal lobes to down-regulate problematic thoughts or behaviors (Kerns et al., 2004). Therefore, if people seek to control their hostile thoughts, one might see reduced flanker costs immediately following hostile primes. Just such a pattern was evident at low levels of trait anger. At high levels of trait anger, by contrast, there was no reduction in flanker costs following hostile primes. These findings indicate that people low in trait anger, but not high, spontaneously recruit cognitive control resources in the context of their hostile thoughts. Such habits are likely to play a significant role in anger control (Wilkowski & Robinson, 2010).

Indeed, Wilkowski, Robinson, and Troop-Gordon (2010) were able to link such processing tendencies to anger control. In Study 1, people who exhibited reduced flanker costs following hostile primes were less revenge-motivated in a laboratory aggression task, and they were less aggressive. In Study 2, individual differences in this model of anger control predicted several daily outcomes suggestive of forgiveness. People with reduced flanker costs following hostile primes were more forgiving of provocations in daily life. Additionally, these people were capable of effective forgiveness in that, for them, forgiveness on one day predicted reduced anger on the next. By contrast, people who did not recruit cognitive control following hostile primes were less forgiving of provocations, and their states of forgiveness were less effective in down-regulating anger. These findings, perhaps more than those of Wilkowski and Robinson (2008b), reveal how a cognitive model of anger control can be used to make substantive predictions concerning real-world forms of provocation and reaction.

Flanker effects are malleable in that they rise or fall with the preceding context (Kerns et al., 2004). It is perhaps for this reason that trait anger does not appear to predict the magnitude of the flanker effect, independent of hostile primes (Wilkowski & Robinson, 2008b). Yet there are other forms of control (e.g., motor control) that appear to be more dispositional in nature. Recall that Bresin et al. (2012) found that agreeable people exhibited better motor control while rehearsing hostile words. In addition, they

also found that agreeable people exhibited superior motor control, independent of hostile primes; that is, there was a main effect for agreeableness in this analysis. Bresin and Robinson (2013) sought to extend this main effect perspective to trait anger and its control. In two studies, the trait of anger control was linked to better motor control. In another two studies, the trait of anger was linked to worse motor control. These effects were not altered by emotional context manipulations such as affective sounds. Accordingly, angry people seem less capable of controlling their behavior in micromomentary terms, and motor control tasks may be useful as basic probes of self-control.

Cognition as Implicit Personality

When we ask people about their personality traits, we are assessing explicit components of personality. When we ask people to perform a task, we are potentially assessing implicit components of personality. These two sorts of assessments may not necessarily agree with each other, or they may reveal different things about people. For example, Meier and Robinson (2004) thought that agreeable people would have difficulty assigning hostile meaning in a categorization task, but they failed to observe a relationship of this type. Regardless, people with more accessible hostile thoughts were angrier and more aggressive in daily life (see Figure 17.2), particularly if they were low in agreeableness. Hostile thought accessibility can therefore be regarded as an implicit measure of personality: It predicts outcomes of interest to personality psychologists (e.g., daily anger) but does not correlate with self-reports of personality.

Or consider implicit motives such as the need for power (McClelland, 1987; Schultheiss & Kollner, this volume). These motives can be assessed using a standardized test (which involves writing stories in response to pictures). There are pronounced individual differences that emerge from the test and these predict both long-term (e.g., marital success) and short-term (e.g., argumentativeness) outcomes of interest to social-personality psychologists (Schultheiss & Köllner, Chapter 18, this volume). None-

theless, it is fairly well-established that implicit motives, as assessed by the Thematic Apperception Test (TAT), do not correlate with self-reports of motivation or personality (McClelland, Koestner, & Weinberger, 1989). Implicit motives are therefore personality variables in one respect, in that they predict social–emotional outcomes, but not another, in that they do not correlate with self-reports of personality. Cognitive, or performance-based, measures may often possess these features (Robinson & Wilkowski, 2015), and this should not be surprising, in that assessing how people process information (cognition or performance) is quite different than asking them what type of person they are (self-report). In the sections that follow, I touch on a few classes of measures from this implicit personality perspective.

Conditional Reasoning

When people are motivated to engage in a certain type of behavior (e.g., achievement behavior or aggression), they begin to perceive the world in ways congruent with that disposition. An aggressive person, for example, can justify his or her aggressive impulses by pointing to ways that others are taking advantage of the self. These inferences are sometimes unconscious in the sense that one does not realize that the relevant perceptions are quite subjective, and self-serving, rather than objective (James & LeBreton, 2010).

James and colleagues (2004) created a conditional reasoning test for aggression based on this line of thinking. People were asked to make inferences about ambiguous social scenarios by choosing multiple-choice answers, and some of these alternatives supported hostile, suspicious, but likely erroneous interpretations of character motives (e.g., that one character was planning on double-crossing the other in the future). James et al. (2005) showed that aggressive reasoning of this type was predictive of aggressive behavior in a number of contexts, and these relationships remained significant when they controlled for explicit measures of personality. Although the conditional reasoning approach has primarily been used to study aggression, it can be adapted for other purposes as well (James & LeBreton, 2010).

Implicit Associations

The IAT is an RT test that examines associations at the category level (Nosek, Greenwald, & Banaji, 2005). The test is often used to assess implicit forms of stereotyping and prejudice, but it can be adapted to study the implicit self-concept or personality (Greenwald & Farnham, 2000). In applications of this type, one categorization task asks people to distinguish stimuli associated with the self (e.g., the word *me*) versus not (e.g., the word *them*). This self–other distinction is paired with another distinction targeting some domain of personality, such as introversion versus extraversion. The question is whether the self seems to be implicitly associated with one pole of the personality continuum (e.g., introversion) or the other (e.g., extraversion).

IAT-based measures of personality correlate modestly with explicit measures of personality and seem to predict some relevant outcomes (Greenwald, Poehlman, Uhlmann, & Banaji, 2009). In parallel to the implicit motivation literature (McClelland et al., 1989), such measures seem to be particularly useful in predicting spontaneous, less controlled forms of decision making or behavior (Schnabel, Asendorpf, & Greenwald, 2008). Along these lines, for example, an IAT-based measure of shyness better predicted spontaneous relative to controlled forms of shy behavior, whereas the reverse was true for an explicit personality measure of shyness (Asendorpf, Banse, & Mücke, 2002). In the future, it might be important to extend this literature by focusing on a greater number of nonlaboratory or real-world outcomes, particularly given questions about predictive validity (Oswald, Mitchell, Blanton, Jaccard, & Tetlock, 2013).

Executive Functions

Executive functions are cognitive control operations instantiated by the frontal cortex that allow us to control our behaviors when they would produce problems or errors, while tracking longer-term objectives (Lieberman, 2007). The developmental literature has long theorized, and shown, that executive functions both develop with age and support various forms of self-regulation

(Rothbart, Sheese, & Posner, 2007). Similar ideas have been proposed in the social and cognitive literatures (Hofmann, Schmeichel, & Baddeley, 2012).

Miyake, Friedman, Emerson, Witzki, and Howerter (2000) showed that a number of executive function tasks may be understood in terms of three underlying factors: *inhibition*, *updating*, and *shifting*. Inhibition (measured by tasks such as the Stroop task) overlaps to the greatest extent with a general executive function factor, and updating can be assessed with working memory tasks (Miyake & Friedman, 2012). Executive functions are largely genetic (Miyake & Friedman, 2012) and are protective against problems such as procrastination (Gustavson, Miyake, Hewitt, & Friedman, 2015) and substance use (Young et al., 2009). Individual differences in working memory capacity have also been linked to emotion regulation success (Hofmann et al., 2012). Executive functions are not personality traits, but they are clearly relevant to key outcomes—such as impulsive behavior—that are the concern of personality psychologists.

Conclusions

There is considerable flexibility in cognitive approaches. One can model aspects of attention, perception, priming, automatic self-regulation, and effortful performance. Even within a particular area—such as attention (Pashler, 1998) or cognitive control (Braver, 2016)—several different models or tasks can serve as the basis for one's assessment procedures. In many cases, furthermore, one will want to alter the tasks such that they include factors related to motivation, affect, or social context. Anger could be induced through noise blasts (Robinson, Boyd, & Persich, 2016) or social interactions could be modeled using facial expressions (Mansell, Clark, Ehlers, & Chen, 1999). As should be clear, there is a great diversity in cognitive approaches. This diversity can be an advantage, but particularly when it is combined with the taxonomic strengths of the personality trait literature. In other words, trait and cognitive approaches can complement each other in ways that build on the strengths of each.

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CHAPTER 18

Implicit Motives

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Implicit motives are motivational dispositions that are based on affective responses to rewards and punishments, that operate outside of a person's conscious awareness, and that promote attainment of certain classes of incentives and avoidance of certain classes of disincentives. In this chapter, we discuss three major implicit motives; review the assessment of motive dispositions; and survey the affective, cognitive, physiological, and behavioral functions of implicit motives. We also provide a conceptual framework to account for some key differences between implicit motives and conscious (i.e., explicit) modes of goal striving.

Profiles of Implicit Motives

Over the past 60 years, most implicit motive research has focused on the motivational needs for achievement, affiliation, and power (usually abbreviated *n* Achievement, *n* Affiliation, *n* Power; Murray, 1938). Achievement-motivated individuals get a kick out of doing something well or improving on a task; affiliation-motivated individuals experience close, harmonious contact with other people as satisfying; and power-motivated individuals derive pleasure from

having an impact on and dominating others (e.g., McClelland, 1987; Schultheiss & Brunstein, 2010). In the following sections, we provide short profiles of these three motives and briefly discuss the hope and fear aspects of implicit motives.

The Achievement Motive

The psychological core of *n* Achievement is the *capacity to derive satisfaction from the autonomous mastery of challenging tasks* (McClelland, Atkinson, Clark, & Lowell, 1953; Schultheiss & Brunstein, 2005). Achievement-motivated individuals prefer to work on challenging (but not overly difficult) tasks that demand their full concentration and effort (McClelland, 1987; Pang, 2010a). If they cannot choose and solve such tasks on their own terms, but instead are given explicit direction on how to do it, they are likely to leave the context or invest no effort in the task (Spangler, 1992). Individuals low in *n* Achievement, in contrast, typically avoid challenging tasks because they require effort, and success is neither likely to come quickly nor guaranteed in the first place. So why do achievement-motivated people like to tackle challenges, and why are they so independent-minded about it?

As suggested by Schultheiss and Brunstein (2005), achievement-motivated individuals have a generalized expectation of mastery whenever they encounter cues associated with task difficulty. More specifically, they have learned to associate the originally unpleasant experience of investing effort into a task with the subsequent pleasure of mastery, thus turning perceived difficulty into an attractive challenge and something that they even seek out (see McClelland et al., 1953). This characterization of *n* Achievement is consistent with the observation that achievement-motivated individuals have been raised by parents who not only set age-appropriate challenging tasks and rewarded their children's autonomous task mastery with affection but also punished their children when they failed to master such tasks on their own (for a summary, see Heckhausen & Heckhausen, 2018). The parental emphasis on self-directed mastery may explain why individuals high in *n* Achievement prefer to solve challenges independently and quit if they are not allowed to do so (Schultheiss & Brunstein, 2005). The characterization of *n* Achievement as an automatic expectation of mastery when difficulty is encountered is also supported by recent research. Compared to others, achievement-motivated individuals show less of a stress response when engaging in competitions or having to prove themselves under trying circumstances (Schultheiss, Wiemers, & Wolf, 2014) and instead show more signs of active, coping-oriented physiological and behavioral engagement with challenging tasks (Brunstein & Maier, 2005; Brunstein & Schmitt, 2010; Mazeres, Brinkmann, & Richter, 2019).

However, achievement-motivated individuals only show serious task engagement when they can get feedback about how well they are doing and only step up their efforts if the feedback suggests that the task is challenging (Brunstein & Maier, 2005). Without feedback, there would be no way of recognizing a challenge and, consequently, experiencing pleasurable mastery. Moreover, if there is feedback, but it indicates a lack of difficulty or an insurmountable obstacle, the task is likewise unattractive and will not engage achievement-motivated individuals' effort. Finally, achievement-motivated indi-

viduals prefer feedback that indicates how they are doing individually and show little interest in how they are doing compared to others (Brunstein & Maier, 2005).

Achievement-motivated individuals' Pavlovian attraction to challenges ensures that they are emotionally less vulnerable to difficulty. To them, setbacks only signal that the eventual mastery experience will be particularly pleasurable. As a consequence, people high in *n* Achievement are less likely to suffer from depression and other symptoms of psychopathology (see Neumann & Schultheiss, 2015, for a review and findings) and more likely to experience elevated well-being and adjustment (McAdams & Vailant, 1982; Veroff, 1982).

Another consequence is their preference for careers that provide them with frequent opportunities to come up with and master challenging tasks. Entrepreneurial business is one line of work in which achievement-motivated individuals frequently excel, as long as they have full control over how the business is run and can monitor how well it is doing by, for instance, checking the daily cash flow (Collins, Hanges, & Locke, 2004; McClelland, 1961; Winter, 2010). Their performance fizzles, however, when they work in jobs that require managerial or "people" skills (Spreier, Fontaine, & Malloy, 2006; Winter, 2010). In these jobs, the focus is no longer on what the achievement-motivated person may perceive as the best possible goal, the best possible way to achieve it, and having full control over the process. Rather, managerial positions require the delegation of work to others, finding compromises between conflicting views and interests, and making personnel decisions—none of which has any strong appeal for achievement-motivated individuals.

The Affiliation Motive

At *n* Affiliation's core is a *capacity to derive satisfaction from establishing, maintaining, and restoring positive relationships with others and to experience separation as aversive* (Atkinson, Heyns, & Veroff, 1958; Weinberger, Cotler, & Fishman, 2010). Individuals high in *n* Affiliation enjoy spending more time with people, get more relaxation and satisfaction out of their intimate rela-

tionships, and are more likely to seek social support when faced with stressful situations than those low in *n* Affiliation (Dufner, Arslan, Hagemeyer, Schönbrodt, & Denissen, 2015; Job, Bernecker, & Dweck, 2012; Hagemeyer & Neyer, 2012; Schoch, Noser, & Ehlert, 2018; Zygier, Hagemeyer, Pusch, & Schönbrodt, 2018). They respond with not only approach behavior to nonverbal signals of affiliation, such as facial expressions of joy, but also vigilance and avoidance behavior to nonverbal signals of rejection and hostility, such as facial expressions of anger (e.g., Schultheiss & Hale, 2007; Schultheiss, Pang, Torges, Wirth, & Treynor, 2005). In other words, they want to be with individuals who are friendly and accepting, and distance themselves from people who are not (see Winter, 1996). *n* Affiliation is the only motive for which a gender difference has been found meta-analytically, with women scoring higher than men (Drescher & Schultheiss, 2016; see also Schönbrodt et al., 2020). Drescher and Schultheiss speculated that this difference may be due to differential socialization and/or hormonal differences (see below).

n Affiliation has a dark side (Weinberger et al., 2010) that is particularly likely to surface when affiliative needs are threatened or frustrated. Mason and Blankenship (1987) report that affiliation-motivated women are more likely to psychologically or physically abuse their partners when their relationship is under stress. Hofer and colleagues found that affiliation-motivated individuals experienced more cynicism (Hofer, Busch, Ralhala, Šolcová, & Tavel, 2017), envy, and aggression toward others (Hofer & Busch, 2011a) when they felt isolated, but not when they were engaged in meaningful relationships. Boyatzis (1973) argued that *n* Affiliation is characterized mainly by a fear of rejection and that a motive measure tapping more directly into the capacity for love would likely yield different results. Following Boyatzis's suggestion, McAdams (1980) developed a measure for the intimacy motive (*n* Intimacy), defined as a need to experience warm and communicative exchange with other individuals. Initial research on this motive suggested that it indeed represents something different from *n* Affiliation: It correlates only modestly with the *n* Af-

filiation measure and predicts more positive social outcomes (for summaries, see McAdams, 1992; Weinberger et al., 2010). However, other studies do not support a strong distinction between *n* Affiliation and *n* Intimacy. For instance, in a large cross-cultural study, Hofer and Busch (2011a) found that the two needs correlated at .67, and that both intimacy-motivated and affiliation-motivated individuals reacted to social isolation with envy and aggression. Moreover, Winter (1991) studied effects of affiliation- and intimacy-inducing situations on affiliative thought content and found their effects to be so similar that he did not see a justification for a distinction at the measurement level.

Little is known about the developmental precursors of *n* Affiliation. In a longitudinal study, high *n* Affiliation in adulthood could be traced back to not only more parental use of praise as a socialization technique but also to the mother being less responsive to the child's crying (McClelland & Pilon, 1983). These findings suggest that *n* Affiliation may be rooted at least partly in early separation anxiety or an avoidant attachment, but unfortunately the link between affiliation motivation and patterns of early attachment is largely unexplored (see Edelstein, Stanton, Henderson, & Sanders, 2010).

n Affiliation also affects people's behavior outside of obviously affiliative situations. In achievement contexts, affiliation-motivated individuals excel at tasks that require cooperation with others (Atkinson & O'Connor, 1966; French, 1958) or bring them social approval (Atkinson & O'Connor, 1966), but show inferior performance on competitive tasks (Koestner & McClelland, 1992). Past research on management success indicated that high *n* Affiliation may be at odds with the typical requirements of management, such as making tough personnel decisions and holding everyone accountable to the same standards (McClelland & Boyatzis, 1982; McClelland & Burnham, 2003). However, recent research suggests that *n* Affiliation has become a necessary ingredient for effective management, presumably because contemporary work contexts require managers to be more socially attentive (Steinmann, Dörr, Schultheiss, & Maier, 2015; Steinmann, Ötting & Maier, 2016).

Scholarship on the effectiveness of political leaders similarly illustrates the complexities inherent in affiliation-motivated behavior in the real world. Some studies show that *n* Affiliation may predispose individuals to surrounding themselves with like-minded individuals to whom they feel bound in loyalty and cannot let go of even if circumstances demand it. In the political arena, this leads to bunker mentality and scandal (Winter, 2010). But *n* Affiliation is also a positive predictor of arms-limitation treaties and the peaceful resolution of crises (Winter, 2010), which suggests that even within the same general context, a motive can be a vulnerability or an asset, depending on the specific incentives and contingencies prevalent in the situation.

The Power Motive

Individuals high in *n* Power have a *capacity to derive pleasure from having physical, mental, or emotional impact on other individuals or groups of individuals and to experience the impact of others on themselves as aversive* (Schultheiss, Wirth, et al., 2005; Winter, 1973). Although the ultimate goal of *n* Power may be dominance over others, the canonical definition of this motive focuses on an intermediate step toward dominance, namely, having *impact* on others, which is *not* synonymous with being dominant. This is an important distinction, because the stereotypical picture associated with power is a kind of in-your-face aggressive and domineering behavior. Yet among many mammalian species, particularly primates (cf. de Waal, 1998), this type of behavior is rarely a sustainable strategy for attaining and maintaining dominance, and it is not what typically characterizes individuals high in *n* Power. Although they can be aggressive, irresponsible, and uncooperative (e.g., Hofer, Busch, Bond, Campos, et al., 2010; Rawolle, Schultheiss, Strasser, & Kehr, 2017), more often they have been found to be clever and intelligent in their quest for impact experiences (McClelland & Burnham, 2003). For instance, Dittmann, Purdie-Vaughns, Dovidio, and Naft (2017) found that in members of an oppressed minority, when talking to members of the majority group, high *n* Power leads to the adoption of com-

munication strategies characterized not by self-assertion or demands but by a socially engaging, warm style. This in turn helps power-motivated minority members to have a greater impact on their audience, which finds such messages to be particularly memorable.

Recent research has begun to take a closer look at how power-motivated individuals succeed at having social impact. Power-motivated individuals are generally quick at detecting (Donhauser, Rösch, & Schultheiss, 2015) and correctly classifying others' facial expressions of emotion (Vongas & Al Hajj, 2017); they show enhanced cortical processing of, attentional orienting toward, and memory for such emotional signals, even if they are presented below the threshold of conscious recognition (Schultheiss & Hale, 2007; Wang, Liu, & Yan, 2014; Wang, Liu, Yang, Zhang, & Yan, 2017); and they efficiently learn behaviors reinforced by signals of others' low power and inhibit behaviors leading to signals of others' high power (Schultheiss, Pang, et al., 2005; Schultheiss, Wirth, et al., 2005; Stoeckart, Strick, Bijleveld, & Aarts, 2017, 2018). In short, they have a highly sensitive social-impact detection system that enables them to optimize their behavior for exerting influence on others (Schultheiss & Schiepe-Tiska, 2013).

Consistent with their knack for interpersonal sensitivity and influence, power-motivated individuals are more likely to ascend to the highest levels of management in hierarchically organized corporations (McClelland & Boyatzis, 1982; McClelland & Burnham, 2003), to be more effective once they are in management positions (Steinmann et al., 2015), and, more generally, to have productive and successful careers (McClelland & Franz, 1992; Peterson & Stewart, 1993). However, when working in leadership positions, power-motivated individuals become vulnerable to ingratiating behavior by subordinates and favor an autocratic style of decision making that leaves little room for subordinates' input (Fodor, 2010). Another way for power-motivated individuals to have impact is to "make a splash," to do something that will increase their social visibility by attracting others' attention, such as placing risky gambling bets (McClelland & Watson, 1973). Finally, *n* Power is also involved

in generative behavior (e.g., Peterson & Stewart, 1996). This is reflected to some extent already in the *n* Power measure, which treats themes of unsolicited help as indicators of the need for social impact (Winter, 1991). It is also reflected in power-motivated individuals' articulated desire to contribute something to the well-being of others or the next generation (e.g., Peterson & Stewart, 1993; Winter, 2016). But power-motivated individuals' sociality has boundaries. As a study of couples by Hagemeyer, Schönbrodt, Neyer, Neberich, and Asendorpf (2015) shows, power-motivated men showed signs of impaired relationship functioning when they lived in one household with their partner, but not if they lived apart.

In the political arena, *n* Power is associated with the proactive initiation of armed conflicts, as has been observed in U.S. presidents and South African leaders during the apartheid regime (Winter, 2010). U.S. presidents high in *n* Power have a higher risk of being assassinated (e.g., Kennedy, Lincoln) but are also held in greater esteem by historians than low-power presidents (Winter, 2010). Winter (2016) suggests that the potentially aggressive stance of power-motivated politicians can be mitigated by other factors, such as a generative historical awareness that involves an acceptance of one's own limited role and importance (see also Winter & Leclerc, 2019).

In many studies (e.g., McClelland & Boyatzis, 1982; Steinmann et al., 2015), the effects of *n* Power on behavior depend on individuals' level of activity inhibition, the tendency to use negations in spoken or written language (Schultheiss, Riebel, & Jones, 2009). In general, high-power individuals show more sophisticated, context-sensitive power behavior when they are high in activity inhibition, and more self-centered manifestations of their need for impact when they are low in this variable (Langens, 2010; Schultheiss, 2018; Schultheiss, Riebel, et al., 2009).

Developmentally, research has identified prenatal and early socialization factors that are associated with adult *n* Power levels. Schultheiss and Zimni (2015) and Schultheiss and colleagues (2019) have shown that the ratio between the second and the fourth digit, which reflects fetal hormone exposure

during the first pregnancy trimester, is associated with *n* Power in young adults (see also Janson, Bleck, Fenkl, Riegl, Jägel, & Köllner, 2018; Köllner & Bleck, 2020, for relationships of *n* Power to pubertal hormone exposure). McClelland and Pilon (1983) reported that parental permissiveness for aggressive and sexual behavior assessed at the age of 5 positively predicts *n* Power in middle adulthood. Jointly, these findings suggest a growth-and-prune model of *n* Power development (see Köllner, Janson, & Bleck, 2019) according to which prenatal hormone exposure determines initial *n* Power strength, and then the child's need for social impact is either tolerated or scaled back by more or less punitive parental socialization practices, respectively. Even if parents do not curtail their children's power motivation, further development is necessary to refine the impulsive self-assertion characteristic of young children into the socially more intelligent ways of power-motivated adults. Some contextual factors, such as the presence of both parents (McClelland & Pilon, 1983) or younger siblings (Winter, 1988) during childhood and adolescence appear to contribute to mature adult *n* Power. However, in-depth research into the more proximal factors and processes shaping *n* Power over the course of development is still missing, and the existence of early developmental precursors should not be misconstrued as evidence that motives do not continue to develop in adolescence and adulthood.

Measurement of Implicit Motives

A defining feature of motive research in the tradition of McClelland and his collaborators is the experimental arousal of motivational states to derive and validate motive measures (see Figure 18.1). This feature precedes the implicitness aspect of motives, which emerged as an empirical by-product of accumulating research findings over the years (see McClelland, Koestner, & Weinberger, 1989). For instance, McClelland et al. (1953) experimentally manipulated whether research participants wrote imaginative stories in response to pictures after achievement-arousing conditions (including the encounter of success, failure, or both) or

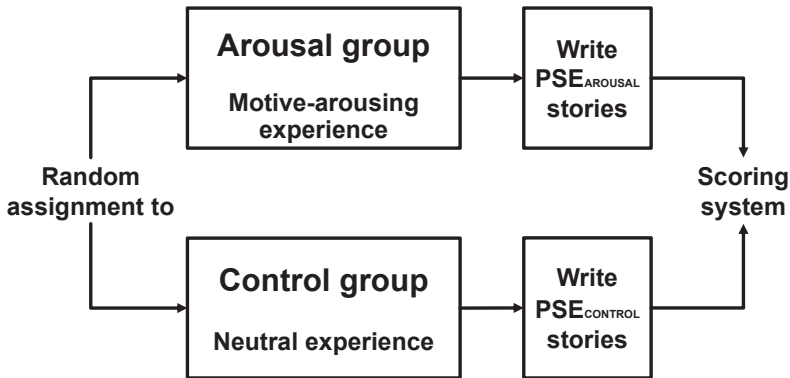


FIGURE 18.1. The logic of experimental arousal of motivation to derive Picture Story Exercise (PSE) coding systems (modified from Winter, 1998).

in a control condition under motivationally neutral circumstances. Winter (1973) contrasted the effects of charismatic speeches versus motivationally neutral travel reports to study effects of power motivation arousal on picture story content. McAdams (1980) collected stories written by individuals in various intimacy-arousal conditions, such as being initiated to a sorority or fraternity or attending a party, and stories written under neutral conditions, in a classroom. In each of these studies, picture stories were later scrutinized for identifiable and recurring narrative imagery that could be coded with high interrater reliability and that differentiated between arousal and control conditions. For each motive, rules for the reliable coding of valid imagery were defined in coding manuals that could then be applied in other studies, to picture stories collected from participants whose motivational state had not been experimentally manipulated. If a participant's stories featured a high amount of imagery, this was interpreted as an indicator for the person's high dispositional motivational need; if the stories were low on imagery, then this was interpreted as a sign of a low dispositional motive.

McClelland (1958; see also McClelland, 1987) termed the covariation between an experimentally manipulated attribute and its measure *sensitivity* and accorded it central importance for a measure's validity. Modern validity theory now takes a similar position. Borsboom, Mellenbergh, and van Heerden (2004) propose as a necessary criterion for

validity that there be a *causal relationship* between an attribute and its measure, such that the attribute must exist and that experimental manipulations in the attribute lead to corresponding changes in its measure. In that sense, motive measures derived in the McClelland tradition fulfilled a key criterion of validity—that of a causal relationship between motives and their measures—from the very beginning.

In principle, the experimental-arousal approach for validating motive measures can be applied to any kind of outcome measure susceptible to motivational arousal effects, such as perceptual thresholds (McClelland & Atkinson, 1948) or implicit association tests (Slabbinck, de Houwer, & Van Kenhove, 2011). Over the past six decades, however, story-writing measures such as the Picture Story Exercise (PSE; McClelland et al., 1989), a descendant of the Thematic Apperception Test (Morgan & Murray, 1935), have been the method of choice for assessing implicit motives. The PSE requires research participants to write short imaginative stories about four to eight pictures showing people in various social situations (e.g., a captain talking to a passenger, two women working in a laboratory). These stories are then scored with content-coding systems derived from the experimental-arousal approach described earlier (see Schultheiss & Pang, 2007, for further details).

Coding systems for the assessment of *n* Power, *n* Affiliation, and *n* Achievement from PSE stories have been revised and re-

financed considerably over time, and a compilation of most existing coding systems for implicit motives was published by C. Smith (1992). Winter (1991) developed an integrated coding system that allows researchers to code all three major motives simultaneously and that can be applied to PSE stories as well as other types of verbal material (e.g., political speeches, diaries). More recently, Pang (2010b) and Schultheiss and Pang (2007) published general guidelines for motive assessment based on PSE story coding. Updated picture norms, guidelines for PSE data treatment, and a database of pictures were provided by Schönbrodt and colleagues (2020).

Reliability of PSE-based motive measures is good in terms of intercoder agreement, with Pearson r 's typically $>.75$, and acceptable in terms of retest stability, with Pearson coefficients of .71 after 1 day, .60 after 1 week, .52 after 1 month, and .37 after 1 year (Schultheiss & Pang, 2007). Internal consistency estimates (e.g., Cronbach's alpha), computed across stimuli (i.e., pictures), are typically much lower (e.g., Schultheiss, 2013a). However, most researchers agree that internal consistency is not an appropriate indicator of the reliability of PSE-based motive measures. For example, Atkinson and Birch's (1970) dynamics of action theory holds that a motivational need, once aroused and expressed in behavior, wanes and does not affect behavior in a subsequent time interval until it is sufficiently aroused again by external cues to resurface. Consequently, if a motive is expressed in response to a previous picture cue, it is less likely to be expressed in response to a subsequent picture. Research on the waxing-and-waning account of inconsistent responding across pictures has yielded inconsistent results (Atkinson, 1981; Lang, 2014; Tuerlinckx, De Boeck, & Lens, 2002).

Schultheiss, Liening, and Schad (2008) proposed an alternative explanation of motive score inconsistency based on Mischel and Shoda's (1995) *if-then* account of personality. According to their explanation, PSE picture cues represent prototypical situational contexts that have become more or less associated with a given motivational incentive (e.g., having impact) and therefore elicit more or less motivational imagery in

a person's story. In support of this account, Schultheiss, Liening, and Schad (2008) showed that motive profiles representing reactions to the individual pictures remained moderately stable across 2 weeks, even though picture sequence was randomized at each measurement. Busch and Hofer (2012) replicated this result in two larger samples and with an 18-month retest interval. These findings suggest that the PSE represents an *if-then* measure of motivational needs, providing information both about the overall strength of a person's motives and about the specific situational contexts in which motives are expressed (Schultheiss & Schultheiss, 2014).

The previous decade has seen increased scrutiny of non-PSE measures claiming to assess implicit motivational needs, primarily the Multi-Motive Grid (MMG; Sokolowski, Schmalt, Langens, & Puca, 2000; see also Johnston, 1957) and the Operant Motive Test (OMT; Baumann, Kazen, & Kuhl, 2010). So far, these measures have not been validated by motivational-arousal studies, and neither measure converges with PSE motive measures (Schüler, Brandstätter, Wegner, & Baumann, 2015). Moreover, the MMG, which combines picture cues with self-report items, features striking similarities with measures of self-attributed (i.e., explicit) motives and traits based on similar picture-item test strategies (Paunonen, Ashton, & Jackson, 2001; Schultheiss, Yankova, Dirlikov, & Schad, 2009), suggesting that this instrument assesses explicit aspects of personality, not implicit motives (Schultheiss, Yankova, et al., 2009).

Hope and Fear Aspects of Implicit Motives

Almost from the start, researchers suspected that each motive may represent two complementary motivational orientations, one directed toward attaining a motive-specific incentive (approach or hope motivation) and another directed toward avoiding a motive-specific disincentive (avoidance or fear motivation) (e.g., Boyatzis, 1973; Heckhausen, 1963; McClelland et al., 1953; Veroff & Veroff, 1972). Others argued that some people may fear a positive incentive itself because of the negative social consequences its attainment may bring (e.g., Horner, 1972; Winter,

1973). These ideas stuck, so much so that the version of this chapter in the previous edition even dedicated a detailed theoretical analysis to this issue (Schultheiss, 2008).

Thirteen years later, we have become more skeptical about the validity of the distinction between incentive-approach and disincentive-avoidance in implicit motive research and conclude that it rests on a weak empirical foundation. The distinction was initially based on theoretical considerations (e.g., Boyatzis, 1973; Heckhausen, 1963; Veroff & Veroff, 1972), and subsequent experimental work has largely failed to demonstrate the expected differences between arousal of incentive-approach and disincentive-avoidance states (Wirth & Schultheiss, 2006) or any motive arousal effect at all (see Hofer, Busch, Bender, Ming, & Hagemeyer's [2010] failure to validate Heckhausen's [1963] coding system). In one notable exception, results pointed toward greater functional similarity between the two motivational modes than originally anticipated (Pang, 2010a). Another reason for caution is the observation that when measures that are presumed to assess hope and fear components of a given motive are used simultaneously in the same study, they typically show substantial variance overlap and predict either the same outcomes or, when they predict different outcomes, are difficult to map onto approach-avoidance concepts in a clear-cut manner (e.g., Hofer & Busch, 2011a; Veroff, 1982).

What *does* appear to be valid is the distinction between hope and fear of an *incentive* (and, conversely, fear and hope of a *disincentive*). Many experimental studies in which motivational incentives and disincentives were experimentally manipulated show disordinal interactions between experimental factors and implicit motive measures in their predictive effects on outcomes. Rather than an indifference toward both incentives and disincentives at very low motive levels, the opposite of what happens at very high motive levels is observed. For instance, Schultheiss, Wirth, et al. (2005) reported that whereas individuals high in *n* Power showed better learning of behavior that was instrumental for beating an opponent (power incentive) and worse learning for behavior that was associated with being beaten (power disincentive), individuals low in *n* Power showed the

opposite effect: worse learning after beating an opponent and better learning after being beaten. Similar disordinal effects were found in other studies involving other motivational needs (e.g., Brunstein & Maier, 2005; Kordik, Eska, & Schultheiss, 2012). Low scores on a given motive measure predicting the opposite of what high scores predict strongly suggest that motive measures based on picture story methods represent a continuum from incentive avoidance, based on *fear and disliking*, at very low scores, through a neutral midpoint at medium scores, to incentive approach, based on *approach and liking*, at high scores.

Other Motives

The research focus on the needs for achievement, power, and affiliation is due, in part, to serendipity and should not be taken to suggest an exclusive status of these needs in motivation science. Other motivational needs have been studied, too (see Atkinson, 1958; C. Smith, 1992). However, because these forays into other motivational domains have so far not generated substantive bodies of research, we do not discuss them here.

How Implicit Motives Differ from Self-Attributed Needs and Goals

One of the most striking and pervasive findings to emerge from more than 60 years of research on implicit motives is that the correlation between storytelling and self-report measures of motivational needs is close to zero. Results from a sample of 309 participants reported by Rawolle, Schultheiss, and Schultheiss (2013; see Table 18.1) illustrates a typical finding: Explicit measures of motivation, like individuals' sense of commitment to personal goals or motivation questionnaire scores, converge with each other, but not substantially with the PSE. A meta-analysis by Spangler (1992) yielded an average variance overlap of less than 1% between PSE and questionnaire measures of the achievement motive. This finding was replicated and extended to other motive domains in a recent meta-analysis (Köllner & Schultheiss, 2014). Here, average corre-

TABLE 18.1. Pearson Correlations between Measures of Implicit Motives,^a Commitment Ratings for Self-Generated Personal Goals,^b and Self-Attributed Motives^c across Three Domains of Motivation

	Implicit motive × personal goal commitment	Implicit motive × self-attributed motive	Personal goal commitment × self- attributed motive
Power	-.12*	.00	.15**
Achievement	.04	-.01	.31***
Affiliation	.10	.02	.26***

Note. *N* = 309. From Rawolle et al. (2013, Table 2).

^aAssessed with the PSE.

^bReflected by scores on items such as “I fully identify myself with this goal.”

^cAssessed with standard questionnaires.

p* < .05; *p* < .01; ****p* < .005.

lations between implicit and explicit motive measures were small for achievement (.14) and affiliation (.12) and did not reliably differ from zero for power (.04). Moreover, Köllner and Schultheiss found that these small correlations decrease to zero in more recent publications. They explained this observation with a substantial file-drawer problem in earlier research.

Schultheiss, Yankova, et al. (2009) pointed out that low correlations between PSE and self-report measures may be due in part to the fact that implicit and explicit motive measures are not commensurable: The former record participants' responses to specific contextual cues (e.g., pictures) and use specific content categories; the latter present largely context-free response options that moreover do not systematically overlap with the content categories used by the former. So, is the lack of association between implicit and explicit motive measures only a methodological artifact masking more substantial relationships between the two forms of measurement? To test this idea, Schultheiss, Yankova, et al. (2009) devised a Picture Story Exercise Questionnaire (PSE-Q) with the same pictures as the PSE and items reflecting the content of each of Winter's (1991) PSE coding categories. In this and subsequent studies (Neumann & Schultheiss, 2015; Schultheiss, Patalakh, Rawolle, Liening, & MacInnes, 2011), PSE and PSE-Q scores for the same motives did not reliably converge, suggesting that the

independence of the two forms of measurement is real. Schultheiss, Yankova, et al. (2009) found that the PSE-Q converged with a standard questionnaire measure of motivational needs, as would be expected based on the interrelationships of explicit measures reported by Rawolle and colleagues (2013). The stubborn lack of substantial between-measures correlations suggests that, in general, *people do not have conscious access to the strength of their motives, as assessed with the PSE, and that the motivational needs and goals they ascribe to themselves cannot be interpreted as valid indicators of their underlying motive dispositions*. For this reason, McClelland and colleagues (1989) labeled motivational constructs assessed with the PSE *implicit motives* and motivational constructs assessed through self-report methods *explicit motives* or *self-attributed needs* (abbreviated *san*).

Implicit and Explicit Motives Predict Different Types of Behavior

Perhaps even more important than the finding that implicit and explicit motives do not correlate substantially is the observation that the two types of constructs respond to different kinds of stimuli and predict different kinds of outcomes. In an early study of the differences between implicit and explicit achievement motives, deCharms, Morrison, Reitman, and McClelland (1955) found that high *san* Achievement, but not high *n*

Achievement, predicted research participants' likelihood of adjusting their ratings of artworks and persons. Conversely, high *n* Achievement, but not high *san* Achievement, predicted episodic memory and performance on a scrambled-word test. Consistent with these early observations, Biernat (1989) found that *n* Achievement predicted good performance on an arithmetic task, but not volunteering for a task group leadership position, whereas *san* Achievement did not predict arithmetic task performance but instead predicted participants' inclination to be a task group leader. Similarly, Brunstein and Hoyer (2002; see also Brunstein & Maier, 2005) reported that *n* Achievement predicted performance on an attention task, but not participants' choice of whether to continue with the task or do something else, whereas *san* Achievement positively predicted the choice to continue, but not the actual performance on the task.

Differences between implicit and explicit measures of motivation have also been reported for other motives (e.g., Craig, Koestner, & Zuroff, 1994; Koestner, Weinberger, & McClelland, 1991; Schultheiss & Brunstein, 1999). For instance, Hagemeyer, Dufner, and Denissen (2016) videotaped participants, whose *n* and *san* Affiliation they had assessed, in a standardized social interaction situation with the experimenter. Videotapes were coded for verbal and nonverbal affiliative behaviors, such as self-disclosure and smiling, respectively. Hagemeyer and colleagues found *n* Affiliation to predict nonverbal but not verbal affiliative behaviors, and *san* affiliation to predict verbal but not nonverbal affiliative behaviors.

Taken together, these studies suggest a double dissociation between implicit and explicit motives and their behavioral correlates, such that implicit motives are more likely to predict nonverbal performance indicators, and explicit motives are more likely to predict choices, judgments, and verbal declarations. This characterization of the differences in predictive validity between implicit and explicit motives is probably too coarse to apply across the board (for examples of implicit and explicit achievement motives additively or interactively influencing the same performance measures, see, e.g., Brunstein & Maier, 2005; Brunstein &

Schmitt, 2010). However, it is broadly consistent with meta-analytic findings (Spanlinger, 1992) and can serve as a useful heuristic for predicting which type of measure will perform well for which outcome type.

Implicit and Explicit Motives Respond to Different Types of Cues

Implicit motives are more aroused by nonverbal than verbal cues. Klinger (1967) observed that individuals showed increases in PSE affiliation and achievement imagery after watching an affiliation-oriented or achievement-oriented experimenter, even when they could not hear his verbal instructions. Similarly, Shantz and Latham (2009) found nonverbal achievement priming to increase *n* Achievement. Schultheiss and Brunstein (1999, 2002) demonstrated that experimenters who verbally assigned a power-related goal failed to arouse their participants' *n* Power. Only after participants had had an opportunity to translate the assigned goal into an experiential format through a goal imagery exercise did their implicit power motive predict goal commitment and task performance.

In recent years, incentive effects of nonverbal cues for implicit motives have been studied extensively through the lens of motivational field theory (MFT; Stanton, Hall, & Schultheiss, 2010). Building on earlier interpersonal theory work (e.g., Wiggins & Trobst, 1999), MFT holds that nonverbal signals of emotion can be classified along the orthogonal axes of dominance and affiliation. According to MFT, dominant emotional signals, such as anger, represent disincentives for perceivers, particularly if their own *n* Power is high, and, conversely, submissive signals, such as surprise or fear, represent incentives for such perceivers. Affiliative emotional signals, such as social smiles, represent incentives for perceivers, particularly if their own *n* Affiliation is high, whereas hostile signals, such as disgust, represent disincentives for affiliation-motivated perceivers. Research focusing on facial expressions of emotion provides support for these predictions. Compared to others, individuals high in *n* Power are particularly sensitive to signals of dominance (e.g., anger) and submission (e.g., surprise) in studies on per-

ceptual sensitivity (Donhauser et al., 2015), attentional orienting (Schultheiss & Hale, 2007), event-related brain potentials (Wang et al., 2014, 2017), instrumental learning (Schultheiss, Pang, et al., 2005; Stoeckart et al., 2017, 2018) and brain activation (Schultheiss, Wirth, et al., 2008). Individuals high in *n* Affiliation are particularly sensitive to not only facial expressions signaling affiliative intent (joy) but also expressions signaling rejection and hostility (e.g., anger, disgust) in studies on facial muscle activation (Kordik et al., 2012), attentional orienting (Schultheiss & Hale, 2007), implicit learning (Schultheiss, Pang, et al., 2005), and valence evaluations (Rösch, Stanton, & Schultheiss, 2013). In summary, research provides mounting evidence for implicit motives' sensitivity to nonverbal signals.

Explicit motives, in contrast, respond preferentially to verbal cues. In a meta-analysis, Spangler (1992) found that high *san* Achievement predicted achievement-related behaviors particularly well in the presence of achievement-focused instructions but failed to predict behavior in the absence of such verbal cues, or in the presence of strong task-intrinsic cues, such as task-based feedback about one's performance increases or decreases. Similarly, Engeser and Baumann (2014) provided experimental evidence that achievement-related words activate the explicit need to achieve but have no effect on *n* Achievement.

An Information Processing Model of Implicit and Explicit Motives

Schultheiss (2001, 2008) has presented an information processing account of implicit and explicit motives that aims to integrate these sets of findings. In a nutshell, the model states that implicit motives preferentially respond to *nonverbal cues and incentives* and, after arousal, are particularly likely to have an impact on *nondeclarative measures of motivation*, that is, measures of behaviors and processes that are not accessible to, or controlled by, a person's self-concept or verbally represented intentions. Nondeclarative measures include physiological responses aimed at promoting biologically rooted needs (e.g., changes in blood pressure and heart rate, hormone release,

muscle tone), acquisition of new stimulus–stimulus associations and goal-directed behaviors through processes of Pavlovian and instrumental learning, and utilization of such learned stimulus connections and behaviors in the appropriate contexts. Explicit motives, on the other hand, preferentially respond to *verbal–symbolic cues* and influence *declarative measures of motivation*, that is, measures that tap into a person's verbally represented sense of self and the attitudes, judgments, decisions, and goals associated with it. Evaluative judgments, choice behavior, assessments of self-regulatory control, and idiographic personal goal descriptions are all examples of declarative measures of motivation.

The model also specifies a mechanism by which verbal cues can interact with implicit motives to influence both declarative and nondeclarative measures of motivation: *Referential processing*, the process through which words are assigned to nonverbal experience and, conversely, mental images are generated in response to words (Schultheiss & Strasser, 2012; Paivio, 1986). One way to employ referential processing is through the strategic translation of verbally communicated goals into experience-like mental imagery. In a series of studies by Schultheiss and Brunstein (1999, 2002), participants were assigned power- or affiliation-related goals and then either had an opportunity to translate these verbally represented goals into an experiential, nonverbal format through guided goal imagery procedures (goal imagery group) or not (control group). The authors found that declarative and nondeclarative measures of motivation were contingent on participants' implicit motives in the goal imagery groups, but were independent of their implicit motives in the control groups (for a replication, see Rawolle et al., 2017). Research shows that in addition to such strategic use of referential processing, dispositional differences in the ability to quickly translate between verbal and nonverbal representations also moderate the degree to which individuals' goal choices fit their implicit motivational needs (Schultheiss et al., 2011). In summary, these findings show that referential processing allows implicit motives to “understand” and respond to verbal stimuli, which would otherwise bypass them.

Other proposed moderators of the relationship between implicit and explicit motives include self-determination (Hofer et al., 2010; Thrash & Elliot, 2002), the ability to quickly down-regulate negative affect (Brunstein, 2001), private body consciousness, self-monitoring, and preference for consistency (Thrash, Elliot, & Schultheiss, 2007), and the hemispheric decoupling effects of progesterone (Schultheiss, Patalakh, & Rösch, 2012). It remains to be determined whether these moderators reliably influence the convergence between implicit and explicit motives and how they relate to each other, as well as to referential processing.

Biopsychological Aspects of Implicit Motives

A central idea in motivation science is that basic motivational needs represent phylogenetically evolved, neurobiologically anchored systems dealing with recurrent problems and requirements of survival, such as finding food, mating, caring for offspring, or, among socially living organisms, affiliating with others and finding one's place in the pecking order (e.g., Panksepp & Biven, 2012; Rolls, 2005; Toates, 1994). Ontogenetically, these systems are fine-tuned through interactions with the environment throughout pre- and postnatal development (see our previous discussion of the association of *n* Power and digit length as a marker of prenatal brain development), giving rise to individual differences in motive strength and style. But at their core, all of them are built around fundamental affective–emotional responses to primal stimuli and situations (e.g., not only eating, orgasm, and having impact but also social rejection and threat) and the cues predicting them (Cabanac, 2014; Panksepp & Biven, 2012; Schultheiss & Wirth, 2018). As a functional consequence, implicit motives are closely coupled to physiological and endocrine manifestations of these responses, such as sympathetic and parasympathetic changes, and their effects on the immune system (see Jemmott, 1987; McClelland, 1989). The hypothalamus represents a central interface between motive-relevant stimulus processing and the autonomic nervous system (ANS) governing these changes

(Iversen, Iversen, & Saper, 2000; Schultheiss, 2013b). But the biopsychological substrates of implicit motives also encompass other brain structures that interact with the hypothalamus: the amygdala, which is critical for learning of predictive cues through Pavlovian conditioning; the striatum, which supports instrumental learning and habit formation; the orbitofrontal cortex (OFC), which represents the hedonic value of rewards and punishers in a need-dependent way; and the hippocampus, which not only provides relevant contextual information to motivational learning processes but is also influenced by the amygdala in its emotion-dependent creation of episodic memories (Hall, Stanton, & Schultheiss, 2010; Schultheiss & Köllner, 2014; Schultheiss & Wirth, 2018). In the following sections, we review evidence for the involvement of specific brain, endocrine, and physiological systems in implicit motives, and also highlight some implications for physical health.

The Biopsychology of the Power Motive

The endocrinology of *n* Power is characterized by the interplay between situational factors, the hormonal stress responses they elicit, and gonadal steroid changes that partly depend, in turn, on stress hormone changes. Summarizing the state of research, Stanton and Schultheiss (2009; Schultheiss, 2013b) describe this complex dynamic for individuals with high *n* Power as follows: Situational arousal of *n* Power leads to primary activation of the sympathetic nervous system (SNS), manifested in the release of adrenaline and noradrenaline. In men, adrenaline has a stimulating effect on the testes, leading to increased testosterone, a hormone involved in physical strength and male dominance across many species. If the individual prevails and wins a dominance contest, testosterone levels also remain elevated and appear to be involved in the consolidation of instrumental learning (see Schultheiss & Schiepe-Tiska, 2013). If the individual is defeated, on the other hand, another type of stress response, mediated by the hypothalamic–pituitary–adrenal (HPA) system, is primarily activated, leading to increased cortisol. In men, cortisol has an inhibiting effect on the testes, leading to a

drop in testosterone after a defeat (see also Vongas & Al Hajj, 2017).

While studies show that *n* Power also predicts testosterone increases in response to dominance contests in women, there is evidence for a more critical role of estradiol in women, with *n* Power predicting increased estradiol after winning and decreased estradiol after losing (cf. Oxford, Tiedtke, Ossmann, Özbe, & Schultheiss, 2017; Stanton & Schultheiss, 2007). Stanton and Schultheiss (2007) therefore speculated that estradiol may represent a female dominance hormone, similar to the role testosterone fulfills in males. Transiently elevated testosterone or estradiol after a victory may help reinforce successful behavior and keep the individual motivated for another fight, just as transiently depressed levels of these hormones after a defeat inhibit unsuccessful behavior and help avoid another costly fight (Mazur, 2015; Stanton & Schultheiss, 2009).

Situational power challenges or stressors with their effects on SNS arousal and stress hormone release make power-motivated individuals more susceptible to cardiovascular problems, immune system changes, and illness (Jemmott, 1987; McClelland, 1989). Power stress has been shown to lead to elevated and prolonged SNS activation and suppressed immunocompetence in power-motivated individuals and, as a consequence, to more frequent and severe illness in these individuals (for a summary, see McClelland, 1989).

n Power also predicts brain activation responses to power-related incentives. Schultheiss, Wirth, et al. (2008; see also Hall et al., 2010) used high- and low-dominance facial expressions of emotion as stimuli in a functional magnetic resonance imaging (fMRI) study. Individuals high in *n* Power showed increased brain activation in the striatum, the OFC, and the insula (a cortical area involved in subjective emotional experience), particularly in response to high-dominance anger faces. Hall and colleagues (2010), in a reanalysis of this study, also found that *n* Power predicted increased amygdala responses to such faces. These findings suggest that *n* Power is tied to several key areas of the motivational brain involved in incentive

prediction and evaluation as well as in instrumental learning.

The Biopsychology of the Affiliation Motive

Research on the biological aspects of *n* Affiliation suggests an association of this motivational disposition with indicators of parasympathetic nervous system (PNS) activity, better cardiovascular health, and better immune system functioning (for summaries, see Jemmott, 1987; McClelland, 1989; for a recent finding, see Prestele, Gerstenberg, Hagemeyer, & Geisler, 2016). Another line of research points to a link between *n* Affiliation and the steroid hormone progesterone (see Schultheiss, 2013b, for an overview). For instance, women who take oral contraceptives, which contain progesterone, have higher *n* Affiliation scores than women not taking the pill or men (Schultheiss, Dargel, & Rohde, 2003; Schultheiss & Zimni, 2015). Also, higher *n* Affiliation scores are preceded by greater increases of progesterone in the course of women's menstrual cycle (Schultheiss et al., 2003). In an attempt to synthesize findings on the link between progesterone and *n* Affiliation, Wirth (2011) has suggested that progesterone, through its effects on gamma-aminobutyric acid (GABA) receptors in the brain, may help to down-regulate HPA axis activation once it has been triggered by stressors. This account is consistent with the more general idea that social affiliation acts as a buffer against stress (Taylor, 2006), but also with the idea that, conversely, overwhelming stress may disrupt one's ability to affiliate with others (Sandi & Haller, 2015). Although research on *n* Affiliation has only focused on progesterone as a specific marker so far, it may also be associated with other hormones and transmitters, such as oxytocin and opioids (see Gangestad & Grebe, 2017).

The Biopsychology of the Achievement Motive

The biological correlates of *n* Achievement have received the least attention so far, despite the fact that clues to such correlates emerged almost from the beginning of *n* Achievement research (e.g., Muecher & Heckhausen, 1962). For instance, Bäumler (1975; cf. Schultheiss & Brunstein, 2005)

showed that administration of a drug that increases central dopamine, a key transmitter in reward prediction and reinforcement processes in the midbrain and the striatum, leads to increased *n* Achievement, whereas administration of a drug that decreases dopamine leads to reduced levels of this motive. Other research suggests a link between *n* Achievement and the peptide hormone arginine vasopressin (AVP), which regulates water retention in the body and memory processes in the brain. McClelland (1995) reported evidence that individuals high in *n* Achievement urinate less and have better story recall after achievement arousal. Although these findings support the *n* Achievement–AVP hypothesis, it has not been tested directly yet.

Finally, recent research points to a role of *n* Achievement in stress response regulation. Individuals high in *n* Achievement show an attenuated HPA stress response to one-on-one competitions, to stressful social evaluation tasks (Schultheiss et al., 2014), and to negative performance feedback (Yang, Ramsay, Schultheiss, & Pang, 2015). They also exhibit greater SNS activation in response to challenging, but not to easy or impossibly difficult, tasks (Brunstein & Schmitt, 2010). Consistent with the characterization of *n* Achievement as a preference for challenges outlined earlier, these findings suggest that achievement-motivated individuals view difficult tasks not as threats, which would preferentially lead to HPA activation, but as challenges, which engage the SNS.

Core Motivational Functions of Implicit Motives

Current theorizing in motivation science emphasizes the role of affective responses to incentives and disincentives as the prime mover of motivation (see Schultheiss & Wirth, 2018, for a review). According to Berridge (1996; Berridge & Robinson, 2003), the motivational process consists of two consecutive, functionally interdependent phases, termed *wanting* and *liking*. Liking denotes the primal affective response to rewards (pleasure) and punishments (pain), that is, to what learning theory has termed *unconditioned stimuli*. Cabanac

(2014) holds that such hedonic responses signal the usefulness, or harmfulness, of a stimulus, event, or situation for an organism's survival, depending on the organism's current needs. They thus represent a common currency for evaluating the utility of outcomes that can otherwise be very diverse (e.g., food, safety) along one dimension. How much pleasure or pain an unconditioned stimulus generates—how much it is liked or disliked—has consequences for how much it is wanted in the future, that is, how emotionally compelled an organism will feel to pursue it, how much energy it is willing to invest in its attainment or avoidance, how much attention to predictive cues (conditioned stimuli) and their situational contexts it will pay, and how well it will retain (or inhibit) behaviors that have brought about the reward (or punishment). Of course, the relationship between wanting and liking is an iterative process that after every motivational episode needs to recalibrate, through the outcome evaluation represented by liking, whether less, the same, or more wanting will be appropriate in the future (see Rescorla & Wagner, 1972). In the following, we present a model of implicit motives that anchors them in the liking phase of motivation, as generators of hedonic responses to motive-specific incentives and disincentives, and that describes their effects on components of the wanting phase as consequences of this fundamental function (see Figure 18.2 for an overview).

Motives Are about Liking: Hedonic Responses to Incentives and Disincentives

Atkinson (1957) argued that a motive represents a capacity to have a strong affective response to motive-specific (dis)incentives—this is the basis of the motive definitions we gave at the beginning. Thus, the strength of an implicit motive determines the strength of individuals' affective responses to a motive-specific unconditioned stimulus, turning incentives into something pleasurable and rewarding and disincentives into something painful and aversive. Without a motive, there is no hedonic response to such stimuli.

Evidence for an affect-scaling function of implicit motives comes from studies of facial expressions, which represent a prime

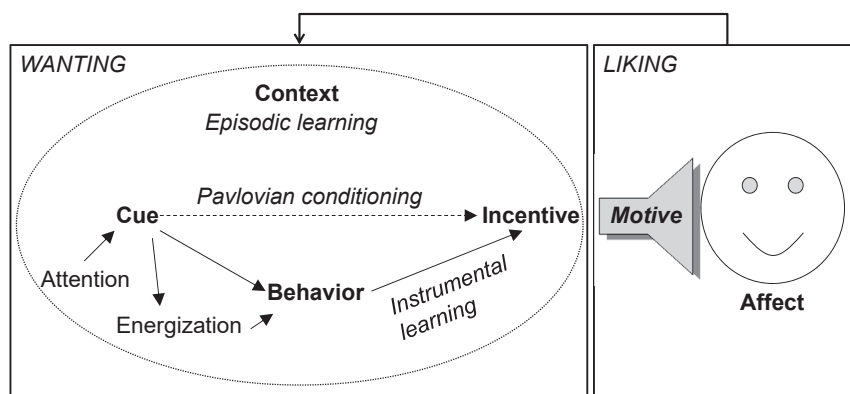


FIGURE 18.2. Schematic overview of implicit motive effects on affect, learning, attention, and behavioral energization.

indicator of the hedonic impact of goal attainment (cf. Berridge, 2000). In humans, spontaneous smiles reflect a positive hedonic response, and frowns reflect a negative hedonic response to a wide variety of stimuli and situations (Larsen, Norris, & Cacioppo, 2003). There is growing evidence that facial hedonic responses to motive-specific stimuli are stronger in high-motive individuals and weaker or absent in low-motive individuals. For *n* Affiliation, Dufner and colleagues (2015) used electromyography (EMG) of muscle activity over the *corrugator supercilii*, activated in a frown, and the *zygomaticus major*, activated in a smile, to assess individuals' hedonic responses to pictures with positive affiliative content (e.g., a family going for a walk together). They found that the greater participants' positive hedonic response was to such stimuli (but not to achievement- or power-related pictures), as reflected in more activation of the *zygomaticus* and less activation of the *corrugator*, the higher their affiliation scores were on the PSE. Research by Kordik et al. (2012) had similarly shown that *n* Affiliation predicted more *corrugator* activation when research participants interacted with a nonsmiling, reserved experimenter than when they interacted with a smiling, friendly experimenter. In studies using observational coding measures, individuals high in *n* Affiliation responded with more smiles to friendly encounters with other people (Dufner, Arslan, & Denissen, 2018; Hagemeyer et al., 2016), but also with more frowns to an interaction

partner whom they expected to disagree with them (Schultheiss, 1996).

Facial EMG studies of affect have also been reported for *n* Power. Relative to individuals low in this motive, power-motivated people frown more when faced with a dominant-acting, but not when encountering a submissive-acting person (Fodor, Wick, & Conroy, 2012). Similar findings emerge when power-motivated individuals encounter negative audience reactions when giving a speech (Fodor & Wick, 2009).

Another line of evidence in support of implicit motives' affect-scaling function comes from research on the interplay between implicit motives and the personal goals people pursue in their daily lives. Across four studies with six large samples from the United States and Germany, individuals' reports of hedonic well-being strongly depended on the progress they made toward their personal goals, with feelings of satisfaction being associated with high progress and feelings of frustration and dejection being associated with low progress (Brunstein, Schultheiss, & Grässmann, 1998; Pueschel, Schulte, & Michalak, 2011; Schultheiss, Jones, Davis, & Kley, 2008; Schultheiss, 2013a). However, this finding holds only for those individuals who have strong implicit motives to support their personal goal pursuits. In individuals with low implicit motives, on the other hand, hedonic well-being and goal progress were uncorrelated (for parallel results looking at "universal" relatedness and competence goals, see Hofer & Busch, 2011b; for

results looking at job characteristics, see Brandstätter, Job, & Schulze, 2016). Put differently, progress toward one's personal goals does not generate hedonic well-being by itself. It only contributes to well-being to the extent that a strong implicit motive gets an opportunity to reap pleasure (liking) from motive-specific rewards or avoid the displeasure of motive-specific punishments (Brunstein, 2010).

Using experience sampling, McAdams and Constantian (1983) observed that individuals high, compared to those low, in *n* Intimacy experienced more positive affect during interactions with others in their everyday lives (see Craig et al., 1994, for a replication). Research on *n* Achievement suggests that motives also influence the expectation of hedonic reward (i.e., predicted liking) associated with incentive attainment, another critical feature of motivational processes (cf. Berridge, 2004). Brunstein and Maier (2005) observed that high-achievement individuals expect to get more pleasure out of mastering a challenging task and less pleasure out of mastering an easy task than do low-achievement individuals.

Thus, studies using objective measures of hedonic responses, such as facial EMG, and subjective measures, such as rating one's current happiness or dejection, consistently support Atkinson's (1957) hypothesis that implicit motives represent a capacity for hedonic responses—liking and disliking in Berridge's (1996) conceptual framework—to motive-specific incentives and disincentives. This has consequences for the contexts, cues, and behaviors that preceded contact with the (dis)incentive, issues to which we turn next.

Motives Shape Incentive-Driven Learning Processes

Implicit motives, in interaction with motive-specific (dis)incentives, influence the degree to which individuals show evidence of (1) Pavlovian conditioning in response to incentive cues, (2) learning of behavior that is instrumental for incentive attainment (including inhibition of behavior that precedes an encounter with a disincentive), and (3) memory for the episodic context in which a

(dis)incentive occurs (Schultheiss & Köllner, 2014).

Pavlovian conditioning mechanisms have been assumed to be at the core of implicit motives from the outset. McClelland and colleagues (1953) theorized that *n* Achievement is aroused by cues that have become associated with, and thus predict, a surge of positive affect accompanying the mastery of challenging tasks, similar to Ivan Pavlov's canine subjects whose appetite was aroused by the sound of a metronome that predicted the arrival of pleasant food. In support of a role of Pavlovian learning in implicit motives, Stanton, Wirth, and Schultheiss (2006) reported that power-motivated individuals show attentional avoidance of salient abstract cues that have been conditioned to high-dominance facial expressions of emotion (joy, anger), a finding that parallels high-power individuals' attentional avoidance of high-dominance faces (Schultheiss & Hale, 2007; see below). Although these results support the idea that Pavlovian conditioning plays a role in motive-driven learning of (dis)incentive-predictive cues, more research on this fundamental issue is long overdue.

There is considerably more evidence for a role of instrumental learning in implicit motives. Using implicit learning tasks, Schultheiss and colleagues found replicable evidence across several experiments that high-power individuals show superior performance on visuomotor sequences whose execution has become associated with winning a dominance contest, but impaired performance on sequences whose execution was followed by defeat (Schultheiss & Rohde, 2002; Schultheiss, Wirth, et al., 2005). In another line of research, Schultheiss, Pang, et al. (2005) used facial expressions of emotion as reinforcers and found that *n* Power and *n* Affiliation influence instrumental learning in response to nonverbal dominance and affiliation signals. For instance, relative to low-power individuals, high-power individuals showed enhanced learning of a visuomotor sequence whose execution was rewarded by the presentation of surprise, a low-dominance signal. Recently, Stoeckart et al (2017, 2018) presented additional evidence for *n* Power's influence on

instrumental conditioning using a decision-outcome task. In two studies, participants could freely decide to press one of two keys while simultaneously performing an unrelated task. One key was always associated with the presentation of dominant faces (a power disincentive) and the other one with submissive faces (a power incentive). Across trials, *n* Power predicted key presses favoring submissive faces and avoiding dominant faces. Schultheiss and Schiepe-Tiska (2013) argued that the findings related to *n* Power-dependent instrumental learning point to a crucial role of the anterior striatum in motive-driven acquisition of behavior instrumental for obtaining incentives and avoiding disincentives.

Evidence for a role of implicit motives in episodic memory, including autobiographical memory, is strong and has been summarized by Woike (2008; Bender & Woike, 2010) as follows: Implicit motives specifically predict encoding and detailed, vivid memories for emotionally arousing events, both good and bad, associated with the respective motive. Thus, individuals high in *n* Power have superior recall for situations in which they were particularly powerful or powerless; individuals high in *n* Achievement have excellent recall of situations in which they mastered a challenge or failed at it; and individuals high in *n* Affiliation are prone to remember experiences of blissful social contact or of loss and rejection. On the other hand, individuals high in a given implicit motive are not better than others at encoding and recalling mundane, unspecific, or everyday experiences. The latter type of memory is more frequently the domain of explicit motives, especially if the remembered events are relevant for a person's self-concept and the goals derived from it.

In summary, there is substantial evidence for a role of implicit motives in functions related to the wanting phase of motivation, particularly in conjunction with emotionally arousing material—that is, encounters with motive-specific (dis)incentives. These functions do not operate independently of each other but instead represent complex competencies only partially accessible to introspection that integrate the automatic recognition of relevant cues (Pavlovian conditioning)

embedded in an emotionally charged situational context (episodic memory) with properly timed and executed goal-directed behaviors (instrumental learning) in the service of obtaining a cherished reward or avoiding a dreaded punishment (Schultheiss & Köllner, 2014). We believe that such competencies are behind many of the successful life outcomes associated with implicit motives reviewed earlier in this chapter.

Motives Direct Attention toward Incentive Cues

According to McClelland (1987), implicit motives sensitize a person to cues predicting motive-specific (dis)incentives. Such cues are particularly salient stimuli that automatically attract the person's attention. Early evidence for an attention-directing function of implicit motives came from a study documenting an influence of *n* Affiliation on the detection of human faces under conditions of impaired visibility (Atkinson & Walker, 1958). More recent research has yielded similar results for *n* Power: Power-motivated individuals are faster than others to detect unfolding facial emotional expressions in dynamic displays (Donhauser et al., 2015) and are more likely to correctly identify low-intensity anger expressions (Wang et al., 2014). Schultheiss and Hale (2007) found that power-motivated individuals oriented their attention toward surprised faces (low dominance) but away from happy or angry faces (both high dominance; see Stanton et al., 2010), whereas affiliation-motivated individuals oriented their attention toward not only happy faces but also hostile, angry faces, perhaps reflecting their heightened sensitivity to rejection cues. Recent research using event-related potential (ERP) measures provided further evidence for the particular salience of anger faces to power-motivated individuals (Wang et al., 2014, 2017).

In summary, these studies provide evidence for a role of *n* Power and *n* Affiliation in bottom-up, stimulus-driven attentional processing. Despite some clues for an involvement of *n* Achievement in attentional orienting to emotional stimuli (Stanton et al., 2010), the broader role of this motive in attentional processes remains to be explored.

Motives Energize Behavior Aimed at Incentive Attainment

After a motive has become aroused by the presence of cues signaling a possible encounter with a (dis)incentive, behavior directed at attaining the incentive or avoiding the disincentive—a core characteristic of wanting (Berridge, 1996)—becomes highly energized, as reflected by the recruitment of physiological systems supporting active behavioral engagement with the environment (e.g., SNS activation) and both quicker onset and more effective (e.g., faster, more frequent, more forceful) execution of instrumental behavior (e.g., Ikemoto & Panksepp, 1999; McClelland, 1987; Wright & Brehm, 1989). Evidence for an energizing function has been obtained for all three frequently studied motives.

Bäumler's (1975) previously mentioned finding that dopamine agonists increase, and antagonists decrease, PSE achievement imagery suggests that *n* Achievement engages the dopamine system, which invigorates responding (Ikemoto & Panksepp, 1999). Furthermore, high-achievement individuals show greater SNS activation when faced with a recall task of medium difficulty compared to individuals low in this motive (Brunstein & Schmitt, 2010; see also Mazeres et al., 2019).

Behavioral studies using measures of response speed, persistence, and performance output also suggest that *n* Achievement energizes behavior aimed at the mastery of challenges. For instance, compared to others, high-achievement individuals show shorter response latencies on mental concentration tasks, particularly in response to negative feedback (Brunstein & Maier, 2005, Rawolle et al., 2017); persist longer on challenging arithmetic tasks (Wendt, 1955); and solve more items on word-puzzle (Brunstein & Schmitt, 2010) and arithmetic (Biernat, 1989) tasks in a fixed amount of time.

Energizing effects have also been documented for *n* Power. Individuals high in this motivational need, relative to others, show signs of increased SNS activation when confronted with power challenges (see Fodor, 2010, for a review of relevant studies). For instance, individuals whose *n* Power is aroused show an increase in salivary alpha amylase, a

marker of SNS activation (Wiemers, Schultheiss, & Wolf, 2015). Steele (1977) found that power-arousing speeches lead to greater subjective activation in high-power individuals as compared to low power-individuals or high-power individuals in a neutral speech control condition. Schultheiss and Brunstein (1999) observed that power-motivated individuals felt more activated and performed better while playing a competitive computer game.

Finally, individuals high in *n* Affiliation seem to engage in behaviors that allow them to connect with other people in positive, friendly ways more frequently or intensively. For instance, they interact more frequently with others (Craig et al., 1994) and show more lively and warm nonverbal social behavior toward others (Hagemeyer et al., 2016; McAdams, Jackson, & Kirshnit, 1984; McAdams & Powers, 1981). If the incentives are right, an energizing effect of *n* Affiliation on task performance can also be observed: When male participants were instructed by a female experimenter, their *n* Affiliation predicted superior performance on a challenging digit-letter substitution task (Atkinson & O'Connor, 1966).

Taken together, these findings document that implicit motives predict energized behavior aimed at incentive attainment. The available evidence supports this conclusion for all three motives, based on physiological, performance, and subjective criteria.

Conclusion

When revising this chapter, we were impressed by how much 13 years of research have added to our understanding of implicit motives. The recent growth of the field is reflected in a broadening of methodological tools, including operant learning paradigms (Stoeckart et al., 2017, 2018), fMRI (Schultheiss, Wirth, et al., 2008), ERP (Wang et al., 2014, 2017), facial EMG (Dufner et al., 2015), and neuropsychological methods (Schultheiss et al., 2012); sophisticated statistics, such as dyadic analyses (Denzinger, Backes, & Brandstätter, 2018; Hagemeyer et al., 2015) and structural equation modeling (Hagemeyer et al., 2016); and a renewed interest in assessment issues (e.g., Slabbinck et

al., 2011). The field's growth spurt is due, in part, to new conceptual developments, such as the replacement of McClelland's (1980) problematic suggestion that implicit motives do not respond to identifiable stimuli with accounts that pinpoint the nature of motive-specific stimuli (MFT; Stanton et al., 2010) or the renewed efforts to understand why the PSE, the primary measure of implicit motives, is a reliable and valid instrument (Lang, 2014; Schultheiss & Schultheiss, 2014). With regard to the latter issue, we believe that Borsboom et al.'s (2004) seminal work on the importance of causal relationships between attributes and their measures has helped to vindicate a foundational validity principle on which implicit motive research has been built. It is an ironic twist in the history of science that the implicit motive approach, which once resided outside of the mainstream of personality psychology with its traditional emphases on classical test theory and construct validity, has suddenly become a poster child for the natural-science type of validity espoused by Borsboom et al (2004). We are certain that this property is ultimately responsible for the long endurance, recent growth, and bright future prospects of the implicit motive concept.

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CHAPTER 19

A Cognitive–Affective Processing System Approach to Personality Dispositions

Rejection Sensitivity as an Illustrative Case Study

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As a construct, the existence of personality is contingent on the assumption that the qualities that distinguish one person from another are consistent across time and situations. Yet both common intuition and empirical data demonstrate that although mean levels of behavior across situations tend to be relatively stable over time, people's behavior nevertheless changes quite a bit from one situation to the other (e.g., Mischel, 1968; Mischel & Peake, 1982; Mischel & Shoda, 1995; Smith, Shoda, Cumming, & Smoll, 2009). For example, even a generally caring and generous person might pass up opportunities to help the homeless or be insensitive to someone else's needs or plague. In fact, recent studies support examples like this and have shown that within-person variability in behavior is as large as, if not larger than, between-person variability (e.g., McCabe & Fleenon, 2016; Fleenon & Law, 2015; Fleenon & Jayawickreme, 2015).

Given this seeming inconsistency, should we ignore intraindividual variability across situations by treating it as random noise or take it seriously by examining the possibility that it may serve as an additional source of consistency and coherence to personality? The cognitive–affective processing system

(CAPS, Mischel & Shoda, 1995) approach represents an effort to do the latter. As such, it provides an alternative (but not mutually exclusive) framework to trait theories in its conceptualization of personality, which in turn has implications in the study of personality dispositions, particularly for the kinds of assessment tools one might need and the types of research questions one might ask.

Although the CAPS approach has been applied to the domains of prejudice (Mendoza-Denton & Goldman-Flythe, 2009), stigma (Mendoza-Denton & Worrell, 2019), health (Mendoza-Denton & Leitner, 2017), and relationships (Mendoza-Denton & Ayduk, 2014), the fact that this is a metatheory may make it difficult for researchers to easily see how its principles and tenets can be systematically applied to a personality-oriented program of research. Therefore, in this chapter, our goal is to use the rejection sensitivity (RS; Downey & Feldman, 1996) model as an illustration of how a personality disposition can be fruitfully studied within the CAPS framework, highlighting the conceptual and methodological aspects that are guided by the CAPS model, as well as the findings that inform and support the model in return.

The CAPS Model

The CAPS model has been extensively described before (see Mischel & Shoda, 1995, 1998, 1999, 2008; Shoda & Mischel, 1996, 2000; Mischel, 2004). Therefore, in this chapter, we provide only a summary of the model before our larger discussion of how this approach is fruitfully reflected in the study of RS.

From its inception, the key challenge for the CAPS model has been to demonstrate that there is (at least to some degree) stability in the way behavior changes from one situation to another. If such variability is not systematic, then situation–behavior contingencies must be noise and should be ignored. If there is systematicity and thus stability, however, then such situation–behavior contingencies can be thought of as *if–then signatures* of personality and are therefore worthy of consideration as additional sources of personality coherence.

Because examining the temporal stability of if–then contingencies required massive amounts of empirical data (repeated observations across time and contexts), initial evidence was sparse but consistent with the model (e.g., Mischel & Shoda, 1998). With the invention of new technologies such as mobile phones over the last two decades that allow easy implementation of longitudinal within-person research designs (i.e., experience sampling studies), a substantial amount of data has now accumulated, clearly demonstrating that within-person variability, or if–then profiles are relatively stable (e.g., Borkenau, Riemann, Spinath, & Angleitner, 2006; English & Chen, 2007; Fleeson, 2001; Fournier, Moskowitz, & Zuroff, 2008; Mendoza-Denton & Mischel, 2007; Shoda, Mischel, & Wright, 1993, 1994; Vansteelandt & Van Mechelen, 2006; Fleeson & Furr, 2016; McCabe & Fleeson, 2016).

As the very concept of if–then signatures implies, situations in the CAPS model are incorporated into the conceptualization of personality itself. However, it is important to note that situations in CAPS are defined in terms of the way they are constructed and perceived by the person. As such, they specifically refer to *psychological situations* and not to nominal or physical features of settings (e.g., at school). The relationship between the *ifs* and the *thens* in a CAPS

system is explained by the availability/accessibility of five basic types of cognitive and affective units (CAUs) and the interrelationships among them: (1) encodings and construals; (2) expectations and beliefs; (3) feelings and emotions; (4) goals and values; and (5) competencies and self-regulatory abilities (Mischel, 1973). The specific CAUs that are available and accessible in the system, as well as the interconnected activation network, are the result of each individual's own social, cultural, and biological learning history (Mischel & Shoda, 1995).

In this framework, psychological features of a situation (i.e., *ifs*) elicit activation in a small subsample of available CAUs, which then spread to other CAUs to which they are connected (i.e., activation network), through excitatory or inhibitory links, generating a behavioral response (i.e., *thens*). Behavioral responses, in return, alter the situations people face subsequently, thus creating self-fulfilling prophecies in the way people actively construct their social worlds (Shoda, LeeTiernen, & Mischel, 2002; Zayas, Shoda, & Ayduk, 2002).

What is stable is the system itself. A particular situational feature reliably activates a particular encoding, emotion, expectation, and so on, and this initial activation spreads through a particular network of other CAUs, resulting in a particular behavioral response. In other words, the same activation network of CAUs is reliably activated in response to a particular situational feature, leading the individual to behave in a similar way every time that psychological situation is encountered. On the other hand, when the individual encounters a different psychological feature, it activates a different network of CAUs that may generate different behavioral responses. Thus, although the person may behave inconsistently across situations, such as behavior A in situation X and behavior B in situation Y, their behavior changes reliably and stably from A to B when the psychological situation changes from X to Y. This conceptualization allows one to explain both consistency and inconsistency in behavior across situations within a unified framework.

Furthermore, people with a similar disposition share the psychological features they pay attention to, the way they construe them, the activation network of CAUs that

is elicited, and the behavioral responses that are generated in response. In other words, personality types share their *if–then* signatures and the underlying “processing dynamics”—the “patterns and sequences of activation among the mediating units that are generated when these individuals encounter or constructs situations with relevant features” (Mischel & Shoda, 1995, p. 257) that generate them.

Rejection Sensitivity: A Cognitive–Affective Processing Disposition

Social acceptance and belonging are fundamental human needs (Baumeister & Leary, 1995) and experiences that fail to fulfill such needs lead to a host of negative outcomes, including aggression, depression, self-control failures, and reductions in prosocial behavior (e.g., Chester, Lynam, Milich, & DeWall, 2017; Twenge, Baumeister, Tice, & Stucke, 2001; Twenge, Baumeister, DeWall, Ciarocco, & Bartels, 2007; Slavich, O’Donovan, Epel, & Kemeny, 2010). Nevertheless, not everyone who is rejected respond to it similarly. The RS model (Downey & Feldman, 1996) was initially developed to understand such variability in the way people respond to social rejection in close relationships. Drawing from attachment and attributional theories (Bowlby, 1969, 1973, 1980; Horney, 1937), the basic premise of the RS model is that rejection–acceptance experiences in early relationships with caregivers lead people to develop relationship schemas that shape the way they think, feel, and behave in subsequent relationships (Feldman & Downey, 1994; Downey, Khouri, & Feldman, 1997).

The RS model draws from the CAPS framework in that it specifically focuses on cognitive and affective processes through which experiences with significant others come to shape individuals’ *if–then* signatures in close relationships later in life. Therefore, RS is defined as a *cognitive–affective processing disposition* whereby individuals anxiously expect, readily perceive, and overreact (emotionally and behaviorally) to rejection (Downey & Feldman, 1996; Feldman & Downey, 1994). Situations that are relevant to rejection (e.g., disagreement) are the *ifs* of the disposition, and defensive

overreactions (e.g., hostility, depression, disengagement, ingratiation) are the *thens*, generated by fears, expectations, and construals of rejection.

Because rejection in early close relationships occurs due to personal characteristics that lead a person to expect rejection of the self as an individual, the processing dynamic studied in the initial work on RS has been referred to as personal RS (*RS–personal*; Downey & Feldman, 1996). Rejection can also happen, however, based on status characteristics shared with members of a group, such as characteristics based on one’s race, particularly when other groups stigmatize or discriminate against those social identities. In contrast to RS–personal, such rejection experiences lead people to expect rejection based on their stigmatized status characteristics; hence, this has been referred to as status-based RS (*RS–status*; Mendoza-Denton, Downey, Purdie, Davis, & Pietrzak, 2002). To date RS–status has been studied in the context of race for African-Americans (Mendoza-Denton et al., 2002), and for Asian Americans (Mendoza-Denton et al., 2002; Chan & Mendoza-Denton, 2008), as well as for gender (London, Downey, Romero-Canyas, Rattan, & Tyson, 2012), social class (Rheinschmidt & Mendoza-Denton, 2014), sexual orientation (Pachankis, Goldfried, & Ramrattan, 2008), age (Kang & Chasteen, 2009), and immigrant status (Wolfgang, Morf, & Hannover, 2014). As expected by the CAPS model, each of these constructs show differences in terms of its specific trigger situations (*ifs*) and associated outcomes (*thens*), even though the overall cascade of the dynamic is similar.

In what follows, we first focus on the body of empirical work on RS–personal describing the various links of this processing dynamic, highlighting the ways the construct exemplifies essential features of the CAPS framework. We then selectively highlight findings from the literature on RS–status to further illustrate CAPS, noting both the similarities and the differences between RS–personal and RS–status, as well the domain-specific manifestations of RS–status. Together, these findings show how fears and expectations of rejection in a particular domain lead people to readily perceive rejection and overreact to it in ways that are relevant to the domain.

Personal Rejection Sensitivity

The implications of adopting a CAPS framework are evident in a number of methodological and theoretical features that distinguish RS from the study of many other personality dispositions. First, because dispositions in a CAPS system are conceptualized in terms of CAUs that get triggered by specific situational features, RS is measured in terms of the activation of anxious rejection expectations in specific situations rather than in terms of broad, average levels of behavioral tendencies. Second, because processing dispositions are hypothesized to reflect the stable activation of a network of CAUs, the program of research on RS has focused a great deal on explicating the activation links among the CAUs that make up the RS dynamic. Third, the emphasis of the CAPS approach on the interactions among different activation networks of CAUs within the mind itself as determining behavior has led to an active exploration of moderator variables for the behavioral manifestations of the RS system. Below we elaborate on each of these features for RS-personal.

Situation-Sensitive Measurement of CAUs

Because, theoretically, activation of anxious expectations of rejection is what triggers the entire RS dynamic, RS is measured in terms of this specific CAU. In addition, consistent with the idea that dispositions need to be measured in their diagnostic situations, RS is measured in scenario-based questionnaires in which the situations depicted are unique to the relevant RS domain being measured. Therefore, the Rejection Sensitivity Questionnaire (RSQ; Downey & Feldman, 1996) includes 18 interpersonal situations that afford the possibility of rejection based on one's personal characteristics to measure RS-personal. These situations were identified by young adults in focus groups as being particularly relevant to interpersonal rejection concerns and include scenarios with parents (e.g., "You ask your parents for extra money to cover living expenses"), peers and friends (e.g., "You ask someone in class if you can borrow his or her notes"), and romantic partners (e.g., "You ask someone you don't know well on a date"). For each situation, participants are asked to rate their de-

gree of concern/anxiety about the possibility of rejection (i.e., anxiety component) and their perceptions of how likely rejection is as a possible outcome (i.e., expectation component). Empirically, anxiety and expectation dimensions tend to be orthogonal.

The theoretical model of RS argues that to be high RS, one needs to both be highly anxious about the possibility of rejection (reflecting the high value the individual places on this outcome) and to believe that rejection is a very likely outcome (reflecting their expectancies of rejection). In other words, the model argues that being high in anxiety without expecting rejection (e.g., generalized anxiety) or expecting rejection without being particularly anxious about it (e.g., telemarketers) does not capture high RS; instead, the effect of rejection expectations needs to be weighted by the value people place on this outcome (Bandura, 1986). Therefore, level of anxiety and rejection expectations are multiplied for each scenario, and then averaged across scenarios to capture a single dimension of anxious rejection expectations. Thus, low scores on the RSQ capture the tendency to calmly expect acceptance, whereas high scores capture the tendency to anxiously expect rejection.

Rejection as the Psychological Feature Eliciting Anxious Expectations of Rejection

Consistent with the CAPS approach, the RS model proposes that the processing dynamics of high RS are activated only in situations that are relevant to rejection. In the absence of situational cues that are relevant to rejection, the model does not expect differences in behavior as a function of RS. This point is well demonstrated by a study that utilized the human startle-probe paradigm to capture activation of anxious rejection expectations at the physiological level (Downey, Mougios, Ayduk, London, & Shoda, 2004). The startle-probe paradigm is a well-established measure of the activation of a physiologically based defensive motivational system (Lang, Bradley, & Cuthbert, 1990). The paradigm capitalizes on the fact that the strength of the startle reflex, which is a naturally occurring defensive reaction to a loud noise, can be modulated by the negativity-positivity of people's psychological state in the moment. If people are psychologically threatened or scared, as

is the case with most people when looking at gory pictures or watching a scary movie, for example, the magnitude of their naturally occurring startle response to a loud noise is potentiated (i.e., larger eyeblink response) reflecting strengthening of defensive action tendencies. In contrast, if they are happy or excited, because they are looking at cute baby pictures or watching a comedy, their startle reflex to the same burst of loud noise gets attenuated, reflecting inhibition of defensive action tendencies. Thus, the magnitude of the startle response to a particular stimulus in the environment is interpreted as a readout of the degree to which that stimulus activates or inhibits physiological mechanisms that prepare the organism for self-defense.

In the context of RS-personal, the startle paradigm was used with high-RS individuals to examine whether physiological mechanisms that reflect activation of anxious rejection expectations are triggered by situational cues uniquely relevant to rejection (vs. negative but rejection-irrelevant cues). The hypothesis was that if anxious expectations of rejection are activated uniquely by rejection, not by any negative stimulus, then high-RS individuals should show greater potentiation of their startle reflex while viewing pictorial stimuli depicting rejection themes (e.g., loneliness) but not while viewing stimuli depicting just negativity (e.g., gloomy colors).

Consistent with these hypothesis, Downey and colleagues (2004) showed that high-RS people startled more strongly than low-RS individuals while viewing artwork depicting rejection, social isolation, or interpersonal alienation, but not while viewing nonrepresentational artwork that elicits general negative affect. Overall, these findings provide evidence that psychological features of situations that communicate rejection constitute the specific ifs of the high RS-personal dynamic.

Activation Network of CAUs in the RS Dynamics

Once the high-RS dynamic is triggered (i.e., anxious rejection expectations are activated), it is hypothesized to lead high-RS people to try to prevent rejection while also increasing their likelihood of perceiving such rejection. Perceived rejection, in turn, elicits intense reactions to defend the self. Thus, the key activation links in the system include

anxious expectations triggering prevention efforts, as well as perceptions of rejection, and perceived rejection triggering affective and behavioral overreactions. We elaborate on each component below.

Anxious Expectations → Perceptions of Rejection

Extensive evidence from animal and neurobiological studies provide insight into the processes that are activated by anticipation of rejection. The anticipation of threat orients the individual toward threat cues, privileging schema-driven, top-down interpretations of their meaning (Davis, 1992; Öhman, Flykt, & Esteves, 2001). As such, for high-RS individuals, rejection-relevant contexts increase their readiness to detect and interpret environmental cues in line with their prior rejection expectations.

There is strong empirical support for this hypothesized link between anxious rejection expectations and perceptions/attribution of rejection among high-RS individuals. For example, high-RS people tend to attribute more intentional rejection to their romantic partners' cold or aloof behavior (Downey & Feldman, 1996, Study 3). In a laboratory setting, Downey and Feldman (1996, Study 2) found that high-RS participants were more likely than low-RS participants to perceive rejection when an interaction partner left the study following a brief introduction, even when alternative explanations (e.g., lack of time) existed. Another study revealed that high-RS people were more likely to detect cues of anger, but not other emotions, in faces that were emotionally blended, demonstrating their readiness to perceive rejection-related stimuli in the environment (Olsson, Carmona, Downey, & Ochsner, 2008).

Anxious Expectations → Prevention Efforts

The defensive motivational system similarly motivates coordinated efforts to prevent or avoid rejection. For example, high-RS people are more likely to report suppressing their thoughts and emotions that may threaten their ongoing relationships, and this is particularly true among high-RS individuals who are also particularly concerned about preventing negative outcomes (Ayduk, May, Downey, & Higgins, 2003). High-RS ado-

lescent girls and women report greater willingness to do things they know are wrong for the sake of keeping their partners happy (Bedell, 1997; Purdie & Downey, 2000). More recently, high-RS men have been shown to engage in greater ingratiation relative to low-RS men following rejection by a group (Romero-Canyas et al., 2010). As such, these findings suggest that high-RS people put coordinated efforts into preventing rejection, sometimes to the point of overaccommodating their partners and potentially compromising their own well-being.

Perceptions of Rejection → Negative Overreactions

Research suggests that when high-RS people perceive rejection, they tend to overreact to these perceptions with defensive and negative behavior. High RS is associated with greater reactivity to perceived rejection, because in situations that activate fears and expectations of rejection, the defensive motivational system is automatically activated, preparing the individual physiologically and psychologically for self-defense even before rejection is actually perceived. In other words, rejection sensitivity primes the individual to respond to rejection in more intense and negative ways, and these responses tend to include both externalizing and internalizing behaviors.

The extant literature on RS has repeatedly demonstrated that perceived rejection elicits externalizing behaviors including, anger, hostility, and even physical violence among people high in RS. For example, Ayduk, Downey, Testa, Yen, and Shoda (1999) found that high-RS women pronounced hostility-related words (e.g., *revenge*) more quickly relative to low-RS women, specifically when those words were preceded by rejection-related words (e.g., *abandon*), suggesting that dynamics of high RS are characterized by a stronger activation pathway between thoughts of rejection and thoughts of hostility. Underscoring the situation-specific activation of the RS dynamic, the facilitation of hostility as a function of RS was not observed when context words were negative in valence but unrelated to rejection (e.g., *vomit*).

Hostile thoughts activated by rejection among high-RS individuals have also been found to translate into behavior. Labora-

tory studies in which participants were led to believe that a potential online partner had rejected them elicited greater retaliatory rejection (e.g., negative impression ratings) and aggressive behavior (e.g., giving the rejector hot sauce, when they knew the person did not like hot sauce) as a function of RS (Ayduk et al., 1999, Study 2; Ayduk, Gyurak, & Luerssen, 2008). These patterns are mirrored in high-RS individuals' ongoing relationships. For example, high-RS women are more likely to pick a fight with their partners than low RS women when they feel rejected (Ayduk et al., 1999, Study 2), and express greater hostility toward their partners during conflicts (Downey, Freitas, Michaelis, & Khouri, 1998; Study 2). Similarly, high-RS men report using greater physical aggression to cope in conflicts with their romantic partners relative to low-RS men (Downey, Feldman, & Ayduk, 2000).

Research also suggests that hostility is not the only possible outcome associated with RS. In fact, rejection also leads to internalizing symptoms in which negative reactions following rejection are directed at the self. Ayduk, Downey, and Kim (2001) found that although high-RS women tended to be more depressed than low-RS women over the course of an academic year, those who had experienced a partner-initiated breakup during the year were significantly more depressed. This pattern was not seen if the high-RS women had themselves initiated the breakup, or if they had experienced academic failure, suggesting that rejection played a central role in eliciting depression.

In another study, Ayduk, Gyurak, and Luerssen (2009) examined the relationship between experiences of rejection and self-concept clarity. Given that the ability to prevent or avoid rejection may be central to the high-RS person's self-concept, the hypothesis was that experiences that communicate their failure in this domain (i.e., rejection) would undermine the structural stability of their self-concept. Indeed, Ayduk et al. found that high-RS people reported feeling less clear about their self-concept than low-RS individuals following rejection experiences (but not other kinds of negative experiences) both in laboratory studies and in daily diary studies of dating couples.

Recent studies have also shown that high-RS individuals are at greater risk for self-

harm (Breines & Ayduk, 2015). In a series of laboratory studies, participants were primed with rejection subliminally or through a recall task or with other negative or neutral events in the control conditions. On both explicit (e.g., “I feel an urge to harm myself,” behavioral measure of willingness to endure pain) and implicit (e.g., self-harm implicit association test [IAT]) measures, high-RS people showed higher levels of self-harm-related cognitions following rejection compared to control conditions, and this effect was above and beyond the association between RS and other-directed hostility.

The Self-Fulfilling Prophecy

Consistent with the CAPS model described earlier, the dynamics of RS are maintained in part by a feedback loop that serves as a self-fulfilling prophecy. In particular, high-RS people’s hostility plays a crucial role in eliciting actual partner rejection, which confirms their worst fears (Downey et al., 1998). Across both daily diary (Study 1) and lab-based studies (Study 2), for example, the partners of high-RS women reported more anger and thoughts of ending the relationship following conflict, with the high-RS women’s greater hostility during the conflict mediating this relationship (Downey et al., 1998; Study 2). Consistently, the relationships of both high-RS men and women are likely to be of shorter duration than those of low-RS individuals (Downey et al., 1998), and high-RS individuals tend to be overrepresented among people who are not involved in relationships (e.g., Ayduk et al., 2003).

Mean-Level Differences and If–Then Profiles of RS

Mischel and Shoda (1995) argued that a dynamic, situationally sensitive personality system such as CAPS is able to generate both mean-level differences in behavior and if–then profile differences between personality types. In the case of RS, empirical evidence suggests that there are no mean differences in aggression as a function of this personality dynamic (see Mischel, Shoda, & Ayduk, 2007). Rather, as we outlined earlier, the high-RS CAPS system generates an *if–then* signature, such that the presence of psychological features that signal rejection

(*ifs*) trigger hostility and aggression (*thens*). Importantly, however, in the absence of rejection, high-RS people are not particularly more aggressive than low-RS individuals; if anything, as we have also seen, high-RS individuals may be more likely to engage in accommodation and ingratiation as part of a concerted effort to avoid rejection and to curry favor with partners or social groups (e.g., Ayduk et al., 2003). In short, high-RS individuals’ if–then signature is one in which they are aggressive if rejected but accommodative if they are not.

For internalizing behaviors, particularly for depression, the data point to another pattern. Here, the evidence points to mean-level differences between high- and low-RS individuals (Ayduk et al., 2001; Ayduk, Gyurak, et al., 2008). Mean differences in depressive symptomatology and confusion about self-concept clarity presumably arise because rejection for high-RS individuals is intricately tied to the self and may affect the self more globally. Nevertheless, alongside mean-level differences, we still see an if–then pattern, such that high-RS individuals’ vulnerability to internalizing behaviors is accentuated following episodes of rejection.

Moderation by Self-Regulatory Competencies

In the previous section, we described RS as a CAPS processing dynamic, consisting of anxious expectations, ready perceptions, and intense affective and behavioral reactions triggered in specific situations (when the situation affords the possibility of rejection). However, the CAPS model explicitly recognizes that any given dynamic or process within the CAPS system is itself influenced by other CAUs in the system. Consistent with this notion, research also shows the behavioral and longer-term outcomes associated with RS depend on the availability and accessibility of self-regulatory competencies.

Ayduk and colleagues (2000) followed up a cohort of preschoolers who had completed the classic delay of gratification task (see Mischel, Shoda, & Rodriguez, 1989, for review) at age 4 into adulthood (mean age 25). High-RS participants who, as preschoolers, were able to wait longer for their preferred reward, had higher self-esteem than their high-RS counterparts with low delay scores

as children and were indistinguishable from low-RS adults. In a subset of these same individuals followed a decade later, preschool delay ability again served as a protective factor against vulnerability to borderline personality disorder (Ayduk, Zayas, et al., 2008), a core feature of which involves overreactivity to real or imagined rejection. Similar moderation effects of delay of gratification on negative academic and social outcomes associated with high RS have been found in a sample of ethnically diverse, low socioeconomic status middle school children (Ayduk et al., 2000, Study 2).

Research suggests that self-regulatory competencies may buffer against the negative outcomes associated with high RS through attentional mechanisms. As we summarized earlier, high-RS individuals exhibit an attentional bias toward rejection stimuli. Berenson and colleagues (2009) demonstrated that when faced with rejection cues, high-RS individuals are impaired in their ability to complete competing tasks. However, high-RS individuals' tendency toward such attentional bias was lower if they had demonstrated an ability to engage in cognitive control in an earlier task (Ayduk & Gyurak, 2008). Such cognitive control—the ability to inhibit habitual, prepotent responses—was negatively associated with verbal aggression toward romantic partners among high-RS individuals. Also consistent with this line of reasoning, Gyurak and Ayduk (2007) showed that attentional control significantly attenuates the potentiation of the startle reflex in people with low self-esteem, who tend to be high in RS. This finding suggests that self-regulatory competencies can alter the trajectory of the high-RS dynamic at a relatively early stage of processing, by attenuating the activation of the defensive motivational system.

In short, a substantial body of work has started to address the question of how other CAUs in the CAPS system might interact with the RS dynamic. To date, this work has focused primarily on self-regulatory competencies, demonstrating that attention control and the ability to self-regulate in the service of long-term goals buffer against the maladaptive outcomes associated with high RS. Given that self-control and self-regulation broadly construed maps onto

the conscientiousness dimension of the Big Five (e.g., John & Srivastava, 1999; Bogg & Roberts, 2004), these findings can be interpreted as evidence showing that the high-RS dynamic may play itself out very differently depending on one's level of conscientiousness. There are, of course, many other possible moderators of RS, including other Big Five traits, such as agreeableness or open-mindedness (neither of which strongly correlate with RS). These and other such interesting questions await future research.

Status-Based RS

A growing literature recognizes that individuals can be rejected and experience the psychological sequelae of such rejection on the basis of not only their personal characteristics but also the characteristics they share with others, such as race, gender, religion, or sexual orientation. This is broadly referred to as *status-based rejection sensitivity* (RS-status; Mendoza-Denton, et al., 2002). RS-status manifests itself as sensitivity to rejection in a domain-specific manner based on the status characteristic. As such, to date it has been studied in the context of race (for African Americans and Asian Americans), gender, social class, sexual orientation, age, and immigrant status. Although the general cascade of each dynamic also consists of anxious expectations, ready perceptions, and intense reactions, the trigger situations and outcomes differ, revealing the strong influence of the environment in shaping the dynamic itself. In what follows, we selectively review research findings on RS-status to illustrate this point, focusing primarily on race-based RS as an example of RS-status.

Trigger Situations: The Ifs of the RS-Status Dynamics

Mendoza-Denton and colleagues (2002) proposed the construct of *race-based rejection sensitivity* (RS-race) as an individual difference construct to help explain minority individuals' anticipation and reaction to discrimination, exclusion, and mistreatment on the basis of their race. They found that the kinds of situations that trigger RS-race among African Americans are distinct from

those that trigger RS based on one's personal characteristics. Examples might include walking down the street and seeing someone clutch their belongings a little more tightly, or being followed around a store. In other words, while the “active ingredients” of RS-personal involve the possibility of rejection or abandonment from significant others, for RS-race, these “active ingredients” involve the specter of discrimination or stigmatization.

Furthermore, these “active ingredients” may further differ as a function of the specific identity group that faces the threat of discrimination. For example, while a police stop may trigger legitimate expectations of mistreatment among African Americans and Latino/as in the United States, this situation is less likely to be a trigger for persons of Asian descent, because Asian Americans are not typically stereotyped as aggressive or criminal (although in particular local contexts, people of Asian descent may well be associated with dangerousness, leading people to expect rejection based on that stereotype). By contrast, the trigger features for RS-race among Asian Americans are quite different than those for African Americans; the active ingredients for Asian Americans include suspicions over being “unacculturated” (e.g., not fluent in English), “socially incompetent,” “nerdy,” or “overly competitive” (see Cheryan & Monin, 2005), because these situations tap into the negatively valued aspects of the Asian stereotype. As another example of the group specificity of trigger situations, interactions that require assumptions about knowledge in sports (e.g., knowledge about baseball) may be one of the triggers for rejection concerns among gay men, who are typically stereotyped as lacking interest in masculine enterprises (Pachankis et al., 2008). Alternatively, for RS based on one's social class (Rheinschmidt and Mendoza-Denton, 2014), any situation that makes one's socioeconomic status (SES) public or salient may trigger rejection concerns.

Like the case of RS-personal, the situational specificity of each RS-status dynamic has implications for measurement, and the scenarios included in each RS questionnaires are tailored to the situational cues particularly relevant to the social identity group the questionnaire is targeting. For example, the

RS-race questionnaire for African Americans includes scenarios such as “Imagine you have just finished shopping, and you are leaving the store carrying several bags. It's closing time, and several people are filing out of the store at once. Suddenly, the alarm begins to sound, and a security guard comes over to investigate,” whereas the RS-race questionnaire for Asian Americans includes scenarios such as “You ask a salesperson at a store about a product, and she mumbles 0.62 a response that you don't catch. As you ask her to repeat what she just said.” Similarly, whereas the RS-gay questionnaire includes items such as “Some straight colleagues are talking about baseball. You force yourself to join the conversation but they dismiss your input,” the RS-class questionnaire includes scenarios such as “Imagine that you are in class having a discussion about living in different types of neighborhoods. Your neighborhood comes up, but no one knows you live there.”

Consistent with the measurement of RS-personal, in all group-specific RS-status questionnaires, anxiety and expectations about rejection are assessed for each scenario and averaged across scenarios. Thus, all RS questionnaires measure the degree to which individuals hold anxious expectations of rejection; however, they differ with respect to the identity (e.g., personal vs. race) for which such rejection is expected.

Reactions to Discrimination: The Thens of the RS-Status Dynamics

As we have reviewed, RS-personal is associated with a host of negative interpersonal outcomes, including relationship difficulties, earlier and more frequent breakups, and relationship dissatisfaction, as rejection concerns interfere with the fulfillment of positive relationship goals. Among African American college students, Mendoza-Denton et al. (2002) observed an analogous pattern in predominantly White educational settings (which lead minority students to question their belonging therein; Steele, 1997; Walton & Cohen, 2007). More specifically, individual differences in RS-race were shown to predict difficulties in the pursuit of these students' academic goals, including degree of rapport with professors and peers, atten-

dance at review sessions, and grade point average, above and beyond RS-personal.

Although there is some overlap in the reactions and outcomes to rejection that are associated with RS-status and RS-personal, as reviewed earlier, there are also notable differences. For example, RS-personal is reliably associated with low self-esteem; however, RS-race among African Americans is *not* associated with self-esteem (Mendoza-Denton et al., 2002). This finding is in line with predictions in research on the self-protective properties of stigma (see Crocker & Major, 1989). More specifically, Crocker and Major found that among targets of stigma, discrimination does not affect self-esteem, because targets attribute this outcome to the perpetrator rather than to the self (i.e., “It’s not my fault”; Major, Kaiser, & McCoy, 2003). Consistent with this logic, RS-race has been found to be unrelated to self-esteem among African Americans.

In addition to such differences between RS-personal and RS-race for African Americans, the nature of people’s reactions to perceived rejection also differs among different RS-status dynamics, because these reactions can partly have their roots in one’s cultural upbringing and are therefore group specific. In this regard, the case of RS-race among Asian Americans provides a useful contrast with RS-race for African Americans. Specifically, RS-race among Asian Americans is unrelated to academic outcomes, yet it is negatively related to self-esteem. This interesting pattern suggests that not all stigmas are created equal, and that the protective qualities of stigma—the ability to recognize that it’s not one’s fault—does not happen automatically. As Chan and Mendoza-Denton (2008) argue, the Civil Rights movement precipitated a cultural shift in which attributions of responsibility for discrimination toward perpetrators became part of a cultural narrative for African Americans, whereas Asian Americans have not benefited to such a large extent from such a social movement. Again, these patterns serve to underscore the interaction of the personality system with the social and historical context in which the person develops. One of the features of the CAPS system is that goals, values, expectations, and beliefs, by their very nature, are dependent and inherently interactive within the context of the environment.

Interactions between Status-Based RS and Moderating Variables

As articulated in the CAPS model and illustrated earlier through RS, personality dynamics do not exist in a vacuum; rather, they interact with other CAUs in the system, as well as other environmental inputs, to produce changes to the behavioral outcomes observed. In the same way that self-regulatory competencies moderate the link between RS-personal and negative outcomes such as aggression or relationship failures, researchers have also explored interactive relationships between different types of status-based RS and other individual-difference variables.

In the domain of RS-race, one interesting moderation involves the person’s degree of ethnic identification. The literature on ethnic identity and academic outcomes has been mixed, with some scholars suggesting that a strong minority-group identity should be disruptive for academic performance, because it develops as an “oppositional identity” to an academic identity (e.g., Ogbu, 1978, 1991), while other scholars note that ethnic identity serves as a protective factor because it provides students with a source of strength, purpose, and history upon which to build their studies. Mendoza-Denton, Pietrzak, and Downey (2008) hypothesized that these two patterns could be reconciled in the literature by taking race-based rejection sensitivity into account. The researchers reasoned that when a person expects rejection because of their ethnicity or race in a particular academic context (as indexed by high levels of RS-race), holding a strong ethnic identity should in fact be incompatible with an academic identity, yielding these two identities oppositional. However, when a person has calm acceptance expectations for his or her ethnic identity (i.e., low RS-race), the ethnic and academic identities should be able to flourish together, and ethnic identity should then provide an academic boost. This is exactly what the researchers observed: Participants who were high in ethnic identity had different academic outcomes as a function of RS-race, with those lower in RS-race faring significantly better than their counterparts who were higher in RS-race.

Another finding that illustrates how RS interacts with other CAUs in the system is

class-based rejection sensitivity (RS-class). Rheinschmidt and Mendoza-Denton (2014) tested the idea that concerns about discrimination based on one's social class would be damaging to undergraduates' achievement outcomes, particularly among individuals who held *entity theories* (i.e., the belief that their personal characteristics are fixed) of intelligence. The reasoning underlying this hypothesis was that individuals who hold *incremental theories* (i.e., perceive the capacity for personal growth and change) of intelligence, should make the pursuit of a college degree and upward mobility seem more worthwhile and attainable (see Dweck, 2006). Consistent with these expectations, high levels of both entity beliefs and RS-class predicted lower self-reported grades among undergraduates from socio-economically diverse backgrounds, as well as decreased year-end official grades among lower-class Latino/a students. Furthermore, following failure, entity theorists high in class-based RS were less likely to endorse the belief that hard work is a key to academic success, which suggests that lack of faith in upward mobility is one reason that may underlie their academic underachievement.

Finally, it is worth noting that while the two previous examples are of ways in which personality dynamics interact with other CAUs in the system (in the aforementioned case, entity beliefs and ethnic identity processes), and can also be thought of as intrapsychic processes (rooted in one's social-cognitive learning history), the CAPS system interacts dynamically with environmental inputs to lead to different behavioral outcomes as well. In this regard, Page-Gould, Mendoza-Denton, and Tropp (2008) hypothesized that cross-race friendships should have a beneficial effect on students high in RS-race, because these friendships can provide unambiguous cues of acceptance from members of the outgroup. To test this idea, the researchers adapted Aron and colleagues "Fast Friends" procedure for the purpose of an intensive experimental intervention to test the effects of friendships on outcome attitudes, and conducted an intensive experimental intervention in cross-race versus same-race dyads (Aron, Melinat, Aron, Val-lone, & Bator, 1997). The Fast Friends procedure involves two participants engaging in

a structured back-and-forth task wherein the participants take turns asking and answering questions that increasingly escalate the amount of self-disclosure the answers require. For example, at the beginning, a question may ask about a personal preference for food or pets, but later questions would ask participants to reflect on deeper goals, fears, or aspirations. Following the Fast Friends procedures, participants returned to the laboratory a week later and participated in an additional interactive shared activity (the game of Jenga). Findings from this study revealed that among minority students high in RS-race, cross-race friendship bolstered institutional belonging and satisfaction (Mendoza-Denton & Page-Gould, 2008), and attenuated cortisol reactivity during intergroup encounters (Page-Gould, Mendoza-Denton, & Tropp, 2008). In further research on the effects of cross-race friendship, Page-Gould, Mendoza-Denton, Alegre, and Siy (2010) found that when someone has a close friend of another ethnicity, the closer that relationship, the longer it took participants (measured through a reaction time task) to say that their friend's ethnicity did not describe him or her. This suggests greater overlap between the self-concept and the attributes of one's friend. In subsequent studies, it was found that the latency of participants' responses in this task helped explain the degree of comfort experienced by participants in a novel intergroup situation (both an imagined one and a real-live interaction).

As such, these findings illustrate how "personality" research from a CAPS perspective fluidly incorporates interpersonal and intergroup contexts, challenging traditional notions of "personality" versus "social-psychological" research. The approach recognizes that the question around behavior is not whether the behavior stems from the person or the situation. Instead, the CAPS model encourages researchers to recognize the constant interplay and interpenetration of context into person, as well as the influence of the person into the context. In this way, the CAPS approach is closer to a cultural psychology approach to understanding the human psyche (e.g., Shweder, 1999; Kitayama & Cohen, 2010) than a more traditional approach that defines the person as separate from the environment.

Summary and Conclusions

In this chapter, we have attempted to provide readers with an introduction to the CAPS model of personality, originally described by Mischel, Shoda, and colleagues. Rather than provide an entirely theoretical, model-centric description or analysis, we have chosen to illustrate how CAPS operates “in the wild” through applied and experimental research on RS. To summarize, RS can be conceptualized as a personality dynamic that specifies how anxious expectations of rejection are activated by particular features of situations (here, the potential for rejection) that then increase the likelihood of perceiving and reacting strongly to such rejection. However, the nature of the dynamic and the associated if-then profile are dependent on the kind of rejection (e.g., based on personal vs. status characteristics), as well as the social and cultural context. At one level, we can conceptualize the if-then profile of RS as “if rejection-then strong reaction,” but at a more molecular level, we might specify “if rejection-then lowered self-esteem” for Asian Americans but “if rejection-then no effect on self-esteem” for African Americans. Alternatively, we might say, for Person 1, if rejection-then internalizing symptoms”, but for Person 2, “if rejection-then externalizing symptoms.” CAPS, in other words, not only allows us to consider individual differences at the level of the person, but it also provides a window into how distinct if-then profiles may be shared across cultural groups, opening a door into a conversation about how culture shapes personality in a way that does not rely on broad-brush stereotypes of cultural groups (see Mendoza-Denton & Mischel, 2007, for an elaboration of this argument).

Furthermore, we have explicitly recognized that no single personality attribute or dynamic exists on its own, but is rather embedded in a much broader network of other CAUs that may include abilities (e.g., self-regulatory competencies), beliefs (e.g., entity beliefs), or attitudes (e.g., racial attitudes). Finally, we have reviewed how the CAPS system is not impervious to environmental input and can change as a function of new experiences, as illustrated by research on how cross-race friendship can interact

with RS-race dynamics. Taken together, we hope that the research on RS reviewed here provides a grounded insight into how fundamental features of the CAPS model can inform the study of individual differences by incorporating situations into the very measurement of personality itself, by highlighting the importance of investigating dynamic processes that underlie such individual differences, by recognizing and demonstrating the influence of context and culture in shaping individual differences, and by providing deeper insights into both the stability and instability of behavior across situations, a complexity that characterizes the human species.

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CHAPTER 20

Creativity and Genius

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Creativity and genius are highly desirable but also rather elusive qualities. Employers in high-tech industries often wish that their workers were more creative, so creativity workshops have proliferated that purport to attain that end. Parents are usually pleased to learn that they have given birth to a “budding genius” and often fight hard to get their child enrolled in special programs for the gifted. Although a person can exhibit creativity without being a genius, and be a genius without being creative, both characteristics can converge in a single personality. Indeed, the creative genius is often viewed as the highest or purest manifestation of both creativity and genius (Simonton, 2019a). Isaac Newton, René Descartes, Miguel de Cervantes, Leonardo da Vinci, and Ludwig van Beethoven are clear-cut examples. Creative genius is so highly valued that special honors are devoted to its recognition—the Nobel Prize perhaps constituting the most conspicuous example. A more recent instance is the special grants awarded by MacArthur Foundation, which the mass media have taken to confer the unofficial title of “genius” upon the recipients.

Of the two attributes, genius has the longer history as an individual-difference variable. The first scientific study was Galton’s (1869) book *Hereditary Genius*. Creativity, in contrast, did not come into its own as an

independent research topic until nearly a century later. Often this latter development is taken as beginning with Guilford’s (1950) Presidential Address before the American Psychological Association. Yet it was not until the 1960s that research on creativity really exploded. Although creativity research got a late start, it quickly overtook research on genius as a topic in personality research. Despite something of a decline in interest in the 1980s, research on creativity has resurged. Now both research topics have become sufficiently well established to enjoy their own journals and handbooks (e.g., Kaufman & Sternberg, 2019; Simonton, 2014e).

The main goal of this chapter is to provide an overview of the substantive findings and issues regarding individual differences in creativity and genius, with a special emphasis on the two combined. But before we can begin that task, I first must define the two key terms.

Definitions

What do we mean when we call someone “creative”? How do we know who can be considered a “genius”? Because creativity is perhaps the most difficult to define, I start with the first question.

Creativity

Creativity involves the generation of creative ideas. Although researchers have long debated what makes an idea creative, recent discussion suggests three essential criteria: originality, utility, and surprise (Simonton, 2018). *Originality* signifies that the idea has a very low initial probability; *utility* indicates that the idea proves useful (i.e., effective, appropriate, adaptive, or meaningful, depending on the task demands); and *surprise* means that the idea is not an obvious derivation from prior knowledge but rather adds something new to that knowledge or expertise. All three criteria are necessary, but no single criterion or pair of criteria is sufficient. A useless idea cannot be creative, no matter how original, for example. Unfortunately, the definition of creativity is complicated by the fact that creative ideas are assessed at two contrasting levels (Simonton, 2013b). On the one hand, *personal* creativity involves the creator's own assessment of an idea's originality, utility, and surprise—a purely psychological phenomenon. On the other hand, *consensual* creativity entails how the idea is evaluated by others, whether coworkers, supervisors, colleagues, connoisseurs, audiences, critics, scholars, or historians—assessments that introduce interpersonal, disciplinary, and sociocultural factors operating outside the creator's psychology. Personal creativity is sometimes called “little-c” creativity, whereas consensual creativity is called “Big-C” creativity, with the latter then associated with creative genius (Simonton, 2013b).

Another complication in understanding creativity is that researchers have adopted more than one way to investigate the emergence of creative ideas. These different ways essentially represent contrary levels of psychological analysis. Three viewpoints, in particular, are paramount (Simonton, 2003):

1. Creativity can be viewed as a mental *process* (or collection of processes) that results in the production of ideas simultaneously original, useful, and surprising. This is the perspective favored by cognitive psychologists who study problem solving and insight using either laboratory experiments or

computer simulations (Simonton & Damian, 2013).

2. Creativity can be seen as a characteristic of a *product*, such as a discovery, invention, poem, painting, or composition, which contains one or more creative ideas. The higher the creativity of those ideas and the richer the concentration of those ideas, the more creative the product. The study of creative products is the primary occupation of psychologists in experimental aesthetics (Tinio, 2019), albeit occasionally psychologists have also attempted to comprehend scientific products.

3. Creativity is a trait or personality profile that characterizes a *person*; that is, it is some quality or capacity that some individuals have more than others, and still others may not even have at all. [bodyini]For instance, creativity may consist of some special combination of such individual-difference factors as intelligence, ambition, determination, independence, openness, and originality. Needless to say, this is the perspective adopted by personality psychologists who wish to identify that set of personal attributes that distinguish creative individuals from people who display little if any creativity (Feist, 2019).

These are the process, product, and person perspectives on creativity (cf. Damian & Simonton, 2015a). These three perspectives are not totally independent. At the very least, we might hope that creative products are generated by creative persons using creative processes. It is for this reason that investigators often combine two or three perspectives in a single inquiry. For example, researchers might gauge individual differences in creativity in terms of their comparative output of creative products, then attempt to predict that variation using cognitive and personality variables (e.g., Grosul & Feist, 2014; Feist, 1993; Kell & Lubinski, 2014). Nonetheless, most investigators tend to concentrate on just one of the three perspectives, the remaining two becoming secondary at best. This is true for the bulk of the personality research, which usually concentrates on the creative person, assigning noticeably less attention to the process and product aspects (Simonton, 2003).

Genius

The term *genius* has a much longer history than that of *creativity*. In fact, the word originated in the times of ancient Rome, when each person was believed to be born with a “guardian angel.” Yet beginning with Galton’s 1869 *Hereditary Genius*, the term found its way into the behavioral sciences. The word then began to accrue a more objective and quantitative meaning. Eventually, psychologists proposed two contrary operational definitions of the construct—the psychometric and the historiometric.

Psychometric Definition

Galton (1869) conceived of genius in terms of the normal distribution of what he called “natural ability.” Those individuals whose natural ability placed them in the remote upper tail of the bell-shaped distribution were identified as geniuses. Unfortunately, Galton’s conception of genius could not be directly implemented until the advent of the intelligence test. These tests were used to label children as intellectually gifted. Pioneers such as Lewis Terman (1925) and Leta Stetter Hollingworth (1942) helped to establish the practice of styling a child a “genius” if he or she scored above a certain set level on some standardized IQ test, such as the Stanford–Binet. Later, when adult intelligence tests emerged, this psychometric definition was carried over with minimal modification. A genius was simply a child or adult who scored above some predetermined level.

Often the cutoff was put at IQ 140, a hypothetical threshold that has found its way into many dictionaries and encyclopedias (e.g., *American Heritage*, 1992). Others would relax the criterion somewhat. For instance, the Mensa Society sets the figure at two standard deviations above the population mean, which results in a requirement of around 132 on many tests. Naturally, because scores on IQ tests can be considered interval variables, genius can be also conceived in a more continuous fashion. It is then possible to speak of relative degrees of genius. Indeed, this very practice has inspired the appearance of additional clubs of even more elite intellects. The Four Sigma Society requires its members to be four stan-

dard deviations above the mean (or around IQ 164), while the Mega Society stipulates an IQ only obtained by one in a million (or around IQ 176).

The psychometric definition of genius enjoys the advantage that the best intelligence tests stand among the most reliable of all psychometric instruments. That said, psychometric genius also encounters problems when it is extended to the domain of creative achievement (Simonton, 2016). A concrete illustration is seen in Terman’s classic *Genetic Studies of Genius* (Terman, 1925–1959). Having selected more than 1,500 children on the basis of exceptional IQ scores, Terman conducted a longitudinal study to determine whether these young geniuses would grow up to become highly accomplished adults (Terman & Oden, 1959). Although many attained considerable success, it is fair to say that none achieved the highest levels of acclaim. For example, there were no Nobel laureates among the group. The ironic fact eventually emerged that among those screened in the early 1920s were two children who grew up to earn Nobel Prizes in Physics, namely, William Shockley in 1956 and Luis Alvarez in 1968. Yet their childhood IQs were not high enough to get either one of them included in Terman’s elite sample (Winner, 1996). Although Terman’s longitudinal study continues to this very day, it now has become a gerontological inquiry rather than a study of genius per se (Duggan & Friedman, 2014).

Historiometric Definition

When Galton wrote *Hereditary Genius*, there existed no psychometric measures that could be used to define genius. Therefore, Galton introduced a rather different operational definition, the historiometric (Simonton, 2014b). According to this alternative, genius is defined in terms of an individual’s contributions to a particular domain of human achievement. A genius is then a person whose effects on a domain are so numerous and so distinctive that the domain is appreciably transformed. The most prominent geniuses often make names for themselves by becoming eponyms for discoveries, movements, or events. Illustrations include the Copernican revolution, Newtonian physics,

Darwinism, Pasteurization, and Freudian slips. Furthermore, as in the psychometric definition, historiometric assessment can be designed to gauge the relative magnitude of genius (Simonton, 1990). The greater the degree of impact, the more prominent the individual's reputation, and hence the higher the caliber of genius (e.g., Damian & Simonton, 2015b; Murray, 2003; Whipple, 2004). Thus, according to their comparative impression on the classical repertoire, Mozart can be said to have displayed more genius than Salieri, just as Salieri can be styled a greater genius than Türk. Assertions such as this can be based on two distinct kinds of measurements, eminence and productivity.

1. *Eminence measures* gauge the total global impact an individual has made on a given domain (Simonton, 1990). This impression may be defined according to the ratings of peers or experts (e.g., Helson & Crutchfield, 1970; Roe, 1953); the receipt of special honors or awards, such as the Nobel Prize (e.g., Rothenberg, 2015; Simonton, 1992); the frequency of performance, discussion, or citation (e.g., Feist, 1993; Grosul & Feist, 2014; Simonton, 1991b); or the amount of space assigned the individuals in encyclopedias, biographical dictionaries, history texts, anthologies, and other reference works (e.g., Simonton & Song, 2009; Walberg, Rasher, & Hase, 1978).

2. *Productivity measures* assess the number of concrete contributions an individual has made to a given domain (Albert, 1975). These most commonly include counts of books, articles, poems, paintings, inventions, compositions, and the like (e.g., Grosul & Feist, 2014; Kozbelt, 2014; Matthews, Helmreich, Beane, & Lucker, 1980), although occasionally more refined units may be used, such as the number of melodies created by composers (e.g., Simonton, 1991b). These tabulations may include all works generated, regardless of impact, or they may include only those works that were influential, such as those determined by citation or performance frequencies (Simonton, 1977, 1991a).

Fortunately, because productivity constitutes the single most prominent predictor of

differential eminence, these two alternative definitions, for all practical purposes, are equivalent (Albert, 1975; Simonton, 1997). Beyond this convergence, historiometric definitions have other measurement virtues. First, historiometric measures have clear "face validity"; that is, they seem to correspond closely with what most people would consider indicative of creative achievement. If Beethoven, Michelangelo, Shakespeare, or Descartes cannot count as creative genius, it is doubtful that the word could have any meaning whatsoever. Second, research indicates that such measures have highly respectable reliabilities, multiple indicators of eminence or productivity, usually displaying coefficient alphas in the upper .80s and .90s (Murray, 2003; Simonton, 1990). Third, research has also shown that such measures display a high degree of cross-cultural invariance (e.g., Simonton, 1991c). For example, the most eminent figures according to the African American minority culture are also the most eminent figures according to the European American majority culture of the United States (Simonton, 1998a). Fourth, historiometric assessments enjoy a high degree of transhistorical stability (Simonton, 1991c). Despite the existence of occasional exceptions (e.g., Johann Sebastian Bach and Gregor Mendel), those who are most famous in their own time also tend to be the most eminent today (Ginsburgh & Weyers, 2014). This result suggests that whenever psychologists study distinguished contemporaries, it is highly likely that those luminaries will continue to have exceptional posthumous reputations (Simonton, 1998b).

One last feature of the historiometric definition is worth noting. The word *genius* was first used as a label for those who made outstanding creative contributions. However, it eventually became applicable to all forms of exceptional achievement. As a result, it is now acceptable to talk of political, military, religious, and entrepreneurial genius. Thus, the historiometric definition can apply to accomplishment in leadership domains, as well as that in creativity domains (Simonton, 2014b). To be sure, the leader's products are not the same as the creator's, so the productivity definition cannot be used. Nonetheless, it is often possible to gauge both creators and leaders on a comparable scale of

eminence, something first demonstrated by James McKeen Cattell back in 1903. This common denominator has permitted psychologists to examine the similarities and contrasts in the personality profiles of distinguished creators and leaders (e.g., Cox, 1926; Simonton, 1991d; Simonton & Song, 2009; Thorndike, 1950).

Although it is feasible to speak of genius in leadership domains, as well as genius in creative domains, in this chapter I concentrate on the latter. There are three reasons for this focus. First, the research literature on the personal characteristics of leaders is so immense that it would easily take up considerable space (Simonton, 1995). Second, individual-difference variables appear to play a much less conspicuous role in outstanding leadership than they do in exceptional creativity. Very often, situational factors dominate over individual factors (e.g., Simonton, 2013a). Even when personal attributes have some role to play, frequently their effects are moderated by contextual variables. Third, although leaders can clearly qualify as geniuses by the historiometric definition, they are rather less likely to do so under the psychometric definition. Not only do leaders often display lower levels of intellectual ability than do creators (Cox, 1926; Simonton, 1976; Simonton & Song, 2009), there is also evidence that leadership effectiveness can actually be compromised by a leader's possessing an excessively high intelligence (Simonton, 1995). Sometimes the relation between leadership and intelligence may be best described by a curvilinear, inverted-U function (Antonakis, House, & Simonton, 2017; Simonton, 1985). This nonmonotonic association contrasts greatly with what is observed for creativity.

Having defined the terms and delineated this chapter's scope, I wish to provide next a general personality sketch of the highly creative individual. After doing so, I turn to a discussion of some of the key issues in the study of the creative personality.

General Personality Sketch

Since the onset of research on the creative personality, researchers have periodically published reviews of the central research

findings (e.g., Barron & Harrington, 1981; Feist, 1998, 2019; Furnham, 2017). These reviews indicate a reasonable consensus regarding the factors associated with cross-sectional variation in creativity; that is, individuals who display high levels of creativity appear to differ from less creative individuals on numerous cognitive and dispositional characteristics. The most conspicuous overall feature of this distinctive profile is its complexity. The creative genius often has the appearance of being a bundle of highly variable and sometimes even contradictory attributes. To make this point, consider the following six clusters of findings:

1. Creative individuals are almost invariably more intelligent than average, at least by a standard deviation or more (Furham, 2017; Kim, Crammond, & VanTassel-Baska, 2010). An IQ of about 120 is often given as the approximate threshold level (Barron & Harrington, 1981), yet highly creative people have scored lower (e.g., Cervantes, according to Cox, 1926). Although researchers have often spoken of the relation between IQ and creativity becoming negligible after the supposed IQ 120 threshold, that null relation may only hold for measures of general intelligence (Feist, 2014). When intellectual ability is assessed with greater specificity, such as focusing on mathematical precocity, a positive correlation may appear even among the top 1% of the distribution (Kell & Lubinski, 2014).

2. In line with the last point, intelligence is not a homogeneous construct but rather may comprise distinguishable intelligences (see, e.g., Gardner, 1983; Simonton, 2016; Sternberg, 2003). In Guilford's (1967) classic "structure of intellect model," intelligence was broken into 120 distinct types, only a subset of which has any direct involvement in creativity (Bachelor & Michael, 1997). Particularly crucial is the distinction between convergent and divergent processes. *Convergent thought* endeavors to identify the single correct response to a given problem situation, whereas *divergent thought* tries to generate many different responses. The latter concept has led to the emergence of a large number of divergent thinking tests that have had some suc-

cess in predicting creativity (Plucker, Makel, & Qian, 2019).

3. Moving from cognitive to personality traits per se, creative persons exhibit a tremendous amount of openness to experience, a key factor of the Big Five factor model (McCrae & Greenberg, 2014). For example, highly creative scientists are more likely to display a wide range of interests and hobbies (e.g., Root-Bernstein et al., 2008; Root-Bernstein, Bernstein, & Garnier, 1995; see also Grosul & Feist, 2014). This breadth can often take the form of extraordinary versatility that enables creators to make contributions to more than one domain of achievement (Cassandro, 1998; Cassandro & Simonton, 2010).

4. Beyond these aspects of the creative disposition the motivational attributes. Creators deeply love what they do, and thus show exceptional enthusiasm, energy, and commitment to their chosen domain of creative endeavor (e.g., Chambers, 1964; Roe, 1953). So strong is this emotional involvement that creators are often perceived by family and friends as “workaholics”—an attribution that is not without empirical justification (Helmreich, Spence, & Pred, 1988; Matthews et al., 1980). In any case, because of this characteristic, creators are extremely persistent in the face of obstacles and disappointments (e.g., Chambers, 1964; Cox, 1926). They do not give up easily.¹

5. The foregoing cognitive and motivational attributes are usually coupled with a characteristic social orientation. Creative individuals are more likely to be introverted than to be extroverted (Feist, 1998). Indeed, this introversion can reach the level of being rather remote, withdrawn, and even antisocial (Cattell, 1963; Eysenck, 1995). At the same time, creative persons are prone to exhibit a high degree of independence and autonomy, often displaying a pronounced rebellious streak in their categorical refusal to conform to conventional norms (e.g., Crutchfield, 1962; Roe, 1953).

6. Highly creative individuals, and especially creative geniuses, seem to show higher than average rates of subclinical psychopathological symptoms (Simonton, 2019b). This tendency is sometimes indicated by

disorders such as suicidal depression, as well as alcoholism or other forms of substance abuse (e.g., Ludwig, 1995; Post, 1996). In addition, highly creative personalities often exhibit elevated scores on psychometric instruments that are indicative of mental disorder or emotional instability, such as the Psychoticism scale of the Eysenck Personality Questionnaire (Eysenck, 1995) or the Clinical subscales of the Minnesota Multiphasic Personality Inventory (Barron, 1969; MacKinnon, 1978). Creativity is also negatively associated with the ability to filter out irrelevant information (Carson, 2014). Although this characteristic is positively correlated with openness to experience, it is also positively associated with both psychoticism and psychosis (Eysenck, 1995; Stavridou & Furnham, 1996). Yet the surprising thing is that creators appear to enjoy psychological resources—including intelligence and ego-strength—that convert potential liabilities into personal assets (Barron, 1969; Carson, 2014; Cattell & Butcher, 1968). Hence, outright, debilitating mental illness is relatively rare.

I hasten to point out that the empirical and theoretical literature is by no means consistent regarding the above personality sketch.² Many researchers would delete one or more of the listed attributes, and a few researchers would omit virtually all of them. The points raised in the next section will help us understand why.

Specific Substantive Issues

Seven critical questions complicate any attempt to understand the personality of the creative genius. These issues concern everyday versus exceptional achievements, childhood versus adulthood creativity, cognitive versus dispositional attributes, scientific versus artistic creativity, nature versus nurture in creative development, and individual versus situational determinants of creativity.

Everyday versus Exceptional Achievements

The primary focus of the personality sketch I presented earlier was to describe the creative genius. The implicit assumption was

that the most eminent creators would provide the most typical or characteristic profile of cognitive and dispositional traits. Yet many studies of creative behavior examine more mundane forms of the phenomenon, such as workers in industrial research and development units. Indeed, much research in creativity looks at student populations, including children. Therefore, to what extent are the personality profiles gathered from the examination of creative geniuses truly indicative of what holds in more everyday creators? There are two alternative responses.

On the one hand, we can argue that the creative genius differs only in degree from an individual whose creativity will never earn significant recognition beyond the confines of a rather circumscribed time and place. In other words, there exists some continuum linking the universally recognized genius with the average person on the street. On this continuum may be placed various intermediate grades of creators. All of the traits associated with creativity would then vary according to a person's placement on this latent continuum. Eysenck (1995), for example, argued that psychoticism represents just such a dimension. Low levels of psychoticism predict the absence of creativity, and increased psychoticism predicts ever-elevated creativity. The genius emerges at the exalted level near the dangerous borderline between creativity and madness.

One attractive feature of this continuity hypothesis is the fact that creative behavior itself displays some degree of continuity. This is most obvious when creativity is gauged in terms of the output of creative products. Lifetime creative productivity forms a well-defined ratio scale on which people may vary. In the sciences, for instance, there are those who made no contribution, those who made two, those who made three, and so forth. Furthermore, there already exists ample evidence that the magnitude of creative output can display a monotonic relationship with certain personality traits (e.g., Eysenck, 1995). Hence, continuous variation in creative behavior may be grounded in underlying variation in personality.

On the other hand, we can take the position that there are qualitative differences among the various forms that creativity

may take. An illustration can be found in Kaufman and Beghetto's (2009) "four-C" model of creativity. Besides distinguishing everyday "little-c" creativity from eminent "Big-C" creativity, they also add "mini-c," which occurs during learning and, most significantly, "pro-c" creativity, which is associated with the creative professions. These four kinds of creativity not only exhibit different relationships among each other, but also differ how they are assessed in research; the degree to which they are domain-specific or general; whether their motivational basis is intrinsic, extrinsic, or both; and their association with mental illness. For instance, whereas psychopathology may be related to Big-C creative genius, it may prove uncorrelated with little-c creativity (see also Silvia & Kaufman, 2010; Simonton, 2014c). Hence, the four types are so qualitatively distinct that they cannot be ordered into a straightforward ordinal system, such as mini-c, little-c, pro-c, and Big-C.

Of course, one might simply argue that any hypothesized continuity might be subjected to empirical inquiry. Yet herein arises a problem: The methods for studying everyday and exceptional creativity are not the same. For instance, where pro-c creators are most often studied using psychometric methods (Feist, 2014), Big-C creative geniuses are more frequently examined using historiometric methods (Simonton, 2014b). These methods cannot be simply interchanged, particularly given that only the latter can be applied posthumously (Song & Simonton, 2007). This fundamental contrast is not readily resolved.

Childhood versus Adulthood Creativity

So far we have been discussing creativity in adult samples. Yet studies of creativity often focus on creativity in children, including many of the classic investigations in this field (e.g., Getzels & Jackson, 1962; Wallach & Kogan, 1965). Besides its theoretical interest, this issue can have significant practical consequences for the design and evaluation of programs for the education of gifted children (Balchin, Hymer, & Matthews, 2009). Nevertheless, these inquiries have a somewhat ambiguous status from the standpoint of understanding the personality

basis of creativity and genius. There are two main difficulties.

First is the matter of identification. How does the researcher decide that a given child is creative? One common approach is to make this decision according to performance on some “creativity test,” usually some measure of divergent thinking (Runco, 1992). Yet this approach somewhat begs the question. Such assessment is only as good as the instruments are valid. Unfortunately, the validity of various creativity tests can sometimes be on the low side (Plucker et al., 2019). An alternative approach is to identify creativity according to actual behavioral performance—the generation of genuine creative products. This method is especially useful in the case of children who display precocious talent, such as child prodigies in a particular domain of creativity. Nonetheless, this line of attack does not completely remove the validity problem. It is extremely rare for children (and even adolescents) to generate products that satisfy adult standards of creativity (Winner, 2014). The products may reveal a precocious acquisition of specialized skills, and a degree of virtuosity in the execution of those skills, but without displaying the originality and adaptiveness necessary to be competitive with the output of mature creators. Given these problems of identification, it is not always safe to assume that the personality profile characteristic of youthful creativity is the same as that for adulthood creativity (see, e.g., Parloff, Datta, Kleman, & Handlon, 1968). The selection procedures may not entail sufficiently overlapping criteria.

Second is the matter of continuity. Development from childhood through adolescence and even adulthood is fraught with a great variety of changes in cognitive makeup and personality structure. Besides progressive developmental differentiation of various functions, specific personality traits may wax and wane, with particularly dramatic effects taking place during puberty (Albert, 1996). Some of these transformations may be exogenous (environmental) and others endogenous (genetic), but in combination they signify the instability of a youth’s talent during the course of growth and maturation (Simonton, 1999). At various points during the course of development, creativity may

undergo spurts and slumps, and may even vanish altogether (Runco & Charles, 1997). Even in adulthood, creativity may come and go, whether we assess it psychometrically (McCrae, Arenberg, & Costa, 1987) or historiometrically (Kozbelt, 2014; McKay & Kaufman, 2014). These developmental instabilities within individuals hold even though individual differences in creativity may be relatively stable over time.

It should be pointed out that these two difficulties are mitigated, if not entirely obliterated, when we revert to the psychometric definition of genius; that is, if genius is defined as an exceptionally high IQ, then the problem of identification disappears by definitional fiat. Furthermore, such IQ scores are highly stable across childhood, adolescence, and adulthood (Simonton, 1976; Terman & Oden, 1959). The main source in developmental instability would then probably be concentrated in the personality profiles that characterize highly intelligent persons. However, even if these latter profiles were highly stable across time, that stability would not contribute much to our understanding of the dispositional qualities of the exceptional creator. For both in youth and in maturity, the personality profiles of highly intelligent individuals differ markedly from those of highly creative individuals (Albert, 1994; Getzels & Jackson, 1962; Wallach & Kogan, 1965). The psychometric genius and the historiometric genius are different people from a dispositional perspective (Simonton, 2016).

Cognitive versus Dispositional Attributes

Research on individual differences in creativity may be said to have roots in two distinct psychological traditions. The first harks back to the Gestalt psychologists, who were the pioneers in research on problem solving and insight. In this tradition, much research on creativity has focused more on the creative process than on the person (Simonton & Damian, 2013). Some investigators have even gone so far as to suggest that creativity is a mental operation accessible to all, and thus is largely unrelated to general individual-difference dimensions (e.g., Weisberg, 1992). Creative geniuses are merely persons who have acquired the nec-

essary expertise in a given domain; otherwise, they employ the same cognitive processes as the rest of us in problem-solving situations. In contrast, other researchers in this tradition maintain that the person is indeed important, because creative individuals are those who had superior access to certain special mental operations, such as the capacity for remote association, divergent thought, or some other process or procedure (Ness, 2013; Rothenberg, 2015; Simonton & Damian, 2013). Many psychometric instruments were in fact predicated on the assumption that individual differences in creativity are grounded in certain cognitive abilities (Plucker et al., 2019). Whatever the specifics, this tradition asserts that a complete understanding of the creator requires that we understand the cognitive process behind creativity. If individual differences exist in the capacity for creativity (besides those grounded in domain-specific expertise), then this variation has to do with creative cognition (Simonton, 2012; Ward & Kolumbs, 2019).

The second research tradition may be said to have its source in personality and clinical assessment. Here, researchers are fascinated with the richness of the human personality, with its complex of differentiating interests and values, emotions and motives, activities and reactions. For investigations in this tradition, the creative genius must be distinguished by a highly distinctive profile of traits that enables a person to exhibit creativity. Some investigators have even argued that this defining cluster of dispositional attributes may be more critical in a creative life than are any putative cognitive differences (e.g., Eysenck, 1995). Of course, this second tradition implies a whole different manner of constructing “creativity tests.” Rather than measure the intellectual capacity for certain cognitive operations, the tests may assess preferences, attitudes, and activities associated with creative behavior. Standard personality measures may even be used to identify the characteristic profile of the highly creative person (Feist, 1998). In such circumstances, the assessment of creativity becomes a manner of scoring performance on a generic inventory rather than the application of a test specifically designed to tap the creative personality.

Although some researchers have taken extreme positions, advocating exclusively either cognitive or dispositional assessment, many recent investigators have argued for the involvement of both intellect and personality in the making of a creative individual (e.g., Simonton, 2004; Sternberg & Lubart, 1995). Creativity of the highest order, especially that of the creative genius, may require a special combination of cognitive and dispositional attributes. In fact, it may be the distinctiveness of that combination that renders exceptional creativity so rare. The vast majority of the population may be missing one or more essential components (Simonton, 1999).

Scientific versus Artistic Creativity

Researchers often treat creativity as a single, relatively homogeneous phenomenon. Creativity is some generic capacity for generating original and adaptive ideas, without regard to the specific domain in which the creativity is to take place. Although this simple view may have some justification when discussing everyday creativity or the creativity displayed by children, it becomes clearly invalid when extended to extraordinary creativity, especially when it attains the level of creative genius. The expected cognitive and dispositional profiles vary conspicuously according to the type of creative achievement. The disciplinary contrast that has attracted the most empirical documentation is that between scientific and artistic creativity (Feist, 1998). Expressed in general terms, creative scientists tend to exhibit traits that fall somewhere between those of the creative artist and those of the average human being (Simonton, 2009). For example, remote associations and divergent thinking are less prominent, and that which does occur is more restricted to concepts with the scientific specialty—in contrast to artists who seem to have wild ideas about almost everything. The scientific genius also tends to have a more conventional, predictable, and stable personality structure than does the artistic genius. Especially remarkable is the less conspicuous inclination toward psychopathology seen in great scientists, albeit even here this characteristic might still be more prominent than that found in the general popula-

tion (Damian & Simonton, 2015a; Ludwig, 1995; Post, 1994; Simonton, 2014d).

I should point out that the foregoing differentiations represents only the first cut in laying out some typology of creative personality. Although scientists are broadly different from artists, neither scientific nor artistic creators form homogeneous groups (Taylor, McKay, & Kaufman, 2017). In the sciences, for instance, some personality differences separate contributors to the mathematical, physical, biological, and behavioral or social sciences (Cattell, 1963; Chambers, 1964; Roe, 1953; Terman, 1954). Thus, social scientists, as a group, are more extroverted than are most natural scientists. Even within a particular scientific discipline, revolutionary scientists tend to be much more “artistic” in their disposition than are practitioners of what Kuhn (1970) styled “normal science” (Simonton, 2004). Indeed, scientific revolutionaries exhibit higher tendencies toward psychopathology than hold for normal scientists (Ko & Kim, 2008). In the arts, the variability in empirical profiles is even more remarkable (Cox, 1926; Ludwig, 1992). This diversity is perhaps most apparent in Ludwig’s (1995) study of psychopathology in eminent moderns. The incidence rates for various disorders depend very much on the prevalent form of artistic expression. Poets tend to suffer from extremely high rates, for example, whereas architects are more similar to the scientists in their susceptibility to psychopathology (also see Post, 1994).

It should now be evident that there are many types of creative personalities, not just one. This is reflected not just in their dispositions but in their backgrounds as well. For instance, scientific creators, in contrast to artistic creators, hail from backgrounds that tend to favor more conformity, conventionality, and stability (Simonton, 2009). But this fact brings us naturally to the next substantive issue.

Nature versus Nurture in Creative Development

One of the oldest controversies in psychology is the relative importance of nature and nurture in human development. Interestingly, this issue was first raised—and christened—with respect to the study of genius. The debate began with Galton’s 1869 *Hereditary*

Genius, in which he attempted to show that genius of all kinds clustered into family pedigrees. Galton explicitly argued that genius is born rather than made. It was the immediate consequence of the genetic inheritance of extraordinary intelligence, energy, and determination. This extreme stance was soon challenged, most notably by de Candolle (1873), who endeavored to show how the appearance of outstanding scientific creativity was contingent on a diverse array of climatological, political, and sociocultural factors. As a result, Galton conceded that both genetics and environment may play a role in the emergence of creative genius. This concession was ably made in his 1874 *English Men of Science: Their Nature and Nurture*. The subtitle is significant, for it represents the first formal use of the terms *nature* and *nurture* to label the debate.

Unfortunately, later research on genius and creativity moved even further away from the position that development is a function of both biological endowment and environmental influences. This movement toward nurture accounts can be partly ascribed to the increased dominance of psychology in the United States, which had tended to have a strong emphasis on learning as the central factor in personality development. In addition, the eugenics movement founded by Galton seemed discredited by the genocidal programs of the Nazi regime during World War II. But perhaps most importantly, a great deal of accumulated research seemed to show that the development of creativity was contingent on a host of environmental factors (Damian & Simonton, 2014; Simonton, 2019c). These variables include birth order and family size, and early traumatic experiences; the home intellectual environment, formal education, and special training; geographic, ethnic, religious, or professional marginality; and the larger political, social, cultural, and economic milieu. This large inventory of developmental variables seemed to prove that nurture was supreme over nature in the appearance of creative talent and genius.

However, recently, the tide has turned against this extreme environmentalist view, a turnaround due to the advent of modern behavioral genetics, including the sophisticated analysis of monozygotic and dizy-

gotic twins (Barbot & Eff, 2019; Johnson & Bouchard, 2014). Therefore, it now appears rather likely that at least a portion of what it takes to display creativity, outstanding or otherwise, arises from our genes (Simonton, 1999, 2008, 2014a). In fact, research in behavioral genetics suggests that some so-called “environmental” factors might actually be genetic in their underlying causality (Plomin & Bergeman, 1991; Scarr & McCartney, 1983). There are two main ways this can happen:

1. Offspring obtain their genotypes from the parental genotypes. The parental genotype is also associated with a particular parental phenotype, part of which may leave an imprint on the home environment. For instance, highly intelligent parents will more likely have more intellectual and cultural hobbies and recreational activities. As a consequence, the home may be filled with books, magazines, art prints, and music recordings (e.g., Terman, 1925). This available stimulation may then be improperly given all of the credit for the appearance of a young genius. Yet the apparent connection may be partly or completely spurious from a causal standpoint. It is the shared genotype, not the home circumstances per se, that may be responsible for the bulk of the developmental effect.

2. Even more dramatically, we must recognize that a person's genotype helps shape the environment in which the phenotype must emerge. Children or adolescents are not passive receptacles for events impinging on some *tabula rasa*; rather, these youth are acting upon their world, trying to make it conform more closely to their abilities and interests. They may ask their parents to provide them with music lessons, to purchase certain books or magazines, to visit science or art museums, and so forth. Indeed, there is ample anecdotal evidence that gifted children often continue to pursue activities in the face of active parental discouragement. Blaise Pascal continued to study mathematics on his own even after his father deliberately hid books on that subject, believing that his son was slighting classical studies. So Pascal independently invented a large portion of Euclidean geometry.

It is crucial to recognize the possibility that genes might affect the environment in a manner that sometimes is extremely subtle and therefore not easily deciphered. Take, for instance, research suggesting that creative geniuses exhibit higher rates of orphanhood or parental loss in childhood or adolescence (e.g., Eisenstadt, 1978). This might be seen as an obvious case of a nurture effect, and this developmental influence is often so interpreted (e.g., Damian & Simonton, 2014). Presumably such traumatic experiences can dramatically change the course of personality development. Nevertheless, it can be readily argued that this linkage represents a hidden genetic effect. To provide but one such alternative interpretation, we know that the parents of geniuses tend to have gotten married later in life and to have had their offspring at later ages than is the norm (Bowerman, 1947; Ellis, 1926; Galton, 1874; Raskin, 1936). This may simply reflect the fact that highly intelligent and ambitious people tend to delay family responsibilities until they have fully established their careers. If so, then when all other factors are held constant, it could be that this phenomenon alone might account for the higher incidence of parental loss. The traumatic event itself has no developmental consequence. What does have an effect is that the young genius inherited those qualities that enable him or her to succeed in life, such as intelligence and drive.

Of course, at present, we cannot say with any precision precisely the relative contributions of nature and nurture to creative development. Insofar as creativity depends on intellectual growth, then the genetic contribution should be substantial. After all, intelligence features among the highest heritability coefficients of all individual-difference variables germane to either creativity or genius (Johnson & Bouchard, 2014). At the same time, the heritability coefficients for motives, dispositions, interests, and values are rather less prominent, with genes at best accounting for only half as much variance as they account for in intellectual traits (Johnson & Bouchard, 2014). Thus, the determination of the comparative impact of nature and nurture for creativity must depend on the determination of the relative importance of the diverse characteristics that enter into

the profile of the creative person (Simonton, 2008). If intelligence is the primary factor, then more than half of creativity may be ascribed to genetic influences. But if personality attributes provide the most critical components of the profile, then maybe less than one-fourth of the observed individual differences may be attributed to genetic makeup.

Individual versus Situational Determinants of Creativity

Thus far we have been assuming that creativity has its locus *inside* the person—that it is an individual characteristic or behavior. Not all researchers accept this viewpoint, however (e.g., Csikszentmihály, 2014; Glăveanu et al., 2019). Many sociologists and anthropologists have argued that creativity, even genius, is more a sociocultural than an individual phenomenon. There are two main arguments for this position, one general and the other specific.

The general argument ensues from the fact that creative genius is not evenly distributed across history and geography. Instead, exceptional creativity tends to cluster into what Kroeber (1944) styled as *cultural configurations*. Typically, there will exist long periods in the history of any civilization in which creative activity is virtually nil (“dark” ages), punctuated by other periods in which creativity reaches the greatest heights (“golden” and “silver” ages). The Classical Age of Greece or the Italian Renaissance are prime examples. Kroeber documented the existence of these configurations in every civilization that has ever existed in the world, so we cannot doubt that this is a very general phenomenon (see also Murray, 2003; Simonton & Ting, 2010). Moreover, Kroeber (1944) and others argue from this secure fact that the creative genius is basically an epiphenomenon produced by the *zeitgeist*, or “spirit of the times.” At best, the creators are mere spokespersons for the culture in which they live.

The specific argument concerns the curious phenomenon called *multiples* (Lamb & Easton, 1984). This occurs whenever two or more individuals independently, and often simultaneously, come up the exact same scientific discovery or technological invention. Classic examples include the creation

of calculus by Newton and Leibnitz, the discovery of Neptune by Adams and Leverrier, the theory of evolution by natural selection by Darwin and Wallace, and the invention of the telephone by Bell and Gray. In fact, the number of such multiple discoveries and inventions runs into the hundreds, if not thousands. Furthermore, many social scientists have argued that the very occurrence of these events proves that creativity ensues from the sociocultural system, and not from the individual (Lamb & Easton, 1984). At a particular moment in the history of any creative domain, certain ideas become absolutely inevitable, so it really makes no difference who actually makes the contribution. The new ideas are “in the air” to be picked by anyone. Indeed, some proponents of this social-deterministic account have argued that the discoverer or inventor does not even need any special intellectual or dispositional attributes.

Needless to say, if these arguments are correct, then creativity and genius would no longer become the proper subject of psychological analysis, for creative genius would become a sociocultural process. Nonetheless, scrutiny of both arguments reveals several weaknesses that seriously undermine the thesis of sociocultural determinism (Simonton, 2010). In the case of cultural configurations, for instance, it has been shown that certain political, economic, cultural, social, and disciplinary circumstances play an important part in creative development; thus, the milieu is operating *through* creative individuals (Simonton, 2019c). An excellent example is the impact of role models on the early development of the creative genius. In the case of multiples, it is possible to construct combinatorial models of the phenomenon that are based on how creativity operates within individual minds (Simonton, 2010). Not only can these models explicate the same phenomenon, but they also lead to precise predictions that have so far withstood empirical tests. According to these alternative models, the contribution of the sociocultural milieu is limited to the provision of the necessary (but not sufficient) conditions for the emergence of certain ideas. The creative genius must do the rest.

Although recent research seems to undermine a strong-form sociocultural determin-

ism, this is not tantamount to the claim that creativity and genius are located entirely in the individual. On the contrary, there exists ample empirical evidence that the creative person is open to all sorts of external influences that directly affect the amount and type of creativity displayed (Simonton, 2019c; Simonton & Ting, 2010). Furthermore, to some extent, creativity operates as a state rather than trait variable, changing from moment to moment according to the circumstances, social and otherwise (Amabile, 1996; Paulus & Nijstad, 2019). Indeed, this openness to extrinsic influences is what inspires many researchers to search for environmental stimuli that are most conducive to the manifestation of creative behavior. Especially crucial are various disciplinary networks, such as collaborative and competitive relationships with colleagues in the same field (Simonton, 2004). In fact, it is this social exchange that may be partly responsible for the clustering of creative genius into cultural configurations.

What these data suggest is that creativity is not just a cognitive, developmental, and personological phenomenon, but a social psychological phenomenon besides (Damian & Simonton, 2015a). Creative behavior is affected by a host of factors that reside outside the individual creator.

Future Prospects

It should be apparent from the foregoing discussion that research on creativity and genius has already produced an extremely rich, complex, and controversy-laden literature. It is certainly not a topic for those researchers who wish to investigate a subject in which questions are easily posed and more easily answered. Indeed, it is possible that many psychologists are scared away from the field simply owing to the several methodological and theoretical difficulties it presents. Nonetheless, creativity and genius are human realities too practically important for psychologists to ignore. Whether we are speaking of everyday creativity at home and work or the highly acclaimed accomplishments of creative genius, this is a phenomenon that has affected the lives of everyone, and will probably continue to do so for the duration

of human civilization. Therefore, it is hardly a topic that eventually is going to languish into oblivion. This does not mean that research activity will not wax and wane as the field progresses. Such oscillations have happened in the past, and they will probably continue to do so in the future. Nevertheless, inquiries into creativity will be continually revived as new developments take place in other fields of psychological study.

I believe that this resurgence will be specifically the case with respect to research on the creative personality. Studies into the dispositional attributes of creators and geniuses have slackened considerably since their heyday in the 1970s and early 1980s (Feist & Runco, 1993). Nonetheless, much of this decline may merely reflect a more pervasive slump in personality research as a whole. Now that personality has recovered its vitality and mission as a substantial sub-discipline of psychology, I foresee increased attention to those personal qualities that enable individuals to exhibit creativity—even creativity that assumes the form of genius. I would also hope that this growing attention would be coupled with increased effort toward developing a comprehensive and precise theory that effectively integrates the process, person, and product perspectives (Simonton, 2003). At present personality research is heavily dominated by the Big Five model, a model that may not suffice to capture the complexities of the creative personality (Fürst & Lubart, 2017). Most tellingly, this model fails to explicitly incorporate personality constructs, such as psychoticism or schizotypy, that have proven so crucial for understanding creativity, particularly when displayed as artistic genius (Eysenck, 1995; Feist, 1998; Nettle, 2006; cf. Acar & Runco, 2012; Acar & Sen, 2013). Once all operative personality dimensions are fully integrated into a complete theory, subsequent empirical research should have more theoretical guidance than it currently exhibits.³

NOTES

1. Curiously, the perseverance and determination shown by creative genius may not be equivalent with grit, which concerns a passionate commitment to long-term goals (Duckworth, Peterson, Matthews, & Kelly, 2007). The difference seems

to lie in the fact that grit most strongly correlates not with Big Five openness but rather with conscientiousness, which has a minimal, if not negative, relation with creativity (Duckworth & Quinn, 2009). No wonder, then, that grit exhibits the most predictive power with respect to well-defined goals (and means to attain those goals), such as winning the National Spelling Bee (Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2010; but see Credé, Tynan, & Harms, 2016). Creative geniuses do not operate in a world where means and ends can be so precisely defined.

2. With the advent of the positive psychology movement, a strong tendency has emerged to associate creativity with positive traits (Bacon, 2005). In that context, the concept of the “mad genius” has attracted considerable controversy (Kaufman, 2014). Unfortunately, research in this area is riddled with theoretical and methodological problems. For example, researchers too often conflate what are logically orthogonal hypotheses, incorrectly concluding that creative geniuses cannot be more prone to mental illness if creative people as a whole are more mentally healthy than noncreative people (Simonton, 2014c). Yet these two propositions are not inconsistent at all. In fact, with little effort, it is perfectly possible to frame the mad genius association in terms of at least eight utterly orthogonal hypotheses (Simonton, 2019b).

3. I have spent many years trying to develop a comprehensive explanatory and predictive theory (e.g., Simonton, 2003, 2010). But I would also be the first to admit that the achievement so far remains distant from the goal. The creative personality, particularly at genius levels, is just extremely complex, perhaps even prohibitively so!

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PART V

AFFECTIVE PROCESSES

CHAPTER 21

Emotion and Personality

A Social Functionalist Approach

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Emotions are fundamental to our nature as a species. They guide how we construe the world. They are the basis of our intuitions about right and wrong. They give rise to our sense of purpose. Despite potent cultural shaping, humans communicate emotions without words, in the face, voice, body, and touch in similar enough ways to recognize, and be moved by, the experience of others throughout the world. Emotions structure our moment-to-moment interactions with other people, supporting the network of social bonds that is central to human life.

At the same time, emotions richly define our individuality. From the first months of life, children vary in their emotional tendencies: Some are anxious, others sanguine; some move quickly to inconsolable distress, others seem preternaturally calm; some respond to any social interaction with delight, while others are intensely shy. As we grow older, even more distinctions emerge. One person easily laughs and is cheerful most of the time, another is usually worried about something, and a third seems perpetually annoyed. One person moves through life on an even keel, with little variation in emotion over time; another responds to life vividly and intensely, changing from one moment to

the next. As great writers and artists have shown us, the deeper themes of individual identity—life motifs, recurring conflicts, challenges, foibles and failures, quests for redemption, doubts and epiphanies—are infused with emotion. We sense each person's uniqueness in their style of laugh, how news of a loss crosses their face, the tone of their voice and pattern of touch.

To be human, then, is to have access to the full repertoire of emotions provided by our species' evolution. To be an individual is to experience and express emotion in idiosyncratic and peculiar ways. Our task in this chapter is to unpack this paradox: that emotions both reveal what we share with other human beings, and at the same time define much of our uniqueness as individuals.

To accomplish this goal, we begin by briefly summarizing a first wave of research on personality and emotion that emphasizes individual differences in typical levels of positive and negative affect. We then turn to four animating developments in the science of emotion, many of which emphasize universal functions and the observable processes and underlying mechanisms of human emotional life, and also have significant implications for the study of individual differ-

ences and personality. We discuss evidence that emotions serve crucial social as well as intraindividual functions; that our emotional repertoire contains far more than six distinct emotions; that universal mechanisms such as emotion-antecedent appraisal, neurotransmitter activity supporting emotional experience, and visceral awareness can give rise to variation in individual emotional experience; and that the experience of emotion itself is dynamic and complex, allowing for highly idiosyncratic patterns across emotions and over time. Building on these empirical foundations, we advance two conceptual approaches to the systematic study of emotions' role in person $\times$ environment interactions, and close our chapter with empirical examples of these lines of thought.

Mapping the Domain: Definitions of Emotion, Affect, Mood, and Emotional Traits

Imagine that one friend asks another, "Are you happy?" On the surface this may seem a straightforward question. Upon closer analysis, however, it can refer to a variety of affective experiences. Is the person generally happy with his or her life? Is he or she in a good mood today? Is he or she experiencing a brief burst of positive emotion, joy, mirth, or gratitude in response to a particular event? The affective realm is broad and begins in evaluations of the overall goodness or badness of a stimulus or target (Russell, 2003). Affective experiences can be studied at four levels of analysis (Kahneman, 1999; Rosenberg, 1998); distinguishing among these is important for integrating prior research and generating future directions in the study of emotion and personality.

At the broadest level, emotional *traits* refer to general styles of emotional responding that persist within the individual across context and time (R. Larsen & Ketelaar, 1989; Rosenberg, 1998; Shiota, Keltner, & John, 2006; Silvia, 2008a, 2008b). People with particular trait-like emotional tendencies, toward anger for example, are likely to show an ongoing subjective, expressive, and physiological profile that resembles that of the momentary emotional state (Lerner & Keltner, 2001; Malatesta, 1990; Rosenberg,

1998). The anger-prone individual is generally more likely to show attentional bias toward others' facial expressions of anger, to interpret others behavior as reflecting hostile intent, to react with angry expressions in the face and voice, to show more hostile behavior in social interactions, and to show higher levels of systolic blood pressure (e.g., Martin, Watson, & Wan, 2000; Schum, Jorgensen, Verhaeghen, Sauro, & Thibodeau, 2003; Van Honk et al., 2001; Wilkowski & Robinson, 2007). People who experience trait-like gratitude tend to feel grateful across contexts and time, and are more likely to express this emotion, for example, in linguistic acts of appreciation (Gordon, Impett, Kogan, Oveis, & Keltner, 2012; McCullough, Emmons, & Tsang, 2002). Considerable progress has been made in mapping the correlates of different emotional traits, including those of embarrassment, shame, and guilt (Tangney, 1990; Tracy & Robins, 2007), positive emotions (e.g., awe, love, joy, pride, and compassion; Shiota et al., 2006), and negative emotions (e.g., fear, disgust, and anger; Lerner & Keltner, 2000, 2001).

At a second level of analysis, *affect* is a global, subjective state, characterized primarily by the intensity of overall positive and/or negative feeling (Russell, 2003; Watson & Tellegen, 1985). *Moods* are typically defined as lasting, persistent periods of some affect state. Affect and mood need not be about anything in particular; they do not presume an *intentional object* or explicit, situational causes (recognized or not). Rather, one may have an overall feeling of energy and well-being or simply wake up on the wrong side of the bed.

Emotions, which represent a third level of analysis, are briefer, more context-specific, and thought to be evoked in response to a particular situation or intentional object (Ekman, 1992; Keltner & Lerner, 2010). For example, anger, an emotion, is a quick but short-term reaction to a specific event (a slight at work, or offending content found on Twitter); whereas irritability, a less focused and longer-lasting negative state without an immediate cause, is better described as a mood. Unlike affect, which is defined by global positive and/or negative feeling, emotional episodes are typically labeled

in more specific terms (e.g., *fear*, *disgust*, *pride*) alluding to their situational cause and prototypical physiological, cognitive, and behavioral aspects. Emotions are commonly defined as coherent, multicomponent responses, evoked by one's interpretation of the personal significance of the eliciting event, that include distinct nonverbal expressions, patterns of visceral activity, changes in cognitive processing, and action tendencies geared toward resolving the eliciting situation (Levenson, 1999); although theorists debate the extent to which coherence among these emotion-related processes is "real" and species-typical versus reflecting learned social/psychological constructs (Barrett, Mesquita, Ochsner, & Gross, 2007; Lench, Flores, & Bench, 2011; Lindquist, 2017; Shiota, 2021). How specific emotions, such as gratitude, differ from related mood-like experiences, such as feeling appreciative, and coalesce into trait-like tendencies, such as a grateful disposition, remain essential questions in need of empirical attention (McCullough et al., 2002).

Sensory experiences represent the fourth and most temporally precise level of analysis (Kahneman, 1999). Sensory experiences, such as an itch or the taste of butterscotch, or hearing the sound of the air conditioner, have unique temporal dynamics and contribute to the subjective life of the individual in many ways (Fredrickson & Kahneman, 1993). When sensations are filtered through an individual's appraisals of social goals, aspirations, and concerns, sensations can develop into emotions. For example, Paul Rozin (1996; Rozin, Haidt, & McCauley, 2008) and colleagues have offered an account of how "distaste" for noxious smells and tastes (a sensory experience) evolved into "core disgust," an emotional response preventing contamination by physical toxins, and thence into "moral disgust," a response to the potentially contaminating actions and traits of others within the social environment. How sensory experiences, particularly those early in development—patterns of touch, exposure to loud and harsh sound, visual scenes of natural beauty (or the lack thereof), recurrent experiences of hunger—are transformed into individual differences in emotions remains an area rich with possible discoveries.

Approaches to Personality and Emotion: A First Wave of Science

Individual differences in affect and emotion have been infused into personality psychology throughout the modern development of the field (R. Larsen & Ketelaar, 1991). The fundamental dimensions in Hans Eysenck's (1967) early model of personality were extraversion, neuroticism, and psychoticism, with the first explicitly linked to positive emotionality and the second to negative emotionality (Eysenck & Eysenck, 1985). Cattell (1973) emphasized extraversion and neuroticism as higher-order traits as well. Building on Eysenck's interest in the biological mechanisms of personality, Gray (1981) proposed that extraversion and neuroticism are rooted in individual differences in the reactivity of distinct neural circuits mediating emotional responses to rewards and threats, respectively.

The emphasis on extraversion and neuroticism as higher-order dimensions of personality stimulated a similar emphasis on positive versus negative affect in the emerging science of emotion. Explicitly applying Eysenck's model to this domain, Watson and Tellegen (1985) proposed a two-dimensional structure of trait and state affect with positive and negative axes, supported by a body of research using factor analysis, multidimensional scaling, and related statistical techniques to identify patterns of covariation among affect items rated by participants for similarity and/or current experience. Cacioppo, Berntson, Norris, and Gollan's (2011) evaluative space model posits a similar dimensional space but emphasizes stimulus evaluation and physiological reactivity rather than subjective experience. In his own research on the structure of subjective feelings, Russell (1980, 2003) proposed that *core affect* is defined by orthogonal dimensions of valence (pleasure vs. displeasure) and activation. The resulting space is similar to that identified by Watson and Tellegen (1985) but rotated 45 degrees, so that positive and negative affect cannot be experienced at the same time. Although controversy continues over the nature of "bittersweet" moments—a beloved child's move from home to college, or watching your best friend marry your former secret crush—the

evidence is clear that trait-level tendencies toward positive and negative affect are independent, and these are typically measured using separate subscales (e.g., the Positive and Negative Affect Schedule [PANAS]; Watson, Clark, & Tellegen, 1988).

Global trait positive and negative affect (PA and NA) remain central constructs in the study of personality, and the links between positive and negative emotionality and extraversion and neuroticism have been well documented. High PA and low NA are defining features of “happiness” in Diener’s (2000) influential model of psychological well-being. Costa and McCrae (1980) examined the extent to which variables emerging from multiple theories of personality predicted trait PA and NA, concluding that PA was best predicted by extraversion and NA by neuroticism. The associations of extraversion and neuroticism with trait-level PA and NA are robust as is evident in extensive meta-analysis (DeNeve & Cooper, 1998). In terms of emotion states, extraversion predicts the intensity of self-reported positive emotional experiences in response to experimental mood inductions, whereas neuroticism predicts the intensity of self-reports of negative emotion, without significant crossover effects (e.g., R. Larsen & Ketelaar, 1991; Rusting & Larsen, 1997). Moreover, instructing participants to behave in an extraverted manner leads to an increase in the experience of positive emotion, whereas instructing them to behave in a more neurotic way leads to increased negative emotional experience (McNiel & Fleeson, 2006).

Building on the wave of discoveries relating extraversion to positive emotion and neuroticism to negative emotion, recent research has sought to identify biological and behavioral processes driving these associations. Following Gray (1981), other researchers propose that extraverted individuals react to positive events with more intense dopaminergic reward circuit activity (e.g., Canli et al., 2001; Depue & Collins, 1999), such as heightened action in the nucleus accumbens while performing a gambling task in the scanner (e.g., Cohen, Young, Baek, Kessler, & Ranganath, 2005). The social activity on which extraverts thrive also plays an important role in promoting positive

emotional experience. Although outgoing and self-contained individuals both enjoy social situations, extraverts engage in more of them throughout a typical day, which in part accounts for their heightened positive emotion (e.g., Srivastava, Tamir, McGonigal, John, & Gross, 2009). One’s sense of “social contribution”—the feeling of having a positive impact on the people around you—appears especially important in facilitating positive emotion, and contributes to the extraversion–positive emotion association (Smillie, Wilt, Kabbani, Garratt, & Revelle, 2015).

A complementary line of studies has begun to unpack why high-neuroticism individuals are more likely to experience negative emotion. For example, they tend to use relatively ineffective emotion regulation strategies such as wishful thinking and withdrawal when facing difficult situations (e.g., hoping your neighbor just won’t notice the dent you made in their car, or avoiding the mail when faced with credit card debt) rather than strategies such as problem solving and reappraisal (Connor-Smith & Flachsbart, 2007). Those high in neuroticism may even deliberately increase their negative mood in performance situations, and worrying appears to help them succeed (Tamir, 2005).

Since Goldberg’s (1990) groundbreaking work identifying the “Big Five” personality factors, some studies have reached beyond the PA–extraversion and NA–neuroticism associations to connect other aspects of personality and emotion. For example, agreeableness has been linked to a stronger propensity for love and compassion (Shiota et al., 2006), and lower proneness to anger (Kuppens, 2005). Conscientiousness has been linked to more effective emotion regulation, consistent with this trait’s emphasis on self-control in general (Jensen-Campbell, Knack, Waldrip, & Campbell, 2007). Openness to experience has been linked to greater propensity for mixed emotions—the simultaneous experience of PA and NA (Barford & Smillie, 2016). Also, dispositional tendencies to use different emotion regulation strategies have been linked to social well-being and memory for emotional events, as well as trait positive and negative emotionality (e.g., Gross & John, 2003; John & Gross, 2004; Srivastava et al., 2009).

What is clear from this brief review, however, is that the great majority of studies on emotion and personality have focused on the PA–NA distinction. In the remainder of this chapter, we detail four new developments in the science of emotion that are ripe for exploration, and point to intriguing ways to advance the study of individual differences and personality.

The Rise of Social Functionalism: Emotions Structure Social Interactions within Relationships

The first major development we discuss is the rise of the social functionalist perspective in research on emotion. Most 20th-century research on emotion examined solitary individuals in the laboratory, with a focus on mapping the antecedent causes and subjective, physiological, and expressive profiles of different emotions (e.g., Kreibig, 2010; Lench et al., 2011; Matsumoto, Keltner, Shiota, O'Sullivan, & Frank, 2008; Mesquita & Frijda, 1992; Roseman, 2013). This work was guided to varying degrees by theoretical claims that emotions serve intrapersonal or individual-level adaptive functions: For example, emotion-related peripheral physiology enables survival and reproduction-relevant action (Levenson, 1999); subjective experience prioritizes and organizes thought in ways that guide social-cognitive processes in ways that are fitting to the present context (e.g., Storbeck & Clore, 2007; Forgas, 1995).

Since then, the field has witnessed a pronounced shift in focus toward the *social* functions of emotion. This perspective is grounded in the general observation of how profoundly social humans are accomplishing through relationships the most essential tasks, from the raising of vulnerable offspring to the gathering of food (Richerson & Boyd, 1998; D. Wilson & Gowdy, 2015; E. Wilson, 1975). Emerging out of this perspective is the idea that emotions structure brief social interactions, ultimately enabling individuals to meet the problems and opportunities of social life (e.g., Bartlett, Condon, Cruz, Baumann, & DeSteno, 2012; Keltner & Haidt, 1999; Niedenthal & Brauer, 2012; Shiota et al., 2006; van Kleef, 2016).

This shift has deep theoretical origins. It has precedent in analyses of emotions as mediating the relationship between the developing child and its caregivers (J. Campos, Campos, & Barrett, 1989). A social functional approach to the emotions can also be found in European ethology, which conceptualized emotions as the grammar of social living—the set of mechanisms by which individuals interact (Eibl-Eibesfeldt, 1989).

A social functionalist approach to the emotions translates to two core assumptions that have guided a next wave of science. The first is that emotions provide moment-to-moment structure to the social interactions we experience throughout the day (van Kleef, 2016). For example, early parent–child interactions are structured by closely synchronized emotional displays such as cries, touch, mutual gaze, and laughter, and the appraisals and inferences these expressive behaviors evoke (Feldman, 2007). The flirtations that initiate romantic commitments include subtle exchanges of coy glances, blushes, postural shifts, suggestive smiles, and provocative touches (Moore, 2010). Interactions within social hierarchies include emotion-laden behaviors that reduce the rank of some (e.g., teasing, derogation, gossip, laughter, threat displays, and sarcasm), and actions that elevate the rank of others (e.g., praise, admiration, and imitation) (Feinberg, Willer, & Keltner, 2012; Keltner, Young, Oemig, Heerey, & Monarch, 1998; Van de Ven, 2017). Hostilities toward outgroups are riddled with the rhetoric of disgust and contempt (Mackie, Silver, & Smith, 2004; Roseman, 2013).

The second assumption is that, building on these momentary interactions, emotions are at the heart of the long-term interdependent bonds that are a defining feature of the human species, a foundation for individual development, and a central aspect of contemporary life (e.g., Bartlett et al., 2012; Bowlby, 1969; Keltner & Haidt, 2003; Nesse, 1990; Shiota et al., 2006). Attachment processes are rooted in emotions. So too are friendships. Our place in lasting hierarchies is negotiated through the emotions we express, feel, and perceive in others. Family life is rife with emotion. It is hard to imagine these relationships absent recurring and strong emotion.

Research on specific emotions has long been guided by analyses of their theorized adaptive functions (Sznycer et al., 2016). Guided by these two core assumptions, social functional accounts have broadened considerably the range of states emotion scientists study, a theme we detail in the next section (e.g., Shiota et al., 2017). Researchers are now mapping how emotions such as love, desire, and sympathy are core to attachment processes (e.g., Bowlby, 1969; Diamond, 2003; Goetz, Keltner, & Simon-Thomas, 2010; Gonzaga, Turner, Keltner, Campos, & Altemus, 2006; Mikulincer & Shaver, 2006). Other programs of research show that embarrassment, shame, pride, and envy are vital to the negotiation, maintenance, and change of rank-related relations (Gilbert, 2000; Keltner & Buswell, 1997; Sznycer et al., 2016; Tracy, Weidman, Cheng, & Martens, 2014; van de Ven, 2017). Still other researchers are examining how emotions such as awe, interest, and confusion help the individual explore and acquire information about both the social and the physical environment, and internalize social norms, customs, and values (Bai et al., 2017; Griskevicius, Shiota, & Neufeld, 2010; Piff, Dietze, Feinberg, Stancato, & Keltner, 2015; Shiota, Keltner, & Mossman, 2007; Shiota et al., 2017; Stellar et al., 2018).

Beyond expanding the range of states examined by researchers, the social functional approach has also shifted the field's orientation to consider additional aspects of emotional responding within the individual. Functional analyses at the intraindividual level have long guided research on emotion-antecedent appraisals, emotional experience, peripheral physiology, and even facial expression (e.g., Keltner & Gross, 1999; Levenson, 1999; Mesquita & Frijda, 1992; Oatley & Jenkins, 1992). An explicit focus on social function has suggested new emotional processes that are worthy of study, two of which we discuss in detail. First, appraisals associated with one emotional event tend to "carry over" to our interpretation of subsequent events, organizing downstream social cognition in systematic ways. Second, emotions are accompanied by specific action tendencies that structure social interactions, for example, through the dyadic patterning of expression over time.

Emotions Organize and Direct Social Thought through Appraisal Tendencies

One of the most entrenched ideas about emotions in Western philosophy is that they are the enemy of reason, disrupting rational thought. The past 20 years of scientific and philosophical thought have led to a dramatic departure from this thinking (e.g., Lerner, Valdesolo, & Kassam, 2015; Nussbaum, 2001). It is now widely assumed that emotions shape social cognition in systematic ways that enable the individual to respond effectively to shifting events in the social context. This thinking found early inspiration in accounts of how broader affective states, such as positive and negative moods, inform evaluative judgments of objects of different kinds (Schwarz & Bless, 1991; Clore & Huntsinger, 2007), and infuse cognitive processes such as stereotyping, decision making, and attribution (Forgas, 2003).

An *appraisal tendency framework* has proved particularly generative for understanding how specific emotions shape social cognition (Baumann & DeSteno, 2010; Keltner, Ellsworth, & Edwards, 1993; Lerner & Keltner, 2000, 2001; Lerner et al., 2015). *Appraisal* has been defined as "a process that detects and assesses the significance of the environment for well-being . . . the satisfaction or obstruction of [one's] concerns" (Moors, Ellsworth, Scherer, & Frijda, 2013, p. 120). While some theoretical approaches conceptualize the appraisals associated with specific emotions in categorical terms (e.g., linking anger to the appraisal of an intentional personal offense; Lazarus, 1991), and others as a set of intersecting dimensions (e.g., linking anger to combined appraisals of unpleasantness, goal obstruction, external cause, and unfairness; Scherer, 2009), all presume that appraisals are the proximal causes of emotional response—a thesis with support in the empirical literature (e.g., Ellsworth & Smith, 1988; Siemer, Mauss, & Gross, 2007; Smith & Ellsworth, 1987). Generally speaking, an appraisal tendency framework assumes that each emotion is defined by a core appraisal or set of appraisals (e.g., Lazarus, 1991; Moors et al., 2013; Roseman, 2013; Scherer, 2009): Fear involves the appraisal that one is in danger; compassion involves the appraisal of an-

other's undeserved suffering; pride involves positive appraisals of one's own value within the social group; and shame involves the appraisal that one has failed to live up to collectively shared standards of group identity.

Although a rich literature supports the widely accepted proposal that appraisals lead to emotional responses, the evidence is equally strong that appraisals associated with current emotion tend to bleed into our perception and interpretation of the events that follow (for review, see Lerner et al., 2015). Through their *appraisal tendencies*, specific emotions bias what we attend to, our assessment of different events' probability, our perceptions of right and wrong, our explanation of other people's behavior, and even what we remember, in ways that are in keeping with the lingering appraisal. For example, fear is activated by the perception of threat, uncertainty, and powerlessness. When these appraisal tendencies are carried forward, fear narrows attention, leading to selective perception of threats and dangers (Mathews & MacLeod, 1994; Mineka, Rafaeli, & Yovel, 2003). Fearful individuals not only preferentially attend to threat, but they also perceive threatening and uncertain events (e.g., disease, financial troubles, family difficulties, disasters) to be more likely in their future (Lerner & Keltner, 2001; Lerner, Gonzalez, Small, & Fischhoff, 2003). Anxious decision-makers prefer uncertainty-reducing options, whereas sad decision-makers tend to prefer reward-seeking options (Raghunathan & Pham, 1999). Fearfulness, as evident in self-reports of fear, increased startle responsivity, and reports of nightmares, is closely associated with conservative political ideology, which highlights ways to reduce uncertainty (Oxley et al., 2008).

Increasingly, research is documenting carryover or "incidental" effects of specific emotions on social cognition that are closely tailored to those emotions' functions. Niedenthal, Winkielman, and their colleagues have shown that transient emotions guide our attention toward those stimuli most relevant to the current emotion's function, and not others, within the social context (e.g., Davis, Winkielman, & Coulson, 2015; Niedenthal & Halberstadt, 2000; Niedenthal & Setterlund, 1994; Niedenthal, 2008). For example, people feeling anger tend to iden-

tify angry facial expressions more quickly compared to appropriate controls (Niedenthal & Halberstadt, 2000), a finding with important parallels in the documented tendency for abused children to perceive anger in complex emotional expressions in the face (e.g., Pollak & Kistler, 2002). Emotions also influence judgment and decision making in important ways (Lowenstein & Lerner, 2003). For example, anger prompts people to expect further unfair actions from others; sadness, by contrast, prompts people to believe that loss is more likely (DeSteno, Petty, Wegener, & Rucker, 2000; Keltner et al., 1993).

Emotions influence complex moral judgments in systematic ways as well, a thesis at the heart of Jonathan Haidt's (2001, 2008) influential theorizing about the foundations and mechanisms of moral judgment. In Table 21.1 we summarize some of the most recent thinking on this issue (for summary, see Horberg, Oveis, Keltner, & Cohen, 2009). Unsurprisingly, angry people are more inclined to punish those who have transgressed social norms and morals (Darley, Carlsmith, & Robinson, 2000). By contrast, highly compassionate people tend to overestimate their commonalities with others, which in turn accounts for their altruistic tendencies and reduced tendencies toward retributive punishment (DeSteno, 2015; Lim

TABLE 21.1. Theorized and Documented Associations between Specific Emotions and Moral Concerns

Emotion	Moral concern made salient by emotion
Disgust	Purity of body and mind
Anger	Fairness, autonomy
Compassion	Undeserved harm
Gratitude	Reciprocity, equality
Contempt	Violation of role, duty
Pride	Meritocratic allocation of resources
Guilt	Own moral transgression
Shame	Own character flaw
Awe	Principles that define group

& DeSteno, 2016; Oveis, Horberg, & Keltner, 2010). Disgust-prone people perceive impurity more readily in the actions of others and are more likely to judge impure acts (e.g., leaving sweat on an exercise machine) as immoral (Horberg et al., 2009). This bias in attention to impurity is associated with specific outgroup prejudices, particularly toward gays (e.g., Tapias, Glaser, Vasquez, Keltner, & Wickens, 2007). Pride guides people to be more sensitive to status and to prefer meritocratic rather than equality-based distribution of resources (e.g., Horberg, Kraus, & Keltner, 2013; Tracy et al., 2014).

This brief review highlights the impact of specific emotions on every aspect of social cognition, from early and automatic attentional processes to higher order, complex inferences about morality and justice. By implication, emotional traits should be characterized by specific and distinct biases in perceiving the social environment. The empirical evidence is increasingly converging with this broad claim.

Emotions Structure Social Interaction through Action Tendencies

At their core, emotions are about *action tendencies*—propensities to respond to challenges and opportunities within the environment in ways that advance the individual's goals (Frijda, 2017; Sznycer et al., 2016). The great majority of human goals and concerns involve our relationships with other people. Pride, at its core, is about signaling and acquiring elevated rank within social hierarchies (Tracy et al., 2014). Embarrassment is about evoking forgiveness from others in the wake of a social transgression (Keltner & Buswell, 1997). Compassion prepares the body and mind to ameliorate suffering and promote the welfare of others in need (DeSteno, 2015; Goetz et al., 2010). Gratitude promotes sequences of actions that build strong reciprocal ties (Bartlett et al., 2012). Emotion-related action tendencies involve both instrumental behaviors—sharing resources, derogation, striking out—and signaling behaviors that prompt systematic responses from others in the social context (Keltner, Tracy, Sauter, Cordaro, & McNeil, 2016).

Guided by this thinking, a social functional account has yielded many new insights into how emotional expression structures social interactions through the reactions and inferences they evoke in others in the social context (Niedenthal, Rychlowska, & Wood, 2017). Recent years have seen a shift in focus away from the extent to which specific nonverbal behaviors covary with reports of subjective emotional experience, toward the study of how expressive behaviors in the face, voice, and touch structure social interactions in dynamic and systematic ways. They do so, this literature reveals, by shifting the inferences and action tendencies of people within the social environment (e.g., Keltner & Kring, 1998; Niedenthal & Brauer, 2012; Niedenthal et al., 2017; van Kleef, 2016). This thinking is in keeping with ethological studies of the basic patterns of social interaction in remote peoples (Eibl-Eibesfeldt, 1989). From these detailed and rich observations, ethologists argued that facial expressions, vocalizations, movements of the body, and patterns of touch coordinate social interactions—the soothing of a distressed child, flirtation between potential suitors, status conflicts in groups, exhilarating laughter and bonding among friends sharing stories.

Illustrative of a social functional approach to emotional expression is recent work by Paula Niedenthal, Ursula Hess, and their colleagues (Niedenthal, Mermillod, Maringer, & Hess, 2010; Niedenthal et al., 2017). They reason that within 500 milliseconds, people respond to the emotional expressions of others with mimetic behavior and physiological reactions, triggering a cascade of neural, cognitive, and social reactions that structure interactions in systematic ways. For example, a warm, genuine smile evokes interaction partners' feelings of pleasure, unconscious and automatic mimicry of the smile, inferences of agreeableness and honesty, and cooperative behavior (e.g., Danvers & Shiota, 2018; Maringer, Krumhuber, Fischer, & Niedenthal, 2011; Mehu, Little, & Dunbar, 2007). What is true of smiling is most certainly also true of emotional communication by voice and touch: Expressions of emotion in these modalities set the stage for unfolding interactions between people over time.

Expressions of emotion coordinate social interactions in at least three general ways (Keltner & Kring, 1998; van Kleef, 2016). First, through their *informative function*, emotional expressions provide rapid information not only about the sender's current emotions but also about that individual's intentions and relationship with the perceiver (Ekman, 1993; Fridlund, 1992). In this way, expressions of emotion situate people in specific relationships. For example, anger clearly communicates strength and dominance vis-à-vis interaction partners (Knutson, 1996). When individuals express anger in the face or voice, they are perceived to have more power and are more likely to get their way in negotiations (van Kleef, De Dreu, Pietroni, & Manstead, 2006). From brief laughs as well, observers can infer an individual's rank within a social hierarchy, as well as affiliative intent; acoustic properties of laughs signal social standing and friendly intentions (Oveis, Spectre, Smith, Liu, & Keltner, 2016; Wood, Martin, & Niedenthal, 2017). Emotional expressions also carry information about the sincerity of the sender's intentions. For example, Krumhuber, Manstead, and Kappas (2007) found that people trust interaction partners more and will give more resources to those partners who display authentic smiles (which have longer onset and offset times) rather than fake smiles. Emotional expressions convey information about the environment as well, allowing individuals to coordinate their responses to outside opportunities or threats (e.g., Klinnert, Emde, Butterfield, & Campos, 1986; Sorce, Emde, Campos, & Klinnert, 1985). For example, parents use touch and voice to signal to their young children whether other people and objects in the environment are safe or dangerous (Hertenstein & Campos, 2004).

Second, emotional expressions coordinate social interactions through their *evocative function*, triggering specific responses in perceivers. For example, early in the study of facial expression, researchers found that warm smiles evoke calmer peripheral physiology in interaction partners, whereas angry facial expressions tend to trigger stress-related peripheral physiology and increased activation in the amygdala—a neural structure preferentially engaged by threat-related information (Esteves, Dimberg, & Öhman,

1994; Lieberman et al., 2007). Consider also the powerful reactions a baby's cry produces in caregivers nearby. Infant crying includes a long, continuous sound accompanied by acoustic variations that signal distinct states, including anger (when the infant's hands are pinned down), pain (after getting a shot), or fear (upon hearing a loud sound) (Chóliz, Fernández-Abascal, & Martínez-Sánchez, 2012). Within 49 milliseconds (a 20th of a second) of hearing a human infant's cry, adults show activation in the periaqueductal gray region of the brain—associated with sympathy and caregiving behavior, as well as management of one's own pain—but this is not seen in response to animal cries, human adult sounds, and other controls (Parsons et al., 2014). Similarly motivated researchers have documented the specific behaviors that emotional expressions evoke in perceivers. In social referencing, for example, a parent's facial expression of fear will deter an infant from crawling across a transparent glass cliff, and a disgust expression in the voice ("Yuck!") prompts the child to avoid playing with the referred-to toy (Hertenstein & Campos, 2004). Brief displays of embarrassment have been shown to prompt affiliative feeling, cooperative intent, and forgiveness in observers (Feinberg et al., 2012).

Finally, emotional displays serve *incentive functions*, inviting and rewarding others' behavior. Warm smiles and touches are often used by parents to promote desired behaviors in their children, thus increasing the probability of those behaviors occurring in the future (e.g., Tronick, 1989). Laughter from interaction partners also rewards desirable social behavior in adults (Bachorowski & Owren, 2001).

Fleeting emotion-related patterns of facial muscle movements, vocalization, touch, posture, and gaze are much more than read-outs of interior states; emotional expressions initiate a cascade of responses from social partners that provide structure to ongoing interactions (Oatley, 2009). Distress vocalizations evoke patterns of sympathy and compassion that, in turn, promote attachment formation. Smiles and laughter set the stage for affiliative exchanges, cooperation, and friendship. Expressions of anger, pride, and contempt nonverbally communicate rank and situate individuals within the

social hierarchy. Each dynamic pattern of emotional expression configures a particular kind of relationship.

Beyond the Basic Six: Expanding the Taxonomy of Emotions

The second major development with widespread implications for personality psychology is the dramatic increase in distinct emotion constructs that are theoretically grounded, and the focus of a strong and growing body of science. Fifty years ago, Ekman and Friesen's (1968, 1971) research on facial expression with the Fore tribe in the highlands of New Guinea launched the contemporary scientific study of emotion. In so doing, it oriented the field to the "Basic Six" emotions whose prototypical expressions were included in those studies: anger, disgust, fear, sadness, happiness, and surprise. The Ekman and Friesen discoveries would frame a first generation of research on emotion, which has investigated modalities, universals, and cultural variations in emotional expression (e.g., Keltner et al., 2016), examined emotion-related physiological activation in the peripheral nervous system and the brain (e.g., Kragel & LaBar, 2016; Kreibig, 2010; Levenson, Ekman, & Friesen, 1990; Lindquist, Wager, Kober, Bliss-Moreau, & Barrett, 2012; Nummenmaa & Saarimäki, 2017), and characterized the eliciting appraisals, action tendencies, and subjective qualities of these six emotions (Lench et al., 2011). The Ekman and Friesen discoveries, and the theoretical and conceptual issues surrounding the interpretation of their findings, would also fuel considerable and lasting debate about the nature of emotion (e.g., Barrett et al., 2007; Russell, 1994).

Although the Basic Six remain "the" emotions as portrayed in textbooks and the popular press, affective science now addresses a much wider array of emotions. There is considerable irony in the field's perseverative focus on the Basic Six, for Charles Darwin, whose 19th-century work on emotional expression provided the inspiration for modern studies, richly detailed the patterns of expression for over 40 emotion-like states (Darwin, 1872/1998; Keltner, 2009). The

Basic Six are a narrow slice of human emotion. One might think of them—particularly fear, anger, and disgust—as the emotions of individual self-preservation, with primary adaptive functions that involve avoiding or escaping threats to life and limb. The Basic Six includes just one broad and vaguely defined positive state—happiness. Although English-language speakers consider "love" and "desire" as prototypical emotion states (Acevedo & Aron, 2009; Shaver, Schwarz, Kirson, & O'Connor, 1987), and emotional responding figures prominently in Bowlby's (1969) theories of attachment, parental bonding, and sex, the Basic Six includes no states emphasizing emotional responses toward close relationship partners. The Basic Six also excludes self-conscious emotions, such as embarrassment and pride, that are vital in navigating the codes and hierarchies of human social living (Keltner & Buswell, 1997; Tangney & Fischer, 1995; Tracy et al., 2014).

Functional analyses—theoretical definitions positing the evolutionary context and adaptive function of each specific emotion—play a crucial role in generating hypotheses for empirical research (Shiota, 2021). As long as the emphasis in these analyses remained on intrapersonal or purely individual-level functions, the Basic Six covered the terrain reasonably well, and most 20th-century science on emotion was limited to these states. As we have noted, however, a social functionalist account broadens greatly the range of emotions for which a sound functional analysis can be performed. For example, a rich literature now maps distinctions among "self-conscious" emotions including embarrassment, shame, guilt, and pride (Keltner & Buswell, 1997; Tangney, 1990; Tracy et al., 2014). Inspired in part by Fredrickson's (1998, 2001) broaden-and-build theory, which emphasizes the role of positive emotions in acquiring crucial social and informational, as well as material, resources, scientists have begun to map conceptual and empirical distinctions among positive emotions such as amusement, awe, contentment, enthusiasm, gratitude, interest, love, and relief (e.g., B. Campos, Shiota, Keltner, Gonzaga, & Goetz, 2013; Cordaro, Keltner, Tshering, Wangchuk, & Flynn, 2016; Keltner & Haidt, 2003; McCullough et al., 2002;

Shiota et al., 2017; Silvia, 2008a, 2008b). Increasing attention is also being directed to the study of the emotions that Bowlby long ago proposed as the core of attachment processes: attachment and nurturant love, desire, and sympathy or compassion (e.g., DeSteno, 2015; Diamond, 2003; Eisenberg et al., 1989; Gonzaga, Keltner, Londahl, & Smith, 2001; Goetz et al., 2010; O'Neil, Danvers, & Shiota, 2018).

Empirical investigations of emotion-specific responses have moved far beyond the Basic Six to map distinct profiles of upwards of 20 different emotions. For example, with self-report and narrative methods, there are now systematic studies of the distinct appraisals that give rise to over 20 emotion states (e.g., B. Campos et al., 2013; Roseman, 2013). With respect to emotional experience, consider one recent study that relied on new statistical techniques to uncover the structure of emotional experience in response to over 2,100 short videos or graphical interchange formats (GIFs) (Cowen & Keltner, 2017). Participants' emotional experiences could not be reduced to the Basic Six, much less to a two-dimensional space defined solely by valence and arousal; rather, analyses suggested 27 distinct feeling states in response to this wide array of stimuli.

A strong case for expanding the taxonomy of distinct emotions emerges from 21st-century research on emotional expression. In this literature, scientists have moved beyond facial muscle movements to consider other expressive modalities, such as gaze, head movement, posture and body movement, touch, and respiratory patterns characterizing the expressive behavior of 25 or more states; a summary is presented in Table 21.2. Early studies documented that embarrassment, shame, and pride have distinct facial/postural displays (e.g., Keltner, 1995; Tracy & Robins, 2004) that are recognized across widely different cultures (e.g., Haidt & Keltner, 1999; Tracy, Shariff, Zhao, & Henrich, 2013). In coding the displays posed by participants describing a specific emotional experience, B. Campos and colleagues (2013) found that several positive emotions were differentiated in terms of head movements, postural features, and facial muscle movements beyond the Duchenne smile. Additional research has revealed that brief

tactile contact to the arm of a stranger can reliably communicate relationship-related emotions, such as love, gratitude, and sympathy (Hertenstein, Keltner, App, Bulleit, & Jaskolka, 2006). In one recent study, participants from five different cultures were given 22 different emotion-specific scenarios and asked to express the emotion in any way they felt appropriate (Cordaro et al., 2018). Analysis of these expressions uncovered distinct patterns of expressive behavior in the face, body, gaze, gesture, and respiration. Moreover, on average, 50% of the behaviors in individual expressions of specific emotions were found to overlap with the behaviors of people from the four other cultures. New participants from 10 cultures were then presented with narratives of emotion-eliciting events, and asked to match the event to one of four still photos of 18 prototypical expressions (Keltner & Cordaro, 2017). In all 10 cultures, these 18 emotions were recognized at levels of accuracy well above chance (see Table 21.3).

The human voice is proving to be just as rich a medium for communicating emotions. One modality is prosody—the non-lexical patterns of tune, rhythm, and timbre in speech, modulated by the instruments of human vocal control: air pressure from the lungs; tension in the vocal cords; and filtration through the tongue, palate, cheeks, lips, and nasal passage (Titze & Martin, 1998). Prosody interacts with spoken words to convey emotional feelings and attitudes, including dispositions felt toward the objects and ideas described in speech (Mitchell & Ross, 2013; Scherer & Bänziger, 2004). In one of the most comprehensive studies of emotional prosody, actors from five English-speaking countries were asked to communicate 11 different emotions when uttering sentences of non-emotional content: anger, contempt, fear, happiness, interest, lust, pride, relief, sadness, shame, and a neutral state. When these sentences were played to hearers from four countries, nine of the 11 emotions were recognized at above-chance levels (Laukka et al., 2016; see also Juslin & Laukka, 2003; Scherer, Johnstone, & Klasmeyer, 2003).

Humans also communicate emotion through vocal bursts—brief nonlinguistic sounds that occur between speech incidents or in the absence of speech (Hawk, van Kleef,

TABLE 21.2. Evidence Related to the Expression of Emotion in Different Modalities

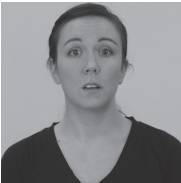
Emotion	Face/Posture	Voice	Touch	Music	Dance
Amusement	yes ^{a, b, c}	yes ^{s, t, v}	n/a	n/a	yes ^c
Anger	yes ^{c, i}	yes ^{s, u, v}	yes ^{x, y}	Yes ^z	yes ^c
Awe/Wonder	yes ^{a, c}	yes ^s	no	n/a	yes ^c
Boredom	yes ^j	yes ^u	n/a	n/a	n/a
Confusion	yes ^q	n/a	n/a	n/a	n/a
Contempt	yes ^r	yes ^{s, u}	n/a	n/a	n/a
Contentment	yes ^a	yes ^t	n/a	n/a	yes ^c
Coyness	yes ^{d, e, f}	n/a	n/a	n/a	n/a
Desire	yes ^g	no ^s	n/a	n/a	n/a
Disgust	yes ^{c, i}	yes ^{s, u, v}	yes ^{x, y}	n/a	yes ^c
Embarrassment	yes ^{c, b, i}	yes ^s	no ^y	n/a	yes ^c
Fear	yes ^{c, i}	yes ^{s, u, v}	yes ^{x, y}	yes ^z	yes ^c
Gratitude	n/a	no ^s	yes ^{x, y}	n/a	n/a
Happiness/Joy	yes ^{a, i}	yes ^u	yes ^x	yes ^z	n/a
Interest	yes ^j	yes ^s	n/a	n/a	n/a
Love	yes ^{a, c, g}	no ^s	yes ^{x, y}	yes ^z	yes ^c
Pain	Yes ^{k, l, m, n}	Yes ^w	n/a	n/a	n/a
Pride	yes ^{a, o, p}	no ^s	no ^y	n/a	n/a
Relief	n/a	yes ^{s, t, u, v}	n/a	n/a	n/a
Sadness	yes ⁱ	yes ^{s, v}	yes ^{x, y}	yes ^z	yes ^c
Shame	yes ^{c, b}	no ^s	n/a	n/a	yes ^c
Surprise	yes ⁱ	yes ^{s, v}	no ^y	n/a	n/a
Sympathy	n/a	yes ^s	yes ^{x, y}	n/a	n/a
Triumph	n/a	yes ^{s, t}	n/a	n/a	n/a

Note. ^aCampos, Shiota, Keltner, Gonzaga, and Goetz (2013). ^b Bonanno and Keltner (1997). ^cHejmadi, Davidson, and Rozin (2000). ^dReddy (2000). ^eReddy (2005). ^fBretherton and Ainsworth (1974). ^gGonzaga et al. (2006). ^hKeltner (1996b). ⁱEkman and Rosenberg (1997). ^jReeve (1993). ^kPrkachin (1992). ^lWilliams (2002). ^mGrunau and Craig (1987). ⁿBotvinick et al. (2005). ^oTracy and Robins (2004). ^pTracy and Matsumoto (2008). ^qRozin and Cohen (2003). ^rMatsumoto (1992). ^sSimon-Thomas et al. (2009). ^tSauter and Scott (2007). ^uSchroder (2003). ^vSauter, Eisner, Ekman, and Scott (2010). ^wDubois et al. (2008). ^xHertenstein et al. (2009). ^yHertenstein and Keltner (2006). ^zJuslin and Laukka (2003).

Fischer, & van der Schalk, 2009; Scherer & Wallbott, 1994). Examples of vocal bursts include cries, sighs, laughs, shrieks, growls, hollers, roars, oohs, and ahhs (Banse & Scherer, 1996; Cordaro et al., 2016). Current evidence indicates that 13 emotions can be identified from vocal bursts, at rates substantially better than chance (Cordaro et al., 2016; Laukka et al., 2013). The capacity to recognize emotion in vocal bursts has been observed in more than 14 cultures, including two remote cultures with minimal Western

influence (Cordaro et al., 2016; Laukka et al., 2013; Sauter, Eisner, Ekman, & Scott, 2010). By 2 years of age, children are able to reliably match appropriate causes, as portrayed in photographs, to vocal bursts related to five positive emotion concepts: funny, excitement, delicious, adorable, and sympathy (Wu, Muentener, & Schulz, 2017). Progress is being made in mapping the distinct peripheral physiological profiles of emotions beyond the Basic Six as well. In her synthesis of over 130 empirical stud-

TABLE 21.3. Example Facial/Postural Expressions, with Facial Action Coding System (FACS) Action Units and Physical Descriptions, for Twelve Specific Emotions

Emotion	Example photo	Action units	Physical description
Amusement		6+7+12+25+26+53+55	Duchenne smile, lips parted, jaw dropped, head raised and tilted
Anger		4+5+7+23+24	Brows furrowed, eyelids raised, lower lid tightened, lips tightened and pressed together
Awe/Surprise		1+2+5+25+26	Eyebrows raised, eyelids raised, mouth open, jaw slightly dropped.
Contentment		6+12	Slight Duchenne smile
Coyness		6+7+12+25+26+51+62	Duchenne smile, lips parted, head turned away, eyes turned forward, lip bite
Disgust		4+9+19+25+26	Brows lowered, nose wrinkled, lips parted, jaw dropped, tongue show
Embarrassment		6+12+14+24+51+61	Cheeks raised, tight/controlled smile, head and eyes turned away, hand touches face

(continued)

TABLE 21.3. *(continued)*

Emotion	Example photo	Action units	Physical description
Fear		1+2+4+5+20+25	Eyebrows raised and pulled together, upper eyelid raised, lips parted and stretched
Happiness/Joy		6+7+12+16+25+26	Duchenne smile display
Love		6+7+12+25+26+55	Duchenne smile, lips parted, jaw dropped, head tilt, (self-)hug
Pride		6+12+53	Cheeks raised, lip corners raised, head raised, chest puffed, postural expansion
Sadness		1+4+15+17	Brows pulled together and raised in the middle, lip corners depressed, chin raised

ies, Kreibig (2010) notes distinctions among emotions including affection, amusement, contentment, embarrassment, anticipatory pleasure or enthusiasm, and relief, as well as anger, disgust, fear, and sadness. Shiota, Neufeld, Yeung, Moser, and Perea (2011) used photographs to elicit five positive emotions in participants, documenting distinct profiles of autonomic activity. For example, enthusiasm, elicited by slides in which the participant won a growing amount of unexpected money, involved a full-blown sympathetic nervous system response, includ-

ing increased cardiac activity, sweat gland activity, and blood pressure. When viewing images of childhood attachment-figure-like cartoon characters (e.g., Big Bird) and images of baby animals, participants showed elevated cardiac activity without heightened sweat gland activity or vasoconstriction. When viewing panoramic nature images evoking awe, participants showed evidence of *reduced* “fight-flight” sympathetic influence on the heart, a sign of the stillness and quiet attention associated with this emotion (see also Gordon et al., 2017).

Studies have uncovered still other emotion-specific autonomic responses. The blush covaries with feelings of embarrassment, but not fear (Shearn, Bergman, Hill, Abel, & Hinds, 1992). A type of chills—the “goosetingles”—is associated with elevated positive emotions rather than fear, particularly awe and aesthetic experiences when listening to certain kinds of music (Maruskin, Thrash, & Elliot, 2012; Nusbaum et al., 2014). Compassion, but not closely related states such as inspiration, consistently predicts increase in vagal tone—a marker of parasympathetic activation long thought to facilitate prosocial behavior (Stellar et al., 2015). Reports of sexual desire, unsurprisingly, track blood flow to the genital region, an effect mediated by activity in another branch of the parasympathetic nervous system (Meston & Frolich, 2003).

These developments are detailing a much richer landscape of emotional experience, expression, and physiology than the Basic Six charted by early emotion scientists. These and other findings make the case for upwards of 20 distinct emotions worthy of study. In Tables 21.4 and 21.5, we synthesize

theoretical analyses for negative and positive emotions. Our definitions emphasize two aspects of each emotion that are central to conceptualizing its adaptive function. The first is its *core appraisal tendency*—the specific appraisal or set of appraisals reflecting the core, subjective, fitness-relevant meaning of a situation thought to trigger that emotional response (Frijda, 2017; Lazarus, 1991; Lerner & Keltner, 2000, 2001). Appraisals reflect the evolutionary “problem” posed by the eliciting situation and guide cognitive processes such as attention, categorization, causal attribution, memory, risk assessment, and expectation. The second component of each emotion’s functional analysis is its *action tendency* (e.g., Frijda, 1986, 2017; Rodriguez Mosquera, Fischer, & Manstead, 2004). Emotions dispose individuals toward goal-based actions (e.g., Fridlund, 1992; Frijda, Kuipers, & ter Schure, 1989); from an evolutionary standpoint, action tendencies are behavioral solutions to adaptive problems.

Our synthesis necessarily simplifies the appraisals and action tendencies associated with each emotion and neglects nuances

TABLE 21.4. A Synthesis of Theoretical Accounts of Negative Emotions

Emotion	Appraisal tendency	Action tendency
Anger	Offense against self ^a	Restore justice; hold individuals responsible ^{b, p, r}
Contempt	Other violates role, duty, obligation ^c	Lower the status of perpetrator
Disgust	Contact with impure object or action ^d	Push away ^{d, l, n}
Embarrassment	Self has transgressed a social convention ^e	Apologize ^f
Envy	Other is superior to self ^g	Reduce status of other
Fear	Imminent threat to self ^h	Flee, reduce uncertainty ^{o, q}
Guilt	Self has violated moral standard regarding harm ⁱ	Remedy harm
Jealousy	Other threatens source of affection ^j	Protect source of affection from others
Sadness	Irrevocable loss ^a	Acquire new goods ^{l, m, o}
Shame	Self has transgressed aspiration or ideal ^k	Hide, avoid scrutiny

Note. ^aLazarus (1991). ^bLerner, Goldberg, and Tetlock (1998). ^cRozin, Lowery, Imada, and Haidt (1999). ^dRozin and Fallon (1987). ^eR. Miller and Tangney (1994). ^fKeltner and Buswell (1997). ^gSalovey (1991). ^hÖhman (1986). ⁱBaumeister, Stillwell, and Heatherton (1994). ^jDeSteno and Salovey (1996). ^kTangney (1991). ^lLerner, Small, and Loewenstein (2004). ^mCryder, Lerner, Gross, and Dahl (2008). ⁿHan, Lerner, and Zeckhauser (2012). ^oRaghunathan and Pham (1999). ^pSmall and Lerner (2008). ^qTiedens and Linton (2001). ^rSmall, Lerner, and Fischhoff (2006).

TABLE 21.5. A Synthesis of Theoretical Accounts of Positive Emotions

Emotion	Appraisal tendency	Action tendency
Contentment	Pleasing stimulus ^a	Savoring ^{b, c}
Enthusiasm	Reward likely ^a	Goal approach ^{a, d}
Love	Perceived commitment ^e	Affection ^f
Sexual desire	Sexual cue or opportunity ^g	Flirtation; sexual activity ^b
Compassion	Undeserved suffering ^{i, j}	Prosocial approach ^k
Gratitude	Unexpected benefit given by another ^l	Promote reciprocity ^{l, m}
Pride	Self-relevant achievement ^{a, n}	Status display ^{a, n}
Awe	Self is small vis-à-vis something vast, beyond current understanding ^{a, o}	Cognitive accommodation, devotion, reverence ^{a, q, r}
Interest	Novel opportunity ^s	Exploration ^{t, u, v}
Amusement	Safety, cognitive flexibility, incongruity resolution ^{a, w, x}	Play ^y
Relief	Cause of distress ends ^z	Signal safety

*ν*Note. ^aShiota et al. (2014). ^{bav}Fredrickson (1998). ^cWood, Heimpel, and Michela (2003). ^dDepue and Collins (1999). ^eGonzaga et al. (2001). ^fHazan and Shaver (1987). ^gDiamond (2003). ^hBuss (1992). ⁱDavidson and Harrington (2001). ^jNussbaum (1996). ^kTaylor (2002). ^lMcCullough, Kilpatrick, Emmons, and Larson (2001). ^mTrivers (1971). ⁿTracy and Robins (2007). ^oKeltner and Haidt (2003). ^pGriskevicius, Shiota, and Neufeld (2010). ^qDanvers and Shiota (2017). ^rWoodruff (2002). ^sIzard (1977). ^tReeve (1993). ^uSilvia (2005). ^vPanksepp (1998). ^wLatta (2011). ^xRuch (1993). ^yPelligrini (1992). ^zTomkins (1984).

of states within a particular category, such as the multiple varieties of disgust (Rozin, 1996), embarrassment (Miller & Tangney, 1994; Tangney, 1992), awe (Keltner & Haidt, 2003), pride (Tracy & Robins, 2007), and compassion (Goetz et al., 2010). Importantly, much of human emotional experience, perhaps even most of it, involves mixtures or blends of emotions (Ekman, 1972; J. Larsen, McGraw, Mellers, & Cacioppo, 2004; Schimmack, Oishi, & Diener, 2002; Shiota, Campos, Gonzaga, Keltner, & Peng, 2010; Watson & Stanton, 2017; Zelenski & Larsen, 2000). However, our brief overview highlights the rich possibilities for future work on individual differences in these many constructs. Some research is beginning to explore this territory. For example, Tracy and Robins (2007) have examined the distinct personality correlates of authentic versus hubristic pride; Shiota and colleagues (2007) have examined the distinct aspects of self-concept associated with awe-proneness; and Dickens and DeSteno (2016) have found that highly grateful individuals are more

likely to delay gratification of an immediate reward in favor of a larger, later one. These are just tastes, however, from the potential banquet of research on individual differences in the experience of specific emotions.

Mechanisms of Emotional Experience: Appraisal, Neurotransmission, and Interoception

The third advance in emotion research with great potential for personality psychology involves our growing understanding of the mechanisms of emotional experience. Study any emotion, or any emotion-related response, and one is certain to encounter significant individual differences. Intensive muscle-by-muscle coding of facial expressions among people in different cultures reveals not only universals and culture-specific dialects but also individual differences in movements for 22 emotions (Cordaro et al., 2018). Individuals express emotions in idiosyncratic ways in the face, voice, and body—

an empirical fact in need of much more systematic study. Diary studies of people's daily experiences routinely find striking variation in how often people feel different emotions, and with what intensity (e.g., Gordon et al., 2017). Highly neurotic individuals often encounter the same contentious issues in romantic relationships as do less neurotic individuals, but they react with greater negative emotion (Bolger & Schilling, 1991). Individual differences in emotion are the rule and not the exception. As empirical work continues to detail the mechanisms of emotion with greater precision, this knowledge will yield critical advances in understanding the sources of individual differences in emotional response, which, we shall see, has important clinical implications. We consider three examples here.

Appraisal Biases

As noted earlier, most theories of emotion assume that emotions are triggered only in part by objective features of an eliciting situation—the furrowed brow in a glare from an adversary, laughter of friends, the taste of ice cream, a child's embrace—as registered by the skin and brain. Appraisals of objective events as they relate to the significance for the individual's goals and well-being endow object events with meaning, and give rise to emotion. Early, automatic appraisals of the situation's novelty, pleasantness, and goal relevance occur quickly, perhaps within 300–500 milliseconds (Smith & Lane, 2015), and involve ancient regions of the brain such as the amygdala, the ventral striatum, and the periaqueductal gray (e.g., Kober et al., 2008). More complex appraisals may follow, transforming broad affective responses into distinct emotions through processes that engage additional brain regions, including evolutionarily newer regions of the prefrontal cortex (Kober et al., 2008; Lindquist et al., 2012; Ochsner, 2008; Smith & Lane, 2015).

Prior to these neuroscientific discoveries, Magna Arnold (1960), a pioneer in appraisal theory, proposed that individual differences in emotion are rooted in appraisal biases, consistently nudging the individual toward experiencing some emotional responses rather than others. This proposal has been

expanded by modern appraisal theorists, who emphasize differences in attention to emotional stimuli, idiosyncratic schemas for the conceptual meaning of events, biases in causal attribution and assessment of personal control, and other appraisal biases as important drivers of individual differences in emotional responding (e.g., Robinson, Vargas, & Crawford, 2003; Silvia, Henson, & Templin, 2009; Van Reekum & Scherer, 1997).

There is an expanding literature, for example, documenting associations between the individual's tendency to perceive threats in social interactions, or *rejection sensitivity*, and the intensity of negative emotions such as anger, fear, and shame (Downey & Feldman, 1996; John-Henderson, Stellar, & Mendoza-Denton, 2015a, 2015b; Mendoza-Denton, 2014; Rheinschmidt & Mendoza-Denton, 2014). Rejection sensitivity has proven to be a proximal determinant, for example, of the elevated anxiety and fear among people of minority ethnic status and lower socioeconomic status (SES) backgrounds (Rheinschmidt & Mendoza-Denton, 2014). Appraisal biases have been found to account for links between personality factors and individual differences in affect as well. For example, one experience sampling study found that higher neuroticism predicted more negative appraisals over the course of 2 days; moreover, high-neuroticism individuals showed stronger links between negative appraisals and the experience of anger, sadness, fear, and guilt (Tong, 2010). Dodge, Bates, and Pettit (1990) showed that children with a tendency toward aggressive behavior are more likely to attribute hostile intent to a peer's videotaped frustrating behavior than did nonaggressive children, as long as the peer's intentions were objectively ambiguous (see also Crick & Dodge, 1996; Hazebroek, Howells, & Day, 2001).

In contrast, a bias to appraise social contexts in terms of the rewards they offer and opportunities for goal satisfaction—approach-related relationship goals—consistently predicts individual differences in positive emotions (e.g., Impett et al., 2010). For example, romantic partners who report higher relationship approach goals, rather than goals emphasizing problem-avoidance, experience more positive emo-

tions such as love, gratitude, and compassion on a daily basis (Impett et al., 2010). When people make personally costly sacrifices in intimate relationships for approach-related goals, they experience greater positive emotion (Impett et al., 2010). People who approach intimate relations with a bias toward approach enjoy the emotional delights and rewards of sex to a greater extent (Impett et al., 2010).

More complex appraisal biases that derive from discrete emotion and componential theories should predict individual differences in emotional response as well. For example, a bias to perceive unfairness in actions at work predicts increased anger and frustration (e.g., Matta, Erol-Korkmaz, Johnson, & Bicaksiz, 2014). Appraisal biases related to perceiving oneself as efficacious predict increased guilt but not shame (Pasanisi, Sapienza, Budello, & Giaimo, 2015). Other, more complex appraisal biases—toward certainty, perceived effort, legitimacy, normativeness—are also likely to influence individual differences in emotion and await empirical investigation.

Shifting to a higher level of analysis, culture-level appraisal biases have been posited as one mechanism leading to individual differences in emotional responding that, when aggregated, produce culturally modal personalities (Scherer & Brosch, 2009). And more recently, emotion scientists have turned to the study of beliefs about emotional experience, which one might think of as meta-appraisals (Ford, Lwi, Hankin, Gentzler, & Mauss, 2018; Ford & Gross, 2019). Do we value happiness and positive emotion, even excessively (Ford, Mauss, & Gruber, 2015; Gruber, Mauss, & Tamir, 2011)? Do we believe emotions are controllable? To what extent do we believe emotions are transient? Are we accepting of emotional experiences, particularly negative emotions? These beliefs about emotion have powerful effects and are certain to contribute to individual differences in emotional experience (Ford et al., 2015).

Genetic Influences and Neurotransmission

Our understanding of the neural mechanisms of emotion is still very young but growing rapidly. At a broad, structural

level, research using functional neuroimaging is slowly unpacking the roles of the amygdala, nucleus accumbens, anterior cingulate cortex, and orbitofrontal cortex, among other structures, in our responses to emotional stimuli (Kringelbach & Berridge, 2017; Phan, Wager, Taylor, & Liberzon, 2002). Although studies attempting to localize specific emotions in the activity of single brain structures have generally failed (e.g., Lindquist et al., 2012), newer, multivariate statistical approaches document distinct patterns or networks of brain activity associated with distinct or “discrete” emotion states (Kragel & LaBar, 2016; Saarimäki et al., 2015; Vytal & Hamann, 2010). Researchers are exploring at the cellular and molecular levels the roles of dopamine, serotonin, the endogenous opioids, oxytocin, and other key neurotransmitters in emotional processes as well (e.g., Domes et al., 2007; Kringelbach & Berridge, 2017; Nelson & Panksepp, 1998; Outhred et al., 2013). The precise psychological processes mediated by any given structure or neurotransmitter are still very much under debate, and increasingly the evidence points to complex networks of activity rather than single structures supporting most activities of the human mind. However, research linking individual differences in emotional experience and behavior to variability in neural activity is not only feasible, but also can help contribute to our understanding of how the brain supports human emotional responding.

The human brain is an excellent example of a universal structure, characterized by species-typical mechanisms supporting specific aspects of sensation, cognition, experience, and behavior that nonetheless show tremendous variability in action from person to person. These variations are closely tied to individual differences in emotion (Hamann & Canli, 2004). Those high in trait anxiety show more intense activity in the amygdala—a structure activated during the perception of emotional stimuli, particularly threatening stimuli—in responses to others’ facial expressions of fear, even when those images are presented subliminally (Etkin et al., 2004). Attachment-anxious individuals show heightened activity in the anterior cingulate and insular cortices, which are also active during the experience of physi-

cal pain, when apparently being excluded from a three-person game (DeWall et al., 2011). Individuals who rely more strongly on cognitive reappraisal as an emotion regulation strategy show heightened prefrontal cortex activity and lower amygdala activity while looking at others' facial expressions of negative emotion (e.g., Drabant, McRae, Manuck, Hariri, & Gross, 2009). Moreover, those who implement instructed reappraisal more effectively in the laboratory also show greater inverse connectivity between these two structures, consistent with more efficient use of cognitive control to modulate emotional attention and response (e.g., Lee, Heller, Van Reekum, Nelson, & Davidson, 2012).

Variations in brain activity have multiple causes, from inherited genes to differential experiences shaping development. A particularly well-documented example of how tiny genetic variations can translate into meaningful differences in neural activity, and thence into a wide array of individual differences in emotional experience, is provided by research on the serotonin transporter gene. In humans, the serotonin transporter gene (*5-HTT*) codes for a protein that supports reuptake of serotonin back into the presynaptic axon terminal after it is released, reducing the time that this neurotransmitter can activate receptors on the other side. A particular stretch of this gene (*5-HTTLPR*) comes in "long" and "short" forms: the long-form version is more effective at vacuuming serotonin from the synaptic gap; the short-form is less so, allowing serotonin to linger longer. Early research suggested that short allele carriers were more at risk for mood disorders; they tend to be slightly higher on neuroticism (Schinka, Busch, & Robichaux-Keene, 2004), more prone to anxiety (Lesch et al., 1996), and at higher risk for depression (Ogilvie et al., 1996). Subsequent studies helped uncover mediators of the gene–emotion effects. For example, individuals carrying one or more short alleles show a stronger attentional bias toward threat stimuli than those with two long alleles (Osinsky et al., 2008; Pergamin-Hight, Bakermans-Kranenburg, Van IJzendoorn, & Bar-Haim, 2012). This attentional bias may be accounted for by individual differences in brain activation supporting the

detection of threats; specifically, people with one or more copies of the short serotonin transporter allele show heightened amygdala reactivity to threat stimuli as well (e.g., Hariri et al., 2002).

More recently, studies suggest not simply that the short form of the gene confers risk for negative emotion, but rather that it promotes heightened emotional reactivity in general, in a true person $\times$ environment interaction. Short allele carriers who have experienced unusually intense life stress are at heightened risk for depression, but this is not the case for those with less stressful lives (Caspi et al., 2003; for a meta-analysis, see Karg, Burmeister, Shedden, & Sen, 2011). In some studies, short-allele carriers show an attentional bias not only to threatening stimuli but also to positive ones, such as happy facial expressions (e.g., Beevers et al., 2011; Beevers, Wells, Ellis, & McGeary, 2009) though some studies have failed to replicate the effect for positive stimuli (e.g., Perez-Edgar et al., 2010). Those with two short alleles have been found to show more intense visceral responses to film clips depicting others in distress (Gyurak et al., 2013), more smiling in response to positive stimuli (Haase et al., 2015), and their marital satisfaction is more closely linked to the profiles of negative and positive emotional behavior displayed during conflict with the spouse (Haase et al., 2013). These studies suggest that those carrying the short form of the serotonin transporter may respond to the environment with higher-amplitude affect rather than having an overall negative bias, but the search for the exact nature and mechanisms of these effects goes on. Overall, although our understanding of the neural basis of emotion is still in its infancy, it has tremendous promise for illuminating the origins of individual difference in various aspects of emotional response.

Biases in Bodily Awareness: Interoception

As emotions unfold, the brain tracks and represents the body's visceral responses: Shifts in cardiovascular profile, digestive activity, blush, chills, tears, dry mouth, muscle tension, and breathing are transformed through complex processes beginning in the body in response to subjective experiences

(Craig, 2009). The ability to sense and report one's own bodily responses is known as *interoception*, and involves three distinct processes (Craig & Craig, 2009; Critchley & Garfinkel, 2017): subjective awareness of bodily sensations, such as heart palpitations or shallow breathing; the ability to provide accurate estimates of visceral activity, such as heart or respiration rate; and metacognitive interoception, or awareness of how objectively accurate one's estimates of bodily activity tend to be.

People differ considerably in each aspect of interoception, and these differences matter for emotion (Critchley & Garfinkel, 2017). Studies consistently find that people who describe their body's activity more accurately, such as those who can estimate their current heart rate with little error, experience emotions more intensely (Barrett, Quigley, Bliss-Moreau, & Aronson, 2004; Wiens, 2005). They are better able to reinterpret their emotions in ways that enable them to respond adaptively to their present circumstances (Füstös, Gramann, Herbert, & Pollatos, 2012). At the same time, they are a bit more vulnerable to anxiety, overly sensitive to shifts in heart rate, circulation, blood pressure, sweaty palms, and the effects of cortisol release on the body that accompany anxious states (Domschke, Stevens, Pfleiderer, & Gerlach, 2010). However, people's objective interoception accuracy correlates only modestly with their subjective awareness of bodily sensations. For example, people with autism are not skilled at reading the cues in their body (e.g., they perform poorly in the heartbeat detection paradigm), but believe that they are (Garfinkel et al., 2016).

Specialized literatures have begun to examine individual differences in the awareness of different bodily responses, and their implications for emotion. Some people are particularly aware of their blush response, and this bias is associated with higher levels of introversion, shyness, and social anxiety (Neto, 1996). People vary dramatically in the frequency with which they experience the chills, and this variation predicts, for example, their likelihood of finding music aesthetically pleasing—a tendency linked to openness to experience across cultures (McCrae, 2007; Silvia & Nusbaum, 2011). Children on the autism spectrum appear to

be more sensitive to emotion-related touch (Riquelme, Hatem, & Montaya, 2016). Future studies characterizing people who cry easily or are more sensitive to butterflies in the stomach will reveal the intriguing implications of sensitivity to these emotion-related sensations.

Emotional Differentiation and the Dynamics of Subjective Experience

A final development in the science of emotion with particular relevance to personality psychology involves differentiation in and dynamics of people's emotional experience. How much precision do people use in describing the quality of their emotions? Which emotions tend to “hang together” in a given person's experience over time? The ability to measure emotion at multiple time points in the real world, via diary studies and experience sampling, is moving the field beyond studies of emotional reactions measured at one point in time to the study of how emotions unfold in patterns over time, and individual differences in the dynamics of emotional experience.

Some people differentiate emotion into a wide variety of categories; they lead and describe emotionally complex lives, experiencing many distinct flavors of positive and negative emotion. For others, the emotion realm has fewer varieties of experience. Researchers have referred to this aspect of the language of emotion as *emotional granularity* or *emotion differentiation* (e.g., Kashdan, Barrett, & McKnight, 2015; Quoidbach et al., 2014; Smidt & Suvak, 2015). When people rate their experience of several emotions on multiple occasions, high average intercorrelations among items across time points within the same person indicate low levels of granularity—the person experiences a lot of positive or negative feeling, or very little, at any given time. Low average intercorrelations among emotion items indicate a person with high granularity, or fine-tuning of emotional experience into more precise categories. For example, a high-granularity person might report feeling primarily amused at one moment, proud at another, and compassionate at yet another, with low ratings of all other positive emotions. Emotional

granularity is often calculated separately for positive and negative emotions, as most people strongly distinguish between these two broad categories of experience.

Emotional granularity has been of particular interest to clinical psychologists who study mental health and well-being. Low granularity, especially for negative emotion experience, has been linked consistently to disorders including depression, schizophrenia, borderline personality disorder, and autism, among others, suggesting that the language-based capacity to differentiate between the varieties of emotion at the conceptual level is important to well-being (Smidt & Suvak, 2015). Low negative emotion granularity is also associated with higher neuroticism and low self-esteem, which has intriguing implications for understanding why high-neuroticism individuals experience more intense and chronic negative affect (Erbas, Ceulemans, Pe, Koval, & Kuppens, 2014). A number of studies suggest that heightened negative emotion granularity is an asset for effective coping. High-granularity individuals report using more diverse emotion regulation strategies over time, suggesting adaptive use of a coping “toolkit” rather than inflexible use of the same strategy regardless of the situation (Barrett, Gross, Christensen, & Benvenuto, 2001). In a daily diary study, those with higher negative emotion granularity reported less aggressive behavior on days when they felt anger (Pond et al., 2012). Yet another study indicated that those high on negative emotion granularity were less likely to consume alcohol when distressed, again suggesting reliance on healthier approaches to coping (Kashdan, Ferrel, Collins, & Muraven, 2010). At least one study has suggested that higher positive emotion granularity is also associated with healthier emotion regulation (Tugade, Fredrickson, & Barrett, 2004).

The evidence so far provides preliminary support for emotional granularity as an important aspect of individual differences in emotion. However, many questions about granularity have yet to be addressed in detail. What mechanisms produce individual differences in the granularity of experience? Is granularity purely a function of differentiated conceptual knowledge around emotions, as suggested by Barrett and col-

leagues (2001)? Or do more fine-grained appraisal, physiological, and/or interoceptive mechanisms lead to “real” differences in the specificity of emotional responding to different kinds of events? What other aspects of personality and individual differences shape and are shaped by positive and negative emotion granularity? These and many other questions await future research.

Another new focus is on the *dynamics of emotional experience*. As we saw earlier, most studies linking emotion to personality have emphasized individual differences in the frequency and/or mean intensity of positive and negative affect. Yet emotions change over time, and these patterns of change differ from person to person (Eid & Diener, 1999). Research on this phenomenon was pioneered by Peter Kuppens and colleagues, who have quantified several aspects of emotional dynamics and linked these to aspects of personality and psychopathology. One approach examines the dynamics of positive and negative affect separately, calculating three aspects of within-person change over time (Houben, Van Den Noortgate, & Kuppens, 2015): *emotional variability*, the standard deviation or variance of affect intensity ratings over some time period; *emotional instability*, or the extent of change in intensity from one moment to the next (e.g., mean squared successive difference); and *emotional inertia*, the extent to which one is likely to remain “stuck” in an emotion state (e.g., high autocorrelation over time in NA intensity). Additional measures capture change over time in the quality of affect rather than its intensity. For example, *spin* is defined as the extent of change over time in the angles of vectors in two-dimensional core affect space, like the hands of a clock, regardless of the intensity of the ratings (Kuppens, Van Mechelen, Nezlek, Dossche, & Timmermans, 2007).

Results of a meta-analysis indicate that high levels of emotional variability, instability, and inertia predict risk of psychological disorders involving emotional symptoms, including depression, bipolar disorder/mania, anxiety, borderline personality disorder, and externalizing disorders (Houben et al., 2015). Effect sizes were considerably stronger for negative emotion variability, instability, and inertia than for positive emotion,

but both were highly significant. Higher spin has also been linked to low self-esteem (Kuppens et al., 2007). Research is beginning to examine the mechanisms of clinically relevant individual differences in emotional dynamics. For example, using experience sampling data over a 7-day period, Koval, Sütterlin, and Kuppens (2016) examined the extent to which exposure to, reactivity to, and recovery from unpleasant daily life events predicted NA inertia. Slow recovery from NA elicited by events best accounted for inertia, highlighting the role of emotion regulation and repair processes in moving on from negative emotion when it occurs.

Spin has been found to correlate positively with neuroticism, and negatively with agreeableness and conscientiousness (Kuppens et al., 2007). Although the great majority of this research measures emotion using two-dimensional affect space, one study has linked intraindividual variability in the intensity of specific emotions to the Big Five personality factors. Eid and Diener (1999) found that higher variability in daily ratings of love intensity was associated with higher neuroticism; variability in joy ratings was positively associated with extraversion; variability in anger ratings was negatively associated with agreeableness; and variability in all four negative emotions (fear, anger, sadness, shame/embarrassment) was positively associated with neuroticism. However, research has barely scratched the surface in examining the predictors and implications of emotional dynamics beyond psychological disorder.

In a final example of the potential offered by the study of emotional dynamics, it is possible to examine individual differences in the *patterning of distinct emotions over time*—the extent to which different sets of emotions tend to “hang together” in one person’s experience. This proposal builds on a fairly recent approach in personality that challenges the assumption that the same set of dimensions revealed through factor analyses of between-subjects data (i.e., the nomothetic approach) will consistently be revealed in factor analyses of data from the same person measured over several time points (i.e., the idiographic approach; Cervone, 2005; Mischel & Shoda, 1995; Molenaar, 2004). The idiographic approach has

the potential to reveal profiles and structures at the individual level that are not easily observed in the aggregate (Molenaar & Campbell, 2009). An idiographic approach may also have implications for how we understand the structure and mechanisms of emotional experience.

In a proof-of-concept of this approach, Danvers (2017) used idiographic “P-technique” factor analysis to identify the dimensions underlying participants’ ratings of 16 distinct positive and negative emotions across 60 time points. Standard, variable-centered factor analyses examining patterns of item covariation across participants within a single time point revealed the expected two-factor negative emotion and positive emotion solution 47% of the time, with an additional 35% of time points requiring a three-factor solution. In contrast, person-centered, *idiographic factor analyses* examining patterns of item covariation within each participant across time points revealed a far more diverse set of factor structures. A two-factor solution was revealed for only 42% of participants, and the two factors did not always correspond to positive versus negative emotion. Across the sample, between one and five factors were needed to characterize idiosyncratic factor structures among the 16 emotion items, and at least nine distinct general structural types could be identified once the content of factors was considered, as well as the number of factors.

Emotion Mediates the Interaction between Person and Environment: A Social Functionalist Approach

Our review thus far has highlighted four major developments in the 21st-century science of emotion. Emotions serve social functions. Humans experience and express far more than the six distinct emotions emphasized in the early years of emotion research. The mechanisms of emotion—appraisals, awareness of bodily states, and genetically influenced central nervous system processes—vary considerably from person to person, and begin to shed light on the striking individual differences in emotional experience. People vary in the complexity and temporal dynamics of their emotional

experience. Emotions vary across individuals in complex and nuanced ways we are only beginning to understand.

These developments point to specific lines of personality research with potential to advance the field. For example, many insights await a move beyond studies linking the Big Five to broad PA and NA, to examine more specific emotions. Studies indicate that agreeableness most robustly predicts love and compassion; openness predicts awe; extraversion is associated with elevated pride and joy; and conscientiousness relates to heightened experience of the self-conscious emotions (Fayard, Roberts, Robins, & Watson, 2012; Shiota et al., 2006). As this work progresses, a clearer picture of the emotional core of higher-order personality traits will emerge. Work has begun on more specific emotional traits as well, including proneness to anger (Rosenberg, 1998); pride, shame, guilt, and embarrassment (Tracy & Robins, 2007); awe and interest (Bai et al., 2017; Silvia, Fayn, Nusbaum, & Beaty, 2015); compassion (Goetz et al., 2010); gratitude (McCullough et al., 2002); amusement (Heintz & Ruch, 2015); and interest or curiosity (Kashdan et al., 2018; Silvia, 2008a, 2008b). As this literature continues to expand, it has the promise of addressing critical questions. How do the tendencies to experience various distinct emotions cluster? What are the neurophysiological correlates of these emotional traits? Does a more fine-grained approach to emotional traits add predictive power beyond the study of positive and negative affectivity? What are the origins of these individual differences in emotion? How do more fine-grained emotional traits shape the life course? How are they are passed from one generation to another, and shaped by factors such as class background, culture, and family dynamics?

In this final section, we turn to ideas for the future study of individual differences in emotion. Our hope is to set the stage for empirical answers to two enduring questions. How do personality traits predict important life outcomes, for example, in health or work? And how do individuals' emotional propensities, when combined in the context of marriages, friendships, work relations, and the parent-child bond, shape the quality of long-term relationships? A social

functionalist approach offers valuable insights into these questions and is beginning to yield empirical fruit. Specifically, this approach suggests that emotions shape the individual's social context through appraisal biases and action tendencies. These processes contribute directly to a variety of life outcomes, including the health of the body (e.g., Moskowitz & Saslow, 2014; Redwine et al., 2016; Stellar et al., 2015), the trajectory of one's career (e.g., Lyubomirsky, King, & Diener, 2005), and the dynamic unfolding of relationships (e.g., Gordon et al., 2012). Here we outline two frameworks for this approach, which we illustrate with empirical examples and questions for future study.

Emotions as Mediators between Higher-Order Traits and Life Outcomes

All of the Big Five—extraversion, agreeableness, conscientiousness, openness, and neuroticism—are proving to have distinct emotional correlates, as we have seen (John & Srivastava, 1999). These five traits also predict just about every important outcome that shapes the life trajectory, including marital quality and stability, career success, physical health, successful aging, well-being, obesity, alcohol and drug abuse, criminal behavior, friendship, and parent-child dynamics (e.g., Bogg & Roberts, 2004; Caspi, Elder, & Bem, 1987; Jokela et al., 2013; Laursen, Pulkkinen, & Adams, 2002; Luo & Roberts, 2015; Sutin, Costa, Miech, & Eaton, 2009; Walton & Roberts, 2004). A particular challenge in this literature is to understand *how* these higher-order traits predict outcomes of different kinds. The individual differences in emotion linked to these traits may provide important clues, highlighting recurring experience of day-to-day psychological states that help account for behavioral tendencies, ultimately nudging lives in one direction or another.

For example, in one recent review, neuroticism was found to predict a variety of physical health maladies, from cardiovascular problems to compromised immune function (Widiger & Oltmanns, 2017). Emotion states that covary systematically with neuroticism, such as fear and rejection-related shame, predict neuroendocrine processes—elevated cortisol and inflammation—that undermine

physical health (Anderson, Monroy, & Keltner, 2018; Dickerson, Gruenewald, & Kemeny, 2004; Dickerson, Gable, Irwin, Azia, & Kemeny, 2009; Dickerson & Kemeny, 2004; John-Henderson et al., 2016). These findings point to shame, anxiety, and social-evaluative threat as clear mediators of the neuroticism–poor health association.

Or consider another life-defining outcome that the Big Five predicts: how an individual fares in the role of caregiver of an ailing loved one. Highly agreeable individuals tend to report less strain and better mental health during this extremely taxing and increasingly common experience (Löckenhoff, Duberstein, Friedman, & Costa, 2011). Emotion likely plays a mediating role. Highly agreeable individuals tend to report high dispositional levels of compassion (Shiota et al., 2006). Compassion is associated with distinct appraisal tendencies—finding commonalities with those who suffer and gratification in attending to those in need—as well as action tendencies to improve the well-being of others (e.g., Goetz et al., 2010). These distinct aspects of the compassion response may help buffer against the stress of caregiving; a proximal mediator by which trait agreeableness confers resilience.

In these examples, we propose that traits shape important life outcomes through their emotional cores—fear and anxiety in the case of neuroticism, warmth and compassion in the case of agreeableness. They do so by chronically shaping how the individual appraises the social context and by potentiating certain action tendencies that contribute directly to outcomes of great interest to the field.

In Figure 21.1 we offer a final illustration of this approach, as it applies to the well-documented tendency for highly extraverted individuals to acquire elevated status in the hierarchies they join, on the school playground, at work, and in community groups (Anderson, John, Keltner, & Kring, 2001; Judge, Bono, Bies, & Gerhardt, 2002). Across the lifespan, this edge in acquiring status translates into important life outcomes linked to elevated social rank, such as larger increases in income, better health, enhanced well-being, and more satisfying social relationships (e.g., Sutin et al., 2009).

A social functionalist account points to emotion-related appraisal and action tendencies that might help mediate the extraversion–status relationship. As noted earlier, extraversion is associated with heightened attunement to potential rewards in the environment, especially social rewards (e.g., Cohen et al., 2005; Lucas, Diener, Suh, & Shao, 2000; Smillie, 2013). Extraverts tend to be high in self-esteem and self-confidence as well (Robins, Tracy, Trzesniewski, Potter, & Gosling, 2001). Consistent with these appraisal biases, trait extraversion is associated with higher dispositional experience of positive emotions in a social context (joy, love), with authentic pride, and with more affiliative and self-enhancing humor styles (Shiota et al., 2006; Tracy & Robins, 2007; Vernon, Martin, Schermer, & Mackie, 2008). These emotions promote a suite of action tendencies—smiling, laughter, social approach, mimicry, speaking faster and with greater energy during social interactions, confident and dominant non-verbal behavior (Duffy & Chartrand, 2015;

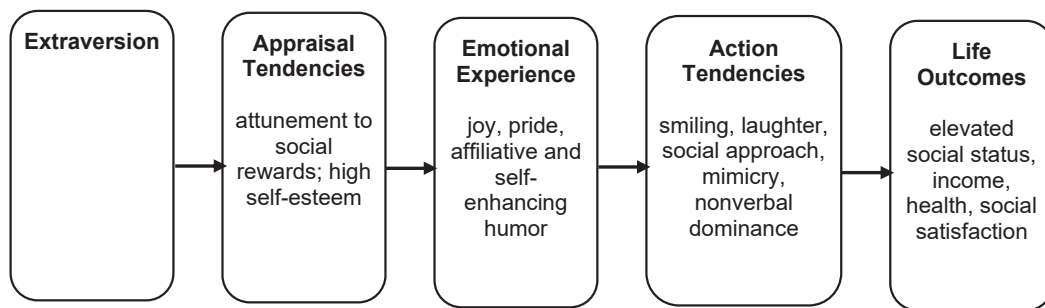


FIGURE 21.1. Emotions mediate relationships between high-level traits and life outcomes.

Feldstein & Sloan, 1984; Funder & Sneed, 1993; Smillie et al., 2015)—that establish rapport, elicit liking, and evoke attributions of confidence and status from observers (Anderson & Kilduff, 2009; Barrick et al., 2012; Harker & Keltner, 2001). Evidence suggests that the consequences of these momentary social interactions are profound, leading to higher rank within hierarchies in the short term, and better professional and personal life outcomes in the long term (e.g., Anderson, Brion, Moore, & Kennedy, 2012; Harker & Keltner, 2001).

Connecting this series of dots suggests that proximal mechanisms of appraisals (anticipated social reward, self-confidence) and action tendencies emerging from the emotional experience of social enjoyment, mirth, and authentic pride may form the path by which trait extraversion leads to higher rank. Consistent with this proposal, experimental studies indicate that extraverted men are most likely to emerge as leaders in an unstructured group discussion when they believe they are being evaluated by an attractive woman, highlighting the importance of reward pursuit as the mechanism linking extraversion to high status (Campbell, Simpson, Steward, & Manning, 2003). Emotions are proximal processes by which broader traits lead to important life outcomes.

Emotions Mediate Relational Dynamics

A second approach considers the roles of emotions in mediating the effects of personality on the experience of close relationships—an area that only now is receiving systematic attention within personality psychology (Harris & Vazire, 2016). Close relationships, ranging from friendships to familial and intimate bonds, to work relations, are vital to individual differences in well-being, health, and career success (Holt-Lunstad, Smith, & Layton, 2010; Myers & Diener, 2018). This thesis, that the emotional core of the individual shapes relationships of different kinds, has been an enduring theme in the attachment literature (Mikulincer & Shaver, 2006). The emotional tones of the family of origin and one's initial romantic encounter give rise to attachment styles, and these individual differences in how we relate to oth-

ers have consequences for relationship satisfaction, health, and well-being across the lifespan (Fairbairn et al., 2018; Fraley, 2019; Mikulincer & Shaver, 2006). Emotion-related appraisals such as self-confidence, the perceived value of relationships with others, and likelihood of abandonment are recognized as the cognitive heart of individual differences in attachment style (Collins & Read, 1990; Fraley & Shaver, 2000; Mikulincer, 1995). Action tendencies reflecting emotional responses and regulation styles—initiating versus withholding affectionate contact before a brief separation, open communication about sexuality, intensity of orienting toward social and material rewards, displaying constructive versus destructive behaviors during relationship conflict—are clearly linked to long-term relational outcomes (e.g., Feeney, Kelley, Gallois, Peterson, & Terry, 1999; Fraley & Shaver, 1998; Gross, 1998, 2002; Simpson, Collins, Tran, & Haydon, 2007; Tran & Simpson, 2009; Yee & Shiota, 2015). However, this approach has yet to be leveraged extensively in other areas of personality psychology.

In Figure 21.2, we apply our framework to the consistent observation that highly neurotic individuals tend to fare worse in intimate relationships (Bolger & Schilling, 1991; T. Fisher & McNulty, 2008; Harris & Vazire, 2016). Individuals high in neuroticism are likely to appraise events within relationships in terms of threat, uncertainty, and rejection—tendencies that diminish trust, comfort, and goodwill in intimate relationships and friendships (Downey & Feldman, 1996). Highly neurotic individuals are also likely to express themselves in ways—through tension, criticism, plaintiveness, facial and vocal expressions of fear and distress—that are likely to undermine relationship health (e.g., Keltner, 1996a). These outward expressions of emotion are likely to trigger patterns of response in the partner that diminish relational well-being—evoking reactions of fear and distress; diminished joy and gratitude; and broader inferences about the security, trust, and certainty that defines the relationship. This framework has been applied to good effect, for example, in studying why people with an avoidance motivation, who construe social relationships in terms of threat and conflict,

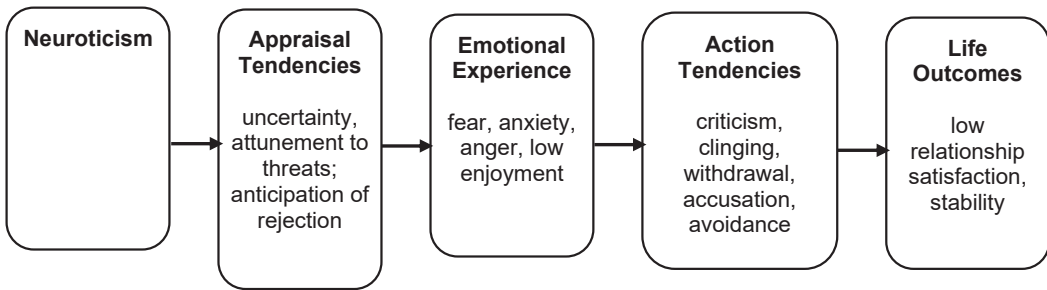


FIGURE 21.2. Emotions mediate dynamics between individuals in close relationships.

fare worse in terms of typical measures of relational strength (e.g., Impett et al., 2010).

Scholars working within different traditions have long argued that emotional tendencies lie at the heart of individual identity—the unique motifs, meanings, and recurring events that make up the individual’s life trajectory (Malatesta, 1990; Oatley, 2009). Here we build on this assertion to point to two general processes—appraisal biases and action tendencies—by which emotions might lie at the heart of individual identity and influence a wide array of long-term outcomes. Tendencies toward specific emotions function like scripts, setting the course for each individual’s life.

Conclusion

The human capacity for emotion is universal, yet individuals differ emotionally in profound ways. In this review we have summarized advances in the scientific study of emotion that have powerful implications for the study of personality and individual differences, highlighting the ways in which universal aspects and mechanisms of emotion can nonetheless vary from person to person. Moving beyond the study of broad affective states and their relation to the Big Five, our review highlighted four emerging themes in the science of emotion: the social functions of emotion; the growing number of distinct emotion states that constitute our subjective lives; the cognitive and neural mechanisms of emotional experience; and the complexity and dynamics of individuals’ emotional experience over time. Each of these four as-

pects of emotion is ripe for exploitation in personality psychology.

What new directions do these insights suggest in terms of future research on individual differences in emotion? We concluded our review by highlighting two broad conceptual approaches exemplifying our broader claim that emotions mediate the relationship between the person and the environment. We detailed how emotions mediate trait to life outcome relations and relational dynamics. The study of individual differences in emotion was a central interest of founding figures in the field—Darwin and James most notably. We are only beginning to realize the promise of this area of inquiry.

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CHAPTER 22

The Approach System as a Component of Personality

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Over the past several decades, a large body of work has examined the idea that a broad, general-purpose system manages motivation, affect, cognition, and behavior in response to cues of incentive and reward. This system has been referred to as the approach system, behavioral activation system (BAS), behavioral engagement system, or behavioral facilitation system (e.g., Depue & Iacono, 1989; Fowles, 1988; Gray, 1990). Personality, neural, animal conditioning, and psychopharmacology models all differentiate one system that acts to foster the approach of incentive cues from another system that acts to avoid threats (Elliot, 2008).

The biological basis of the BAS has been characterized as involving dopaminergic circuits that project from the ventral tegmental area to the ventral striatum (including the nucleus accumbens [NAcc], bilateral putamen, and caudate), and into prefrontal regions such as the medial orbitofrontal cortex, ventromedial prefrontal cortex, and anterior cingulate cortex (Whitton, Treadway, & Pizzagalli, 2015). In particular, research suggests that reward anticipation ac-

tivates the NAcc (Knutson & Greer, 2008) and that activation of this region is particularly related to willingness to work to obtain reward (Treadway, Buckholz, Schwartzman, Lambert, & Zald, 2009).

We have found it useful to differentiate among inputs to, outputs of, and sensitivity of the BAS (see Johnson, Edge, Holmes, & Carver, 2012). Allergies provide a helpful metaphor for these distinctions: a personal allergy (sensitivity) to pollen (the input) guides the degree of symptoms (output) that a person might develop when exposed to pollen. In the case of BAS, inputs are cues of potential reward, ranging from laboratory stimuli to broader life events that suggest potential for goal attainment. The neurobiological pathways implicated in this system guide differential levels of individual sensitivity to those inputs. BAS outputs include interest in incentives, motor activity, energy, confidence, and pleasure in rewards. Hence, a person with a strong trait-like tendency toward high BAS activity would be expected to show more energy, activation, eagerness, and confidence when given an opportunity

to pursue potential rewards than a person with a tendency toward low BAS activity. As noted earlier, most discussions of BAS treat it as a general-purpose system. However, some have also posited that the human approach system is specialized somewhat in the direction of social incentives in particular. Thus, it has been argued that sociability and exploration are also indicators of engagement of this system (Depue & Iacono 1989).

In the following sections, we review measures of BAS sensitivity and their psychometric qualities, and consider gender differences, stability, and developmental shifts in BAS sensitivity across the life course and validation of BAS self-report measures against biological and behavioral indices. We briefly discuss genetic contributions to BAS. We then consider how BAS sensitivity shapes outcomes related to normative variation in goal regulation, affect, close relationships, and several psychopathologies. We conclude with a brief discussion of future directions.

Self-Report Measures Pertaining to the BAS

Several research groups have developed self-report measures of BAS reactivity. Some of the most well-validated and widely used measures include the Behavioral Inhibition Scale/Behavioral Activation Scale (BIS/BAS; Carver & White, 1994), the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ; Torrubia, Ávila, Moltó, & Caseras, 2001), the Snaith-Hamilton Pleasure Scale (SHAPS; Snaith et al., 1995), and the Temporal Experience of Pleasure Scale (TEPS; Gard, Gard, Kring, & John, 2006). Both the BIS/BAS and the SPSRQ focus on a range of responses to rewards, while the SHAPS and TEPS focus more closely on the experience of pleasure in the presence or anticipation of rewards.

The BIS/BAS

Before development of the BIS/BAS (Carver & White, 1994), theories about BAS had been tested mainly using animal models. Carver and White developed the BIS/BAS to measure self-reported sensitivity to threats and rewards in humans. The BAS-relevant items were based in part on Gray's (1990,

1994) earlier theory of the appetitive motivation system, postulated to underlie movement toward goals and generate positive emotion in response to reward-related cues or incentives. The BAS-related items reflect emotional responses to obtaining reward, active pursuit of goals, and the tendency to seek out rewarding and novel experiences, all of which are properties that Gray had attributed to BAS function. Although not originally intended to form separate scales, the BAS-related items consistently separate into distinct (albeit correlated) BAS subscales in factor analyses (Table 22.1).

Large-scale studies have replicated this factor structure in the English version (Jorm et al., 1999; Johnson, Turner, & Iwata, 2003) and in a Spanish version (Segarra, Poy, López, & Moltó, 2014). Campbell-Sills, Liverant, and Brown (2004) found support for the four-factor structure (three BAS scales, one BIS scale), with the exception of a single item that failed to load on the Reward Responsiveness scale. Their findings also supported a higher-order factor of overall BAS, in addition to the three subscales. Findings of one study of 562 undergraduates did not support either of these factor structures (Cogswell, Alloy, van Dulmen, & Fresco, 2006). Overall, though, the bulk of the evidence supports the four-factor structure of the BIS/BAS scales, providing evidence for multifaceted, and distinguishable, manifestations of approach motivation in personality.

The SPSRQ

Whereas the Carver and White (1994) scale's items focus on general rewards, Torrubia and colleagues (2001) developed the Specific Rewards (SR) scale within the SPSRQ to measure sensitivity to a variety of specific rewards, such as money, sex, and social power, as well as impulsivity in the context of rewards. They designed the SR scale to capture a single dimension of approach motivation (rather than separable subscales), which they expected would relate to both extraversion and neuroticism. Each item is phrased in the form of a yes-no question. Many items on the SR scale are socially relevant, encompassing hypersexuality, attention seeking, and social dominance. This

TABLE 22.1. Descriptions and Reliability Statistics of Four Measures of the Sensitivity of the BAS

Measure	Subscales	Description	Internal reliability
BIS/BAS (Carver & White, 1994)	Drive (4 items)	Sustained pursuit of goals	$\alpha = .76$
	Reward Responsiveness (5 items)	Positive affect, energy, and motivation in response to obtaining or anticipating reward	$\alpha = .73$
	Fun Seeking (4 items)	Tendency to approach new experiences that may lead to reward without regard to negative consequences; desire for novel rewards	$\alpha = .66$
SPSRQ (Torrubia et al., 2001)	Sensitivity to Reward (SR) (24 items)	Tendency to approach reward in specific contexts, and to react to reward cues	$\alpha = .78$ (males) $\alpha = .75$ (females)
SHAPS (Snaith et al., 1995)	Snaith-Hamilton Pleasure Scale (14 items)	Inability to experience pleasure across normatively enjoyable situations	$\alpha = .91$
TEPS (Gard et al., 2006)	Anticipatory Pleasure (10 items)	Tendency to experience pleasure during anticipation of reward	$\alpha = .74$
	Consummatory Pleasure (8 items)	Tendency to experience “in-the-moment” pleasure	$\alpha = .71$

Note. Subscales not relevant to the BAS are not included here. Reliability statistics are based on those reported in Franken et al. (2007).

contrasts with the BAS items, which focus more generally on experiences of reward or good experiences.

In addition to this difference, many SR items connote some degree of social deviance or general negativity (e.g., “Do you like displaying your physical abilities even though this may involve danger?”). As a result, a “yes” response to these items concedes some level of negative consequence of approach behavior. While it was not assumed that individuals would necessarily have equal sensitivities to different types of reward, Torrubia and colleagues (2001) expected that differences would generalize across types of reward; as a result, items are summed to provide one total score. Although some subsequent researchers have reported satisfactory internal consistency of the SR scale (e.g., Caseras, Ávila, & Torrubia, 2003; Mitchell et al., 2007), others have not found strong support for the original two-factor model differentiating reward versus punishment sensitivity (e.g., O’Connor, Colder, & Hawk, 2004; Cogswell et al., 2006).

The SHAPS

The SHAPS was devised to be brief measure of anhedonia (the inverse of reward sensitivity) that could be used across cultural and clinical populations. To this end, researchers asked 55 individuals ages 15–80, recruited from the community to list five situations that they found pleasurable and thought would be applicable to broad groups of people (Snaith et al., 1995). These depictions were then reworded to form scale items. The final scale includes 14 items that loaded on a single factor, answered using a dichotomous “agree” or “disagree” format (higher scores indicate greater anhedonia). A validation study of the SHAPS in a nonclinical population generated high internal consistency values and replicated the single-factor structure (Franken, Rassin, & Muris, 2007).

The TEPS

Development of the TEPS was based on biological and behavioral evidence that responses to reward anticipation versus con-

sumption can be distinguished. Animal researchers have been able to distinguish key neurotransmitters involved in consummatory pleasure versus anticipatory pleasure, also termed *liking* and *wanting* (Berridge, Robinson, & Aldridge, 2009). Dopamine plays a key role in goal-oriented anticipatory pleasure, as well as reward learning, whereas opioid mechanisms appear more crucial in consummatory pleasure. Accordingly, the TEPS provides one subscale for anticipatory pleasure and a separate subscale for consummatory pleasure.

Both TEPS scales cover responses to specific and general pleasurable stimuli across all five sensory modalities (Gard et al., 2006). Similar to the rationale for providing a summed total for the SR scale, scores on the TEPS are summed to provide one anticipation score and one consumption score across sensory modalities. A two-factor structure of anticipation versus consumption scores was identified across five separate university samples (Gard et al., 2006).

Convergent and Discriminant Validity of Approach Motivation

The self-report measures described here show expected correlations with each other. The Carver and White BAS scales are moderately intercorrelated (Carver & White, 1994; Jorm et al., 1999; Johnson et al., 2003). Moreover, the TEPS Anticipatory Pleasure and Consummatory Pleasure scales and the SR subscale of the SPSRQ have all shown significant correlations with all BAS subscales (Gard et al., 2006; Cogswell et al., 2006). The SHAPS also displays the expected inverse relationships with BAS subscales (Franken et al., 2007).

Researchers have also considered convergent and divergent validity with other personality traits, most commonly measures of extraversion, neuroticism, and affective temperament. Extraversion is particularly relevant, as most models today emphasize pursuit of incentives as being a central mechanism driving extraversion (Carver & Scheier, 2012). Consistent with such models, a series of studies provides evidence that reward sensitivity is highly related to extraversion (Lucas, Diener, Grob, Suh, & Shao, 2000). In Carver and White's (1994) origi-

nal validation of the BIS/BAS, all three BAS subscales were significantly associated with extraversion, with Fun Seeking showing the strongest relationship. Similarly, the SR subscale and TEPS Anticipatory and Consummatory Pleasure scales correlate positively with extraversion measures (Gard et al., 2006; Segarra et al., 2014; Torrubia et al., 2001).

One might expect that positive affectivity would also correlate with measures of BAS sensitivity, though not be entirely overlapping with them, as measures of BAS sensitivity focus on affective responses to cues of reward, whereas measures of positive affectivity per se are less focused on the role of context. Consistent with this, BAS scales have shown significant but modest relationships with positive affectivity measures (Carver & White, 1994). The SHAPS has also shown expected inverse relationships with measures of positive affect (Franken et al., 2007).

Findings on whether the various BAS-relevant scales relate to negative affectivity are mixed and tend to differ by measure. As noted earlier, across measures, most factor analyses have found that responses to threat and punishment are separable from responses to incentives. Consistent with this separability, BAS Drive, BAS Fun Seeking, SHAPS, and TEPS Consummatory Pleasure scores have been found not to relate significantly to negative affectivity (Franken et al., 2007; Franken & Muris, 2006; Gard et al., 2006; Johnson et al., 2003). An exception to this pattern is the SRSPQ, in which both sensitivity to reward (SR) and sensitivity to punishment (SP) have been found to relate to neuroticism (Torrubia et al., 2001; Mitchell et al., 2007). Indeed, Torrubia and colleagues (2001) argued that both SR and SP should confer a general heightened sensitivity in line with Gray's original impulsivity-anxiety dimensions.

Moderate positive correlations have been observed of the BAS Reward Responsiveness scale and the TEPS Anticipatory Pleasure scale with the BIS scale (Franken & Muris, 2006; Gard et al., 2006; Johnson et al., 2003). These associations are consistent with the idea that there is a more general reactivity to environmental cues, or an overall affective reactivity, which would lead

to higher scores on both BAS and BIS measures. However, these associations between BIS and BAS are never very strong. If a general reactivity is responsible for it, that overall reactivity clearly does not overwhelm the separate sensitivities.

Some researchers have proposed that a strong reactivity to nonreward would be expected if a person has a strong motivation to achieve rewards (e.g., Carver, 2004; Corr, 2001). To address this possibility directly, Wright, Lam, and Brown (2009) developed a five-item Frustrative Nonreward subscale to append to the BIS/BAS. This scale correlates with both the BIS scale and Reward Responsiveness, but not the other two BAS subscales. This finding is consistent with the idea that those who are most responsive to reward also experience stronger negative emotions when reward-related goals are thwarted, but the negative emotions appear specific to emotional responses to reward and its absence.

Age and Gender Differences in Approach Motivation

Several studies have reported gender differences in responses on these self-report scales. Women scored higher than men on Reward Responsiveness (Carver & White, 1994; Jorm et al., 1999), and in one study, scored lower on Drive (Jorm et al., 1999). In contrast, men reported greater sensitivity to reward, on average, than women on the SPSRQ, perhaps reflecting the greater focus on impulsivity of the SR subscale (Torrubia et al., 2001).

Considerable evidence suggests important changes in reward sensitivity across the lifespan, with a peak of reward sensitivity during adolescence (Somerville, Jones, & Casey, 2010). Cross-sectional findings indicate that adolescents, as compared with children and adults, have stronger responsivity to rewards, including monetary incentives (Hardin, Schroth, Pine, & Ernst, 2007; Jazbec et al., 2006) and positive feedback (Cauffman et al., 2010), whether measured by positive affective displays (Ernst et al., 2005) or neural responsivity (Van Leijenhorst et al., 2010). In a longitudinal study, Urošević, Collins, Muetzel, Lin, and Luciana (2012) found an increase in reward sensitivity coin-

ciding with early to late adolescence, with a stabilization in the early 20s corresponding with decreases in volume in the left NAcc. At the other end of the age spectrum, investigators have found lower BAS scores in older adults, suggesting that BAS may weaken over time (Jorm et al., 1999); this is consistent with reports that dopaminergic function decreases later in life (S. Li, Lindenberger, & Backman, 2010).

Beyond these normative developmental patterns, reward sensitivity has shown stability over time. Studies using the BAS scale have shown exceptional test–retest reliability over two years (Brown, 2007; Carver & White, 1994).

There is some question about whether these scales adequately capture BIS/BAS levels in children. In a sample of 284 children ages 8–12 years, factor analysis did not support the four-factor structure described earlier (Muris, Meesters, de Kanter, & Timmerman, 2005). Rather, BIS and BAS items appeared to form two orthogonal dimensions, each with satisfactory internal consistency (.81). There was also an unexpectedly strong relationship between BIS and overall BAS, suggesting that items may not generalize well to this younger group.

A more recent project examined samples of children, adolescents, young adults, and later adults (approximately age 36) and determined that Fun Seeking did not differentiate well from the other BAS factors and a few other items had suboptimal psychometric properties across the age groups (Pagliaccio et al., 2016). Use of a trimmed model that omitted Fun Seeking and the suboptimal items yielded evidence of consistent factors across age groups. Consistent with earlier results, BAS scores tended to be highest in young adulthood and lower in childhood and later adulthood, exhibiting a nonlinear relationship across development.

Biological and Behavioral Correlates of Self-Report Measures

The self-report scales discussed here have all been linked to behavioral, physiological, and neural responses to appetitive stimuli. With respect to overt behavior, research has linked TEPS Anticipatory Pleasure and BAS scores with willingness to exert greater

effort to obtain reward when the probability of obtaining reward was relatively low (Geaney, Treadway, & Smillie, 2015). This suggests that these personality traits may help predict motivation in contexts in which those with low reward sensitivity would not feel that the benefits of potential rewards outweigh the costs.

Much research examining physiological correlates of behavioral activation has focused on frontal cortical asymmetry (Harmon-Jones, Gable, & Peterson, 2010). Relative left frontal activity has been associated with approach motivation as measured by the BIS/BAS scales (Amodio, Master, Yee, & Taylor, 2008; Sutton & Davidson, 1997), but some studies have not found this relationship (Pizzagalli, Shackman, & Davidson, 2003; P. Gable, Mechin, Hicks, & Adams, 2015). Results from a recent meta-analysis taking into account unpublished dissertations suggest that midline posterior versus frontal theta activity may be a more robust marker of BAS activity than relative left frontal alpha activity (Wacker, Chavanon, & Stemmler, 2010).

Neuroimaging studies have found correspondence between blood-oxygen-level dependent (BOLD) response to potential rewards in areas of the reward circuit and self-reported levels of approach motivation. As one example, in a functional magnetic resonance imaging (fMRI) study in which participants were presented with images of types of food as they lay in the scanner, self-reported BAS Drive scores predicted greater neural activation in the frontostriatal-amygdala-midbrain network in response to appetizing food images (Beaver et al., 2006). Greater Anticipatory Pleasure (TEPS), but not Consummatory Pleasure, has been found to correspond with a stronger connection between key regions in the neural reward circuit during anticipation of monetary reward (Z. Li et al., 2015).

Heritability and Genetic Polymorphisms Relevant to BAS Research

In a two-wave longitudinal twin study, researchers estimated that genetics accounted for 28–35% of the variability in BAS scores (Takahashi et al., 2007). Participants were retested on the BIS/BAS scales an average of

2.25 years after the first administration, and stability in BAS scores appeared to be driven predominantly by genetic factors (heritability estimates above .5), whereas nonshared environmental factors contributed to both the stability and change in BAS scores over time (Takahashi et al., 2007).

Many studies of the neurological basis of reward sensitivity suggest links to specific genetic polymorphisms (Bogdan & Pizzagalli, 2009). Ogden and colleagues (2004) integrated findings of a pharmacogenomic study of mice with then-recent human studies of related phenomena and concluded that reward sensitivity is most affected by pathways involving dopamine- and cyclic adenosine monophosphate (cAMP)-regulated phosphoprotein, DARPP-32, a major target for dopamine in the striatum.

Most neuroimaging studies in humans that consider genetic influences on neural responses to reward have identified significant effects of genes relevant to dopamine function, including D2, D3, and D4 receptors and dopamine transporter (*DAT*). Research on neural responses to reward have found significant differences in the following genes associated with dopamine: *ANKK1*, related to dopamine synthesis (Felsted, Ren, Chouinard-Decorte, & Small, 2010), *141C Ins/Del* polymorphism related to D2 receptors (Forbes et al., 2009), D4 receptor gene (*DRD4*; Marco-Pallarés et al., 2009), and *DAT1* (Dreher, Kohn, Kolachana, Weinberger, & Berman, 2009). Individuals carrying the 9-repeat allele of the *DAT1* polymorphism have been shown to take more risks in pursuit of rewards during decision-making tasks (Zhong et al., 2009) and to have increased striatal activity in response to reward cues (Zhong, Chark, Ebstein, & Chew, 2012).

Beyond the studies of genes that are directly linked to dopaminergic function, studies of genes with indirect links to dopaminergic functioning also appear related to neural responses to rewards, including the catechol-O-methyltransferase (*COMT*) and brain-derived neurotrophic factor (*BDNF*) genes. The *COMT* gene facilitates the production of *COMT*, an enzyme involved in catalyzing dopamine and other catecholamines (Chen et al., 2004). The *BDNF* gene has neurobiological effects on the mesolimbic dopamine

pathway, among other effects (Berton et al., 2006; Guillin et al., 2001). Both *COMT* and *BDNF* have been linked to the strength of neural response to reward (Dreher et al., 2009; Marco-Pallarés et al., 2009).

Additional neuroimaging studies have linked reward sensitivity to activity in opioid receptors, which appear relevant for wanting and liking rewards and have been implicated in drug addiction (Cui et al., 2014; Kawahara et al., 2013). The opioid receptor mu-1 gene (*OPRM1*) guides the function of mu opioid receptors and has been linked to neural responses to reward, including greater neural activation and connectivity in reward-related circuitry (Ray et al., 2014).

Research attempting to link self-report BAS scales to genetic polymorphisms in humans has had mixed results. Consistent with the neuroimaging studies just described, much of this work has studied genes associated with dopaminergic functioning. Individuals who carry at least one A1 allele of the *ANKK1* have been found to report lower BAS Drive (Felsted et al., 2010) and higher BAS Reward Responsiveness (Davis et al., 2008; Lee et al., 2007). The g allele of *DRD3* was associated with the BAS Drive scale in one sample but not in a second sample (Henderson et al., 2000). Null findings have been found for *DAT1* (Henderson et al., 2000), *DRD2* markers of the *141 Ins/Del* gene (Davis et al., 2008), *C957T* mutation related to the D2 receptor (Davis et al., 2008), and *COMT* (Henderson et al., 2000). In two studies comparing BAS scores with a composite of multiple serotonergic polymorphisms, one found a significant association among persons exposed to early adversity (Pearson, McGeary, & Beevers, 2014), whereas the other did not (Johnson, Carver, Joormann, & Cuccaro, 2016). On the other hand, the latter found that *OPRM1* interacted with early adversity to predict BAS Reward Responsiveness.

BAS Outcomes

Individual differences in sensitivity of the BAS have been linked to a broad range of outcome domains, including goal setting and appraisal, affective responses to goal progress (or the lack thereof), and interper-

sonal relationships. In this section, we examine evidence that individual differences in BAS levels contribute to outcomes in each of these domains.

Goal Setting and Appraisal

It has long been suggested that individual differences in BAS ought to differentially shape goal-setting tendencies, such that people high in BAS sensitivity would tend to set relatively more goals to pursue rewards than those lower in BAS sensitivity (Elliot & Thrash, 2002). Consistent with theory, high BAS scores have been found to relate to tendencies to set more approach-oriented goals (i.e., goals involving moving toward something) as opposed to avoidance-oriented goals (i.e., goals involving moving away from something; e.g., Jones, Shams, & Liversidge, 2007). For example, persons who are high in approach sensitivity, as measured by the BAS, are more likely to endorse goals that focus on the development of competence and mastery as opposed to the avoidance of incompetence (Elliot & Thrash, 2002). One particularly illustrative finding is that high BAS scores have been found to relate to increased willingness to set and pursue extremely ambitious life goals, such as earning millions of dollars or appearing regularly on TV (Alloy et al., 2012; Johnson & Carver, 2006).

BAS sensitivity has also been linked to individual differences in goal-relevant values and appraisals. High BAS scores are associated with holding more approach-oriented values, such as performance, achievement, and perfectionism (Alloy et al., 2009), and to tendencies to favor self-serving appraisals of successful task performance that may promote confidence in one's ability to succeed (e.g., a tendency to attribute success to one's own internal qualities rather than to chance; T. Meyer, Barton, Baur, & Jordan, 2010).

Affective Responses

Another class of BAS output is affect. In his initial theory, Gray (1994) suggested that the affective outcomes of activity in the behavioral approach and inhibition systems were grouped by valence. More specifically,

he held that the BAS was responsible for generating all positively valenced affects, such as hope, excitement, and elation, in support of goal pursuit and attainment, and only positively valenced affects. Consistent with this notion, BAS scores have been shown to predict situational positive affect in response to cues that a reward is available (Carver & White, 1994; Heponiemi, Keltikangas-Järvinen, Puttonen, & Ravaja, 2003), as well as positive emotional responses immediately after receiving rewards (De Pascalis, Varriale, & D'Antuono, 2010; Germans & Kring, 2000).

There are conceptual complications, however, with respect to certain other affects. Gray (1990, 1994) consistently held that frustrative nonreward engages the BIS rather than the BAS, consistent with the view that negative valence always is attributable to BIS activity. This view is not held universally. Carver and Scheier (1998) have argued that the affective outputs of the behavioral approach and threat systems are instead products of self-regulatory feedback loops that monitor the rate of progress (or the lack thereof) toward one's goals and away from threats. In this view, feelings facilitate effort regulation by signaling whether one is progressing toward one's goal at a sufficiently rapid pace. Accordingly, when the perceived rate of goal-related progress falls below a criterion value that defines acceptable or anticipated progress, negative affect arises that signals a need to increase one's efforts. Positive affect arises when perceived progress exceeds the criterion value, signaling that one's efforts can potentially be relaxed (Carver, 2003).

This model holds that the specific emotional outputs (rather than valence *per se*) differ between the approach and the threat systems (Carver & Scheier, 1998). Thus, the positive affect generated by better-than-expected goal-related progress takes the form of eagerness and joy when doing well at approaching goals, but it takes the form of relief and contentment when doing well at avoiding threats (Carver, 2003).

Responses to lack of expected progress toward approach goals are negative in valence, taking one of two forms. The form depends on the degree to which a goal appears ultimately attainable versus lost (see Carver, 2004). Progress somewhat below the crite-

ron yields frustration and anger. If the approach goal seems unattainable, the affective response is more likely to be sadness, dejection, and despondency (see Carver & Harmon-Jones, 2009).

Research findings are consistent with the idea that high BAS sensitivity can result in negative emotions when goal pursuit goes poorly. In one such study involving frustrative nonreward, participants were led to believe that they could earn extra credit if they performed sufficiently well at a task, but they were subsequently given feedback indicating that they had failed to do so (Carver, 2004). Individual differences in BAS sensitivity (specifically the Fun Seeking subscale), but not BIS sensitivity, were significantly associated with participants' ratings of sadness and frustration after failing to earn the reward. Conceptually similar results have also been reported by Van den Berg, Franken, and Muris (2011).

In addition to predicting situational negative affect, BAS sensitivity has also been shown to positively relate to trait anger (Harmon-Jones, 2003) and proneness to guilt (Sheikh & Janoff-Bulman, 2010), both of which have been conceptualized as approach-oriented emotions (see Amodio, Devine, & Harmon-Jones, 2007; Carver & Harmon-Jones, 2009). Collectively, these findings support the idea that individual differences in BAS produce different affective states as a function of progress or lack of progress toward goals.

This means that the picture of a person with a highly sensitive BAS is considerably more complex than simply positive affect and effort engagement. The picture also depends on the context in which the person is presently operating. A person with a sensitive BAS who is presently facing obstacles and difficulty may be vulnerable to frustration and anger, or even sadness and dejection (though not fear), depending on the degree of difficulty, which must be figured into the prediction of his or her behavior.

Close Relationships

Researchers have suggested that close relationships can be construed in terms of motivational tendencies to approach relationship-related rewards (e.g., intimacy) and avoid relationship-related punishments

(S. Gable, 2006; for a broader perspective, see Fitzsimons, Finkel, & vanDellen, 2015). Within this framework, an individual with underactive approach motivation might tend to be seen as cold or distant by others and to be disinterested in engaging in affiliative behaviors. On the other hand, overactive approach motivation might result in behaviors deemed to be overly intrusive or abrasive. Empirical findings support the notion that BAS sensitivity is linked to meaningful relationship outcomes, such as closer friendships (Berry, Willingham, & Thayer, 2000), greater satisfaction with family and friendship relationships (Gutierrez, Garriz, Peri, Vall, & Torrubia, 2016), secure adult attachment (Carver, 1997), and the tendency to respond actively to potential threats to romantic relationships (B. Meyer, Olivier, & Roth, 2005). Less information is available regarding potential negative effects of high BAS.

A question to which we alluded at the beginning of the chapter is whether BAS sensitivity is best conceptualized exclusively as a domain-general tendency to approach rewards, or whether there is a distinct or partially distinct subsystem involved in responding specifically to social reward cues. A series of studies conducted by Laurenceau, Kleinman, Kaczynski, and Carver (2010) supported the incremental validity of relationship incentive sensitivity (a relationship-specific analogue of BAS) in predicting couples' perceptions of relationship quality and situational positive affect when couples were instructed to have a conversation focused on their positive feelings for one another. These findings further support the utility of thinking about the BAS in understanding functional outcomes in the domain of close relationships, and also suggest that it may be important to understand and measure domain-specific facets of BAS, such as relationship incentive sensitivity, in order to more effectively predict outcomes within specific domains of functioning.

Psychopathology

The BAS has been linked repeatedly to a range of psychopathologies, including both internalizing and externalizing outcomes. Across both cross-sectional and prospective

studies, underactivity of the BAS has been consistently identified as a correlate of and risk factor for internalizing syndromes, including major depressive disorder (MDD), generalized anxiety disorder, and obsessive-compulsive disorder (e.g., Brown, 2007; Kasch, Rottenberg, Arnow, & Gotlib, 2002; Kim, Kang, & Kim, 2009). The relationship between MDD and blunted approach motivation has received particular attention. This is unsurprising given that hallmarks of an underactive approach system might include apathy and amotivation, low positive affect, passivity, and low energy, all of which are characteristic symptoms of major depressive episodes.

At the opposite end of the approach motivation spectrum, overactive approach motivation has been linked to problems of risk taking and impulsivity (e.g., Braddock et al., 2011); anger and aggression (e.g., Harmon-Jones, 2003); antisocial behavior and psychopathy (e.g., J. E. Morgan, Bowen, Moore, & Van Goozen, 2014; Pujara, Motzkin, Newman, Kiehl, & Koenigs, 2014); and substance use (e.g., Hamilton, Sinha, & Potenza, 2012). These findings suggest that BAS hyperactivity may be relevant to understanding a wide range of externalizing behaviors and syndromes, a notion for which there is considerable support overall (e.g., Bjork, Chen, Smith, & Hommer, 2010; see Johnson et al., 2003).

Hypersensitivity of the BAS has also emerged as a leading candidate etiological model for the bipolar spectrum disorders and mania. These disorders are characterized by intensely elevated or irritable mood, increased goal pursuit, and impulsive pursuit of rewarding activities, among other symptoms (see Johnson, Carver, & Gotlib, 2012, for a review). In the sections that follow, we discuss evidence that low levels of approach motivation are associated with depression and that high levels of approach motivation are associated with externalizing syndromes and mania.

Underactive Approach Motivation and Depression

Multiple lines of research, including neurophysiology, behavior, and self-report, converge on the conclusion that hypoactivity of the approach system is implicated in the eti-

ology of depression. Low approach motivation may be especially related to of the transdiagnostic clinical feature of anhedonia (see Treadway, Bossaller, Shelton, & Zald, 2012, for discussion).

At the neural level of analysis, MDD has been consistently linked to blunted reactivity to reward in striatal regions that are thought to subserve the approach system (see Whittton, Treadway, & Pizzagalli, 2015, for review). Of note, striatal hypoactivation in response to rewards has been observed not only in those diagnosed with MDD, but also in children of depressed parents (e.g., Gotlib et al., 2010) and at-risk adolescents (Olino et al., 2014), and has also been found to predict increases in depressive symptoms over a two-year timespan in adolescence (J. K. Morgan, Olino, McMakin, Ryan, & Forbes, 2013), suggesting that this blunting of the approach system is not simply a second-order consequence of depressive experiences. Parallel electroencephalographic (EEG) evidence has emerged from studies showing that depressed individuals and those with a history of depression exhibit lower activation in left anterior cortical areas than nondepressed persons; the same cortical regions have also been implicated in approach system sensitivity, as described earlier (see Harmon-Jones, Price, Peterson, Gable, & Harmon-Jones, 2013, for review).

At the behavioral level, depressed individuals demonstrate lower responsiveness to rewards and less willingness to work for rewards than other people. For example, Pizzagalli, Jahn, and O'Shea (2005) found that individuals with elevated depressive symptoms failed to show the expected response bias toward one of two stimuli that was more frequently paired with a reward, and this deficit in reward learning predicted more anhedonic symptoms 1 month later. Individuals with MDD, including those experiencing first-episode depression and individuals with high trait anhedonia, are less willing to engage in effort to obtain rewards and are more likely to disengage from demanding reward tasks than are nondepressed individuals (Brinkmann & Gendolla, 2008; Treadway et al., 2012; Yang et al., 2016).

At the self-report level of analysis, low BAS scores have been linked to depression cross-sectionally and shown to predict a

more severe course of depression over time (e.g., Campbell-Sills et al., 2004; Kasch et al., 2002). Consistent with these findings, persons with depression also report less positive emotional responsiveness to anticipatory reward cues (McFarland & Klein, 2009) and are less likely to set and plan for specific approach-oriented goals (Dickson & MacLeod, 2004). Overall, these findings provide strong support for the notion that underactive approach motivation, measured across multiple levels of analysis, is a central facet of vulnerability to depression and anhedonia.

Overactive Approach Motivation and Externalizing Syndromes

There are a number of pathways through which high BAS sensitivity might be a risk factor for psychopathology. For example, individuals who have overactive approach systems might be predisposed to unrestrained and overenthusiastic pursuit of rewards that are intrinsically problematic, such as illegal drug use resulting in substance use disorders; that cause individuals to behave in ways that are regarded as abrasive or intrusive by others, as in the case of unabashedly seeking social dominance (e.g., as is commonly observed in psychopathy); under conditions that are suboptimal for goal attainment; or that interfere with completion of less rewarding tasks that are important for long-term adaptation. In particular, multiple theorists have suggested that high levels of BAS sensitivity are central to understanding the spectrum of externalizing disorders (see Fowles, 2001; Newman & Wallace, 1993).

There is considerable evidence supporting the notion that high BAS sensitivity is implicated in a range of externalizing behaviors and syndromes. For example, Hundt, Kimbrel, Mitchell, and Nelson-Gray (2008) found that high BAS self-report scores were cross-sectionally associated with symptoms of drug and alcohol abuse, psychopathy, and hyperactive-impulsive attention-deficit/hyperactivity disorder (ADHD) symptoms in an undergraduate sample. These findings converge conceptually with Honomichl and Donnellan's (2012) prospective finding that surgency, a dimension of temperament that taps into appetitive motivations and bears a

strong conceptual resemblance to BAS, assessed at 54 months of age, predicted externalizing behaviors assessed at 15 years.

Consistent with the self-report findings, hypersensitivity of the mesolimbic dopaminergic reward system has been implicated in a range of externalizing syndromes (Baskin-Sommers & Foti, 2015). Of note, heightened activation of the NAcc during reward anticipation has been shown to correlate with externalizing symptoms and alcohol dependence (Bjork et al., 2010), psychopathy (Pujara et al., 2014), and cannabis use (Nestor, Hester, & Garavan, 2010).

Overactive Approach Motivation and Mania

In its initial incarnation, the BAS hypersensitivity model of bipolar disorder emerged from the observation that the core symptoms of mania overlap considerably with the outputs of the BAS, such as increased activity and heightened high arousal positive affect (Depue & Iacono, 1989). Direct tests of the relationship between self-reported BAS sensitivity and mania have generally supported this model. Of import, BAS sensitivity is prospectively related to initial onset of bipolar spectrum disorders (Alloy et al., 2012) and to the course and severity of manic symptoms over time (Alloy et al., 2008; B. Meyer, Johnson, & Winters, 2001).

These findings converge with evidence that willingness to set ambitious goals has itself been found to predict the onset of bipolar disorder in at-risk individuals (Alloy et al., 2012) and a more severe course of mania over time among those diagnosed with bipolar I disorder (Johnson, Carver, et al., 2012; Tharp, Johnson, Sinclair, & Kumar, 2016). Among persons with bipolar disorder, goal attainment is often followed by unusually persistent elevations in positive affect (Farmer et al., 2006), large increases in energy and effort (Fulford, Johnson, Llabre, & Carver, 2010), and higher levels of manic symptoms (Johnson et al., 2000, 2008).

These self-report findings are complemented by behavioral and neurophysiological evidence of increased willingness to expend effort for reward (e.g., Harmon-Jones et al., 2008; Hayden et al., 2008) higher spontaneous eye blink rate in anticipation of reward (a proxy for dopaminergic func-

tion; Peckham & Johnson, 2015), and differential activity in the ventral striatum and orbitofrontal cortex in response to reward (see Nusslock, Young, & Damme, 2014, for a review). Taken together, self-report and biobehavioral findings provide compelling support for the notion that hypersensitivity of BAS is involved in the etiology of mania and bipolar disorder, although it has recently been suggested that the BAS hypersensitivity model may be overly broad, in that only certain facets of the BAS are dysregulated in bipolar disorder (see Johnson, Carver, et al., 2012).

Unanswered Questions and Future Directions

This chapter has focused on the idea that there is a domain-general system organized around approach incentives, as well as some of the implications that might follow from the incorporation of such a system in personality. Given that focus, much else has been left aside. Clearly, more is involved in personality than approach incentives. For the most part, we have disregarded another very obvious category of motivation—the desire to avoid or escape from threats—and the emotions, actions, and other outputs that follow from that category of motivation. There is also a growing body of work suggesting that even these two broad systems do not sufficiently capture the complexity of human self-regulation. In particular, many have suggested the existence of a system of self-control that comes into play when the potential arises for conflict between short-term and longer-term desires, for example.

In Gray and McNaughton's (1982) original conception of the BAS in humans, they gave the trait variable that was linked to BAS function the label "impulsivity." In retrospect, that may have not been the best choice of label. At first glance, impulsivity does seem to be tied to intense desires for particular outcomes. But impulsivity is a concept with a great deal of complexity, and many influences may lie behind a given impulsive action (e.g., Eysenck, 1987; Johnson, Carver & Joormann, 2008; Parker & Bagby, 1997; Torrubia et al., 2001). By attaching the term *impulsivity* to BAS sensitiv-

ity, Gray and McNaughton (1982) were, in effect positing that impulsivity follows purely from wanting an incentive. However, impulsive action sometimes depends on a lack of threat sensitivity. Impulsive action (and its absence) also often depends on the system that manages self-control. If that system is very responsive, impulsivity (of any sort) is less likely.

One important direction for future work will be to determine more precisely the roles that are played by approach sensitivity and the function of self-control in creating greater versus lesser impulsivity (Carver, Johnson, & Joormann, 2008); that is, cognitive control may help override tendencies toward either extremely blunted BAS or extremely reactive BAS. This would imply that a person who tends to have either a passive disengagement (in the case of low BAS sensitivity) or an overly reactive tendency to seek rewards (in the case of high BAS sensitivity) is likely to experience less difficulty if he or she is able to engage cognitive control to regulate affect, cognition, and behavior. Relatively few studies to date have considered how variations in these two dimensions may combine to predict outcomes. We see this as a particularly promising direction for future research.

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CHAPTER 23

The Self-Conscious and Social Emotions

A Personality and Social Functionalist Account

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In his memoir *Ultramarathon Man: Confessions of an All-Night Runner*, Dean Karnazes (2005) explains how he first became an ultra-long-distance runner, regularly racing 50–100 miles at a clip. Early in his adulthood, Karnazes was an accomplished businessman, using a hard-earned MBA to rise in the ranks of a corporate job. He was successful but dissatisfied. Then, on his 30th birthday, Karnazes had an epiphany. He realized that the life he had been living was not one that allowed him to feel good about his authentic sense of self. To create an identity in which he could feel genuine pride, he needed to make a change. Beginning with a spontaneous 30-mile run out his door that night, Karnazes turned his life around, eventually building a career that now allows him to spend all day (and often all night) running.

What caused this massive behavioral shift? A trait-oriented approach would suggest that Karnazes possesses traits such as conscientiousness and openness, and these stable dispositional tendencies allowed him to make a major change in his life, then persist in what had to be incredibly grueling path. Although such an account provides some understanding of Karnazes's unusual life choices, his behaviors were also shaped

by emotions—and functionalist approaches to emotion suggest that distinct emotions provide the motivational underpinnings of most (if not all) human behaviors. But Karnazes's decision to trade in a promising business career for a life of long-distance running cannot be explained by “basic emotions” such as fear, anger, or happiness. As a successful salesperson, happily married to the love of his life, Karnazes had surely attained the foundational goals that these emotions evolved to help humans achieve: survival and reproduction. Yet somehow this was not enough. In fact, to understand why anyone would *choose* to subject himself to intense pain, frequent boredom, and the risk and uncertainty necessitated by a major postgraduate career change, we need to look beyond the basic emotions and fundamental evolutionary drives humans share with other animals, toward the more cognitively complex, self-relevant, social emotions and the uniquely human drive to build a meaningful identity and sense of self. To understand Karnazes's personality, we need to examine self-conscious emotions, such as pride and shame (Tracy, 2016).

We begin this chapter by explaining what we mean by social and self-conscious emotions, and why these emotions are particu-

larly important to personality research. Next, we broadly review extant research findings on the self-conscious emotions, particularly as they pertain to personality. Several of these emotions have received a great deal of research attention, resulting in a considerable body of knowledge about their psychological experience, nonverbal expression, evolutionary origins, development, and impact on health and well-being. Finally, we provide a briefer overview of research findings on a handful of other social emotions that bear relevance to personality: gratitude, compassion, jealousy, envy, humility, and awe. Throughout the chapter, we highlight important future directions for personality research into all of these emotions.

What Are the Social Emotions, and How Are They Relevant to Personality?

To some extent, all emotions are social, in the sense of functioning to help individuals navigate the social world. Even basic emotions such as fear, anger, and disgust function, in part, to send evolutionarily significant interpersonal messages to social group members, as well as intrapsychic signals to the emotion-experiencing individual about his or her shifting environment and relationships. But some emotions are more purely social, in that they would not exist were it not for humans' intensely social evolutionary history and our unique sense of self. These emotions evolved in humans to help us cope with the tasks that are essential to group living, such as bonding with potential mates, caring for children, establishing group loyalty, following and learning from leaders, and attaining status and influence over others. Although anger, fear, and sadness are instrumental to many of these processes, human societies and cultures have become as complex and highly developed as they are in large part because of our uniquely human social emotions (Tracy, 2020; Tracy, Mercadante, Witkower, & Cheng, 2020; Robins, Tracy, & Trzesniewski, 2008).

Since its inception, emotion research has been at least partially located within the broader field of personality psychology; many of the scholars who founded the contemporary study of affective science in

the 1980s and 1990s were at the time personality or personality-oriented clinical researchers (e.g., Clark, Davidson, Ekman, Levenson, Russell, Tomkins, and Watson). Furthermore, emotions occupy a central position within several more specific approaches traditionally taken to the study of personality. For example, emotions have long been understood as the mechanisms by which human motivation is translated into concrete goal-directed behavior (e.g., McClelland, 1987; Murray, 1938); emotional stability (or neuroticism) is considered a major part of nearly all established trait taxonomies (e.g., John, Chapter 2, this volume), and positive and negative affect are typically viewed as central components of subjective well-being (e.g., Diener & Lucas, 2008).

In the last two decades, personality psychologists have devoted increased attention to the study of distinct emotions, and to the social and self-conscious emotions in particular, often treating these constructs as personality dispositions, emotional pronenesses, or affective tendencies. As a result, the field has begun to accumulate considerable knowledge about how the trait-like tendency to experience emotions such as shame, guilt, pride, gratitude, compassion, jealousy, envy, and humility are related to a range of other personality processes and social behaviors.

What Are the Self-Conscious Emotions?

The primary distinctive characteristic of self-conscious emotions is that their elicitation requires the ability to form stable self-representations (a "me" self), to focus attention on those representations (i.e., to self-reflect, or hold an "I" self; James, 1890), and to put it all together to generate a self-evaluation (Tracy & Robins, 2004a). Complex self-evaluative processes are an important part of both the direct causal processes that elicit self-conscious emotions (i.e., a proximal cause), and the ultimate evolutionary processes through which these emotions became part of the human repertoire (i.e., a distal cause).

At a distal level, self-conscious emotions exist because they motivate individu-

als to protect, defend, and enhance their self-representations, which in turn allows them to maintain their place in their social groups, avoid social rejection, and seek, attain, and maintain social rank (Sedikides & Skowronski, 2000; Tracy & Robins, 2004a). All human societies reveal status differences among individuals that influence patterns of conflict, resource allocation, and mating, and often facilitate coordination on group tasks (Berger, Rosenholtz, & Zelditch, 1980). High-status individuals tend to hold disproportionate influence, while low-status individuals often passively give up these benefits, deferring to higher-status group members. As a result, high status tends to promote greater fitness than low status, and a large body of evidence attests to a strong relation between social rank and fitness or well-being (e.g., Barkow, 1975; Hill, 1984). Self-conscious emotions may have evolved to coordinate and motivate behaviors essential to maintaining and attaining high status, or effectively coping with a drop in status.

At a more proximate level, self-conscious emotions guide individual behavior by compelling people to do things that are socially valued and to avoid doing things that lead to social approbation. We strive to achieve, to be a good person, parent, friend, or partner, because doing so makes us proud of *ourselves*, and failing to do so makes us feel guilty or ashamed of *ourselves*. Society tells us what kind of person we should be; we internalize these beliefs in the form of actual and ideal self-representations, and self-conscious emotions motivate behavioral action toward the goals embodied in these self-representations. Although we might understand cognitively that hard work is valuable, it often takes the psychological force of emotions such as guilt and pride to make us do those things we know are good for us (Tracy & Robins, 2004a; Tracy, 2016). Ultimately, doing these good things is what ensures that we retain our place in society—and advance it.

Pride

One of the most notable aspects of pride is that it is not just one thing; scholars have commented upon pride's dual-faceted nature for over a millennium. Its dark or "sin-

ful" side has been widely cautioned against (see Tracy, Shariff, & Cheng, 2010; Tracy, 2016), while its more positive, prosocial, and achievement-oriented side tends to be just as widely cheered. Correspondingly, researchers have postulated distinct "hubristic" and "authentic" components of the emotion (Tracy & Robins, 2004a, 2007). Several lines of empirical research support this account and suggest that individuals conceptualize and experience pride in terms of two very different categories of feelings (Tracy & Robins, 2007). Authentic pride comprises feelings of accomplishment, productivity, and self-worth, whereas hubristic pride comprises arrogance and conceit. At both the trait and state levels, authentic pride is positively related to the socially desirable and generally adaptive Big Five traits of extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience, whereas hubristic pride is consistently negatively related to the two prosocial traits of agreeableness and conscientiousness. People who tend to feel authentic pride also tend to have high self-esteem, at both explicit and implicit levels, whereas those who tend toward hubristic pride are more likely to have low implicit and explicit self-esteem, and to be prone to shame and vulnerable or dysfunctional (as well as grandiose) forms of narcissism (Tracy & Robins, 2007; Tracy, Cheng, Robins, & Trzesniewski, 2009). Authentic pride is also positively associated with narcissism, but only with the grandiose, "healthy" form, consistent with the suggestion that the distinction between the two prides maps onto the well-noted distinction between genuine self-esteem and narcissism (Tracy, Cheng, Martens, & Robins, 2011).

The pride facets also differ in their associations with a wide range of social behaviors; each seems to underlie a different way of engaging with the social world and approaching one's goals. Individuals high in dispositional authentic pride tend to be low in aggression, hostility, and rejection sensitivity, and high in life satisfaction, relationship satisfaction, dyadic adjustment, and social support, and they report secure attachments to their relationship partners. In contrast, individuals high in dispositional hubristic pride are more likely to engage in aggression, hostility, and other antisocial

misbehaviors (e.g., drug use, petty crimes), and to report lower dyadic adjustment and social support (Tracy, Cheng, et al., 2009). Not surprisingly, the facets are located in different quadrants of the interpersonal circumplex (i.e., the independent dimensions of agency and communion; Kiesler, 1983); although both are linked to high agency, individuals high in communion are prone to authentic pride, whereas those high in hubristic pride are low in communal traits (Cheng, Tracy, & Henrich, 2010). This distinction also plays out in goal striving. Both facets are positively related to an approach orientation, evidenced by high scores on measures of the behavioral activation system and low scores on the behavioral inhibition system, yet individuals high in dispositional authentic pride vigorously engage in their life goals and are able to put failures in perspective, whereas those high in dispositional hubristic pride tend to set unrealistic goals for fame and success, and self-servingly interpret any positive event as indicative of their own greatness (Carver, Sinclair, & Johnson, 2010).

Shame and Guilt

When former Senator Bob Kerrey publicly acknowledged that he had ordered soldiers to murder innocent civilians during the Vietnam War, he told a reporter, “It’s far more than guilt. It’s the shame. You can never, can never get away from it. It darkens your day” (Vistica, 2001). Kerrey chose his words carefully, emphasizing a distinction between two seemingly similar self-conscious emotions. Despite the traditional view that guilt and shame “are one and the same affect” (Tomkins, 1963, p. 133), a large body of research is more consistent with Kerrey’s conceptualization. Shame is an acutely painful emotion that is typically accompanied by a sense of smallness, worthlessness, and powerlessness. Shamed people tend to feel exposed, and to want to hide or escape in response. Guilt, in contrast, tends to be a less painful experience, largely because the object of condemnation is a specific behavior the individual committed rather than his or her entire self-concept. Guilt is typically accompanied by feelings of tension, remorse, and regret, which can preoccupy the individual

and motivate reparation or apology (Tangney & Tracy, 2012).

Supporting this distinction, guilt has been linked to numerous prosocial reparative behaviors, whereas shame has been linked to hiding and social withdrawal, as well as a range of more problematic psychological and social consequences (Baumeister, Stillwell, & Heatherton, 1994; Randles & Tracy, 2013; Tangney & Dearing, 2002). Yet there are few antecedent events that uniquely elicit either shame or guilt (Keltner & Buswell, 1996), suggesting that it is not the event *per se* that determines which emotion is experienced, but rather how that event is appraised. Individuals tend to experience guilt when they focus on negative aspects of their behavior—the “*thing* done or undone”—but shame when they focus on negative aspects of themselves—the *self* who did or did not do it (H. B. Lewis, 1971, p. 30; M. Lewis, 2000; Tangney & Dearing, 2002). For example, individuals who blame poor performance on ability (e.g., “I’m dumb”) tend to respond with shame, whereas those who blame effort (e.g., “I didn’t study for the exam”) tend to respond with guilt (Brown & Weiner, 1984; Russell & McAuley, 1986; Tracy & Robins, 2006).

Together, these studies suggest that guilt may be an adaptive response to failures or transgressions that can be avoided in the future; experiencing an emotion that motivates apology and reparation is a functional way to cope with unstable or controllable negative events. In contrast, shame may be an equally adaptive response to failures that cannot be prevented; in such cases, withdrawal and avoidance may be the best approach. Consistent with this account, proneness to guilt is linked to prosocial tendencies such as empathy and perspective taking, whereas shame focuses individuals’ attention inward, preventing empathy or care for others (Leith & Baumeister, 1998; Stuewig, Tangney, Heigel, Harty, & McCloskey, 2010). Shame-prone individuals instead demonstrate bouts of anger and aggression; although these outward-directed emotions seem antithetical to shame’s self-blaming focus, individuals may regulate painful shame feelings by externalizing blame and directing their negative self-oriented feelings outward (Tangney, Wagner, Fletcher, &

Gramzow, 1992; Tracy & Robins, 2004a; 2006).

However, several researchers have raised questions about this fairly straightforward view of shame as bad and guilt as good. These authors note that many studies demonstrating this pattern of effects rely on measures that operationally define shame in terms of withdrawal and maladaptive coping, and guilt in terms of proactive coping (e.g., the Test of Self-Conscious Affect [TOSCA]; Tagney & Dearing, 2002). The TOSCA further isolates the maladaptive side of shame and the adaptive side of guilt by examining partial correlations between shame or guilt and dependent measures while controlling for the other emotion (e.g., examining a partial correlation between shame and aggression while controlling for guilt), a tactic that captures guilt-free shame and shame-free guilt but precludes the possibility of finding that both shame and guilt—and, importantly, the shared variance between the two—might have both adaptive and maladaptive outcomes. In contrast, several researchers using measures other than the TOSCA have observed positive effects of both emotions; for example, when assessed as single-adjective items, both emotions have been associated with a desire to make amends and change the self (e.g., Leach & Cidam, 2015; Lickel, Kushlev, Savalei, Matta, & Schmadder, 2014; Tignor & Colvin, 2017).

Taken together, these studies suggest that the correlates of shame and guilt largely depend on how these emotions are measured. Both the TOSCA and single-item approaches have limitations, and one important future direction is to develop measures that (1) capture behavioral tendencies, cognitions, and feelings without relying on the often-confused single words; (2) allow for the possibility of shared variance between the two emotions; and (3) avoid inherently embedding prosocial and antisocial content into the measure itself, thus conflating presumed definitions of these emotions with their outcomes. One potentially promising measure is the scenario-based Guilt and Shame Prone-ness (GASP) scale, which include separate subscales capturing the tendency toward negative self-evaluations, negative behavior evaluations, repair action tendencies, and withdrawal action tendencies (Cohen, Wolf,

Panther, & Insko, 2011). Although these researchers labeled the negative behavior evaluation and repair action tendencies scale as “guilt,” and the negative self-evaluation and withdrawal action tendencies scale as “shame,” their primary aim was to allow for tests of independent effects of each of these components; future iterations might consider removing the “shame” and “guilt” labels altogether. For a more detailed discussion and review of available measures of shame and guilt, as well as other self-conscious emotions, see Robins, Nofhle, and Tracy (2007).

Embarrassment

Embarrassment is typically considered a less intense or prolonged emotional experience than shame or guilt; it is also less likely to occur in response to moral wrongdoings or transgressions that harm others, compared to generally harmless mishaps that expose the individual (Tangney, Miller, Flicker, & Barlow, 1996). In fact, embarrassment’s most defining characteristic is that it involves public exposure or negative evaluations by others (Miller & Leary, 1992; Semin & Manstead, 1982). Miller (1996) found that the most common causes of embarrassment are situations in which the individual behaved in a clumsy or hapless way while others were watching. More sociologically oriented theorists subscribe to a “dramaturgic” account, in which embarrassment is the result of a social role or social script disruption (Goffman, 1956; Silver, Sabini, & Parrott, 1987). In all these cases, embarrassment seems to be functional by virtue of motivating individuals to behave in appeasing or conciliatory ways that might re-earn approval and inclusion (Cupach & Metts, 1992; Leary, Landel, & Patton, 1996). Personality studies indicate that there are individual differences in proneness to embarrassment (Modigliani, 1968); those high in this dimension tend to be high in neuroticism, negative affect, self-consciousness, fear of negative evaluations, and shyness (Edelmann & McCusker, 1986; Leary & Meadows, 1991; Miller, 1995), which may be the result of high sensitivity to social norms (Miller, 1996). Personality differences can also affect the onset of embarrassment; Hofmann, Moscovitch, and Kim (2006) found that shy individuals showed

heightened physiological responses indicative of embarrassment (i.e., blushing) following an embarrassing situation.

Are Self-Conscious Emotions Evolved?

Most theoretical accounts of self-conscious emotions view these states as evolved responses to the environment, which function to send important messages about one's social worth and status to the individual experiencing the emotion and to others, typically through a distinct nonverbal display (e.g., Keltner & Buswell, 1997; Tracy, 2016; Tracy & Robins, 2004a). Indeed, one of the most prominent "gold standard" criteria to determine whether a particular emotion is likely to be evolved is whether it has a distinct, cross-culturally recognized nonverbal expression. Although pride and shame were not included in the pantheon of emotions originally thought to meet this criterion, in recent years, evidence has emerged for cross-cultural, reliably recognized expressions of both. The prototypical pride expression includes both the body (i.e., expanded posture, head tilted slightly back, arms akimbo with hands on hips or raised above the head with hands in fists) and the face (i.e., small smile; Tracy & Robins, 2004b), and is reliably recognized and distinguished from similar emotions by individuals across cultures, including several highly isolated, largely preliterate, traditional small-scale societies (Tracy & Robins, 2008; Tracy, Shariff, Zhao, & Henrich, 2013). In educated North American samples, pride-recognition rates are comparable to rates found for most basic emotions (e.g., anger, sadness).

Importantly, the recognizable pride expression is also spontaneously *displayed* in pride-eliciting situations, by successful children as young as 3 years old (Lewis, Alesandri, & Sullivan, 1992; Stipek, Recchia, & McClintic, 1992), high school students who have performed well on a class exam (Weisfeld & Beresford, 1982), and victorious adult Olympic athletes from countries all over the world, as well as congenitally blind athletes across cultures, who could not have learned to display pride through visual modeling (Tracy & Matsumoto, 2008). Together, these findings suggest that the pride expression is likely to be a human univer-

sal, and even an innate behavioral response to success. It is unlikely that the expression would (1) be recognized so consistently and robustly, (2) by individuals who could not have learned it through cross-cultural transmission (e.g., films, magazines), or (3) be reliably and spontaneously displayed in pride-eliciting situations by individuals who have never seen others display it, if it were not a basic part of human nature.

Shame is also associated with a recognizable nonverbal expression that comprises essentially the opposite set of behaviors as pride: head tilted downward and lowered eye gaze, along with slumped posture (Izard, 1971; Keltner, 1995; Tracy, Robins, & Schriber, 2009). The shame expression can be reliably distinguished from similar emotions, such as embarrassment and sadness (Keltner, 1995). Shame-recognition rates in North American samples are typically lower than those observed for pride, but not substantially lower than rates often found for certain basic emotions, such as fear (Haidt & Keltner, 1999; Keltner, 1995; Tracy, Robins, et al., 2009).

Shame-recognition rates are considerably lower in non-Western cultures (e.g., Chung & Robins, 2015), but significantly-greater-than-chance recognition was observed in the same two traditional small-scale societies in which pride recognition was examined, providing evidence for universality (Tracy & Robins, 2008; Tracy et al., 2013). In addition, the recognizable shame expression is spontaneously displayed in the shame-eliciting situation of failure. Head tilt downward and slumped posture or narrowed shoulders have been documented in response to failure or loss of a fight in children as young as 2.5–3 years old (Lewis et al., 1992; Stipek et al., 1992), older children ages 3–10 (Strayer & Strayer, 1976), high-school students (Weisfeld & Beresford, 1982), and adult Olympic athletes from a wide range of countries (Tracy & Matsumoto, 2008). Interestingly, these athletes reliably narrowed their chests and slumped their shoulders in response to defeat only if they were from countries *outside* of North America and Western Europe. This cultural difference—an absence of failure-based shame displays by individuals from the most individualistic and self-expression-valuing Western

nations—is consistent with the strong devaluation of shame in these cultures (Tangney & Dearing, 2002). The finding that congenitally blind athletes across cultures, including several from Western nations, *did* reliably display shame in response to loss in this research suggests that the observed cultural difference in sighted athletes is likely to be a result of display suppression—sighted individuals from cultures in which shame is devalued inhibiting the expression in accordance with local cultural norms (Tracy & Matsumoto, 2008).

Researchers have failed to find a distinct nonverbal expression for guilt (Haidt & Keltner, 1999), which may mean that shame is *the* evolved negative self-conscious emotion and guilt is a highly cognized version that exists in many but not all cultures. Alternatively, guilt might be an evolved emotion that is simply not associated with a distinct nonverbal expression. In contrast, embarrassment is associated with a distinct nonverbal display, which includes head tilted down and to the side, a controlled smile, and movement of the hand to touch the face (Keltner, 1995). In North American samples, this display is recognized at rates comparable to—and often better than—those found for shame (Tracy, Robins, et al., 2009). Keltner (1995) uncovered this display by coding videos of participants experimentally manipulated to feel embarrassed, suggesting that the recognizable display is in fact shown during experiences of the emotion.

Few studies have tested whether the embarrassment expression generalizes across cultures, but Haidt and Keltner (1999) found that villagers in Orissa, a relatively underdeveloped Indian state, identified the embarrassment display as *lajya*, a term that conveys both shame and embarrassment. Individuals in this sample also described the situations that elicit *lajya* in similar terms as Americans use for embarrassment, such as self-exposure, being praised in front of others. Although they used the same word to refer to shame situations (“doing something wrong”), they made a distinction between the *lajya* a person feels in one situation versus the other. These results suggest that the distinction between embarrassment and shame may generalize across cultures that do not have distinct words for the two

emotions—in much the same way as Americans use the word *pride* to refer to both hubristic and authentic pride. Together, the accumulated evidence suggests that pride, shame, and possibly embarrassment are associated with nonverbal displays that may be universal, consistent with evolutionary accounts of these emotions.

The Adaptive Functions of Self-Conscious Emotions

A growing body of research suggests that pride functions to motivate status-seeking efforts and help individuals communicate to others their increased deservedness of status (Tracy et al., 2010). Pride arises in response to achievements that are likely to promote high status (Tracy & Matsumoto, 2008; Weidman, Tracy, & Elliot, 2016), individuals intuitively assume that people who feel pride hold high status (Tiedens, Ellsworth, & Mesquita, 2000), and individuals induced to feel pride tend to engage in high-status behaviors and be perceived by others as dominant (Williams & DeSteno, 2009). In addition, pride experiences and the desire to attain these experiences, motivate achievement, perseverance, and positive behavioral change in status-relevant domains (Verbeke, Belschak, & Bagozzi, 2004; Williams & DeSteno, 2008; Weidman et al., 2016). Consequent achievements are in turn rewarded with social approval and high status.

It thus seems self-evident that pride functions to promote status, but this conclusion is complicated by the strong evidence that pride is not a singular experience. Although authentic pride is linked to achievement, hubristic pride tends to be a weaker response to success (Tracy & Robins, 2007; Weidman et al., 2016). Furthermore, given the notably negative personality correlates of hubristic pride, it is not immediately obvious how this form of the emotion might be adaptive. However, there is evidence to suggest that both facets ultimately promote increased social influence, but via different avenues. Whereas authentic pride may be ideally suited to promoting a *prestige*-based status, hubristic pride may be functional by promoting *dominance*.

This distinction comes from Henrich and Gil-White (2001), who differentiated be-

tween individuals who attain social rank by inducing fear, typically through intimidation and coercion (dominance), and individuals who attain rank by demonstrating skills or expertise, and earning respect and willing deference on this basis (prestige). Empirical studies suggest that both dominance and prestige are effective means of increasing one's status; each strategy leads to the acquisition of power and influence over one's group (Cheng, Tracy, Foulsham, Kingstone, & Henrich, 2013). Hubristic and authentic pride may therefore have separately evolved as the affective mechanisms that, respectively, underpin each of these systems (Cheng et al., 2010; Tracy et al., 2010). More specifically, hubristic pride may facilitate the attainment of dominance by motivating individuals to behave in an aggressive and intimidating manner, and providing a sense of grandiosity and entitlement that allows them to take power rather than earn it, and to feel little empathy for those who get in the way (Ashton-James & Tracy, 2012; Tracy, Cheng, et al., 2009).

In contrast, authentic pride may facilitate the attainment of prestige by motivating creativity, accomplishments, and other indicators of competence, and providing individuals with feelings of genuine self-confidence that allow them to comfortably demonstrate both social attractiveness and generosity (Cheng et al., 2010; Damian & Robins, 2013; Weidman et al., 2016). Furthermore, to retain subordinates' respect, prestigious individuals must avoid succumbing to feelings of power and superiority, and authentic pride may allow these individuals to acknowledge their own achievements while maintaining humility and helping others (Ashton-James & Tracy, 2012; Tracy, Cheng, et al., 2009; Tracy & Robins, 2007; Weidman, Cheng, & Tracy, 2018). Several studies provide more direct evidence for these theorized associations (Cheng et al., 2010). Individuals prone to authentic pride were found to rate themselves as highly prestigious, whereas those prone to hubristic pride rated themselves as more dominant. This pattern was replicated using peer ratings of dominance and prestige; varsity athletes high in dispositional authentic pride were viewed as prestigious (but not dominant) by their teammates, whereas those high in dispositional hubristic pride

were viewed as dominant (but not prestigious).

The pride nonverbal expression also appears to serve an adaptive function; a large body of evidence suggests that pride displays send rapidly and automatically perceived messages of high status to other group members (Shariff & Tracy, 2009; Shariff, Tracy, & Markusoff, 2012). The status signaling property of these displays generalizes across cultures, including a small-scale traditional society on Fiji's outer islands (Tracy et al., 2013), suggesting that the expression may be an evolved status signal. Furthermore, given how widely and reliably recognized the pride expression is, perceiving pride in others may have adaptive benefits for both observers and expressers (Martens, Tracy, & Shariff, 2012). Studies supporting this account indicate that observers use others' pride displays to determine which group members are likely to possess knowledge or expertise that should be copied (Martens & Tracy, 2013).

Turning to shame, its functionality may be akin to that of physical pain, which is aversive but adaptive by virtue of promoting injury avoidance. Shame experiences may have evolved as a kind of alarm system, warning individuals that a drop in social rank is imminent, and they should change their behavior or depart from the situation to avoid the consequences. Consistent with this argument, shame responses to social transgressions have been documented among members of a small-scale traditional fishing village, suggesting that the propensity to feel shame in response to a deviation from culturally normative behavior may be a human universal (Fessler, 2004). Another supportive study revealed that individuals contribute more generously to a public good if they are threatened with being shamed for selfish behavior (Jacquet, Hauert, Traulsen, & Milinski, 2011).

Shame may also be adaptive by virtue of motivating individuals to engage in appeasement behaviors that demonstrate their increased trustworthiness or conformity to group norms, thereby reducing the likelihood of punishment in response to transgressions (Fessler, 2007; Gilbert, 1998). In a study testing this account, Giner-Sorolla, Castano, Espinosa, and Brown (2008) asked participants to read hypothetical scenarios

about a CEO who apologized for a negative ecological incident caused by his company. Participants who learned that the CEO verbally expressed feelings of shame while apologizing were more satisfied than those who learned that he communicated guilt or no emotion. Similarly, individuals apply weaker penalties to fictitious sex offenders who are described as feeling ashamed than to offenders described as feeling sad and remorseful, or no emotion (Proeve & Howells, 2006). Correspondingly, although the shame non-verbal display is automatically perceived as low status (Shariff & Tracy, 2009), a communication that is likely to *reduce* the expresser's fitness, showing the display in response to a transgression may benefit expressers by appeasing onlookers (Keltner & Buswell, 1997). Indeed, the shame expression may have evolved as a social signal that functions to inform group members of (1) a transgressing individual's awareness that social norms have been violated, and (2) his or her respect for those norms (Gilbert, 1998). Supporting this account, Keltner, Young, and Buswell (1997) found that participants were more sympathetic toward hypothetical students who failed a class presentation, and more forgiving of hypothetical criminals, when those individuals were said to display shame.

Although studies highlighting shame's more problematic social consequences (e.g., anger, aggression, social avoidance) raise questions for this account of shame as adaptive, in many cases these negative behaviors result from a tendency, among individuals from Western cultures in particular, to try to avoid or otherwise regulate experiences of shame, often by externalizing blame (Tangney, Wagner, Hill-Barlow, Marschall, & Gramzow, 1996; Tracy & Robins, 2004a). It is therefore possible that shame experiences and nonverbal expressions are evolutionarily adaptive but humans' desire to counteract, suppress, and avoid the emotion is problematic.

In contrast to shame, guilt is more clearly functional, as it motivates individuals to engage in prosocial, reparative behaviors following transgressions, and to take responsibility for their actions, all of which can enhance interpersonal relationships (Tangney & Dearing, 2002). In a personal-

ity context, these functional responses are consistent with behaviors typical of highly conscientious individuals, who tend to obey social norms and demonstrate responsibility and accountability toward others (Roberts, Chernyshenko, Stark, & Goldberg, 2005). In fact, studies have found that conscientious people tend to be high in proneness to guilt—a dimension associated with adaptive responding to transgressions (Fayard, Roberts, Robins, & Watson, 2012)—yet low in proneness to shame, the much more maladaptive propensity (e.g., Fee & Tangney, 2002).

Development of Self-Conscious Emotions

Self-conscious emotions are first experienced later in the course of development than more basic emotions: typically around 2.5 to 3 years of age for pride and shame (M. Lewis et al., 1992; Stipek et al., 1992). These findings are based on studies that present young children with a challenging task and compare their behavioral and verbal responses after successful completion versus failure. Behavioral components of the pride expression and verbal indicators of pride tend to be shown by children at 2.5 to 3 years of age but not earlier, and not in shame-inducing (i.e., failure) situations. Correspondingly, by age 3, children tend to respond to failure situations by showing shame behaviors such as tilting down their heads or covering their faces with their hands (Belsky, Domitrovich, & Crnic, 1997).

In contrast, embarrassment has been identified in children somewhat earlier—at age 2 and younger—and to be correlated with mirror self-recognition (M. Lewis, Sullivan, Stanger, & Weiss, 1989). On the basis of this finding, these authors argued that embarrassment emerges prior to shame and pride, perhaps because it requires only an ability to be self-aware (and no subsequent attributions or appraisals), and therefore belongs within a cognitively simpler class of self-conscious emotions. Similarly, Izard and colleagues (2001) included shame, guilt, and pride, but not embarrassment, within the category of cognition-dependent self-conscious emotions.

The capacity to understand pride emerges somewhat later than its (assumed) experi-

ence. The earliest emerging form of understanding is the ability to recognize the pride nonverbal expression, which first appears when children reach age 4 (Tracy, Robins, & Lagattuta, 2005)—the same age at which they begin to show accurate recognition of most other expressions. In contrast, the ability to understand the situations and contexts in which pride is elicited seems to develop considerably later. Seven-year-olds have difficulty understanding that pride should be attributed to individuals whose success is due to internal but not external factors (P. Harris, Olthof, Terwogt, & Hardman, 1987). However, by age 9 or 10, children can make the appropriate attributional distinctions and grant pride only to individuals who are the cause of their own success (Kornilaki & Chloverakis, 2004). Although research into the development of children's understanding of other self-conscious emotions has been scarce, the period from ages 4 to 8 seems to be critical; in one study, Chobhthaigh and Wilson (2015) found that 7- to 8-year-olds could independently predict when another individual would feel embarrassment based on that person's past experience, whereas 6- to 7-year-olds needed substantial prompting to make this connection, and 4- to 5-year-olds could not make it at all.

Using a cross-sectional approach with a very large sample, Orth, Robins, and Soto (2010) delineated a portrait of normative developmental shifts in trait levels of shame, guilt, and authentic and hubristic pride across the lifespan. Authentic pride increased fairly continuously from adolescence to old age, in a trend that paralleled overall well-being. In contrast, hubristic pride peaked in adolescence and young adulthood, declined throughout the rest of adulthood until about age 65, and was stable in old age. Guilt and shame also showed somewhat opposing patterns; guilt increased steadily from adolescence through age 70, before hitting a plateau, whereas shame showed a steady decrease from adolescence through age 50, followed by a steady *increase* of equal magnitude through old age. These findings suggest that self-conscious emotional development generally follows the maturity principle of personality development (e.g., Roberts, Wood, & Caspi, 2008), wherein maturing social roles facilitate the

experience and expression of socially and intrapsychically adaptive emotions and traits. However, longitudinal studies are needed to ensure that the observed age differences in self-conscious emotions are not due to cohort differences.

Biological Correlates and Consequences for Health

Evolutionary accounts suggest that distinct emotions orchestrate coordinated suites of biological and physiological responses to environmentally significant events that have recurred throughout human history (e.g., Beall & Tracy, 2017). Given evidence for evolutionary origins of both pride and shame, these two emotions are likely to be associated with biological and physiological reactions that facilitate their respective adaptive goals. In fact, several studies have documented associations between shame and increases in cortisol and proinflammatory cytokines (Dickerson, Mycek, & Zaldivar, 2008; Dickerson, Kemeny, Aziz, Kim, & Fahey, 2004), which might facilitate behaviors such as submission and withdrawal (Dickerson, Gruenewald, & Kemeny, 2009). Pride, in contrast, may be associated with hormonal responses such as increased testosterone, which could facilitate gaining social rank (see Tracy et al., 2010). However, research on the biological correlates of these emotions is in its infancy, and much more work is needed to test whether shame and pride—along with guilt and embarrassment—are associated with distinct physiological or neurological markers, and how these responses might relate to status-seeking, appeasement, and deference behaviors.

Numerous studies have, however, examined the impact of shame and guilt on mental health. Perhaps not surprisingly given the clear distinction between these two emotions in prosocial versus antisocial outcomes, they show highly divergent relations with various psychological disorders and symptoms. Those who are prone to shame are also prone to depression, anxiety, low self-esteem, suicidal behavior and self-injury, and substance abuse (see Tangney & Tracy, 2012, for a review). In fact, clinicians

have long argued that feelings of shame lie at the core of numerous addictions, especially alcoholism (e.g., Dearing, Stuewig, & Tangney, 2005). Alcohol consumption can provide a means of escaping painful feelings of shame by reducing self-awareness, so alcoholics may drink to avoid shame, then, in a vicious cycle, come to feel even more shame about their addiction. Supporting this account, in one longitudinal study, Randles and Tracy (2013) found that the degree to which recovering alcoholics display expressions of shame while discussing their past drinking substantially predicts subsequent declines in their physical and mental health, as well as their likelihood of relapsing and the severity of that relapse, up to 4 months later.

Turning to guilt, less consensus exists regarding its implications for psychopathology. Clinical theory and case studies make frequent reference to a maladaptive guilt characterized by chronic self-blame and rumination (e.g., Zahn-Waxler, Kochanska, Krupnick, & McKnew, 1990), but these views are inconsistent with the large body of work suggesting that guilt motivates prosocial approach-oriented behaviors. Tangney and Dearing (2002) reconciled these accounts by arguing that studies demonstrating negative outcomes generally fail to control for shared variance with shame, and it is the latter emotion that is the cause of psychological dysfunction. For example, in a meta-analysis, Kim, Thibodeau, and Jorgensen (2011) found that shame is more strongly and consistently associated with depression than is guilt (mean weighted effect size r 's = .43 and .28, respectively), and guilt controlling for shame (i.e., "shame-free guilt") was unrelated to depression ($r = -.03$).

Only one study has examined correlations between dispositional tendencies toward the two facets of pride and psychopathology; results suggest a generally healthy portrait for those prone to authentic pride, and a much less healthy one for those prone to hubristic pride. Most notably, authentic pride is negatively, and hubristic pride is positively, associated with narcissistic personality disorder, dissociative tendencies, social phobia, and trait anxiety (Tracy, Cheng, et al., 2009). Additional studies are needed to examine

the extent to which the different forms of pride are causally related to these divergent mental health profiles.

Other Social Emotions

In the past two decades, emotion and personality researchers have begun to examine a wider range of social emotions, beyond the self-conscious emotions that previously pervaded the nonbasic emotion research literature. One unifying theme is that these other emotions are almost always inherently social, arising on the basis of actual or potential interactions among people, or in response to a social comparison. This is an important distinction from self-conscious emotions, which can (and often do) occur in response to social events but are more intrinsically about the self, and can occur when individuals evaluate themselves without regard to others. These other social emotions are nonetheless similar to self-conscious emotions in that most are thought to serve adaptive functions, though evidence for their evolutionary origins is generally much weaker than that for pride and shame. Here, we provide a brief overview of extant research on six social emotions, with an emphasis on findings from or relevant to personality psychology.

Gratitude

Gratitude arises when an individual believes that he or she has benefited from another person's action, and can motivate the individual to engage in tedious tasks that are helpful to a benefactor, and to donate more of his or her personal profit to a communal pot (e.g., Bartlett & DeSteno, 2006). Gratitude also prompts altruistic behaviors toward one's romantic partner, which in turn helps bind the two individuals together, thereby enhancing relationship quality (e.g., Algoe, 2012). At a dispositional level, trait gratitude is positively linked to life satisfaction, optimism, and positive affect (McCullough, Emmons, & Tsang, 2002), and negatively to a range of psychopathologies, including depression, anxiety disorders, and posttraumatic stress disorder (Wood, Froh, & Geraghty, 2010).

The beneficial effects of the emotion may be particularly pronounced for older adults, who tend to experience greater gratitude as a result of viewing their remaining time as limited (Allemand & Hill, 2016). However, other studies suggest that a grateful disposition can be cultivated by anyone, and interventions designed to boost dispositional gratitude have shown promise for increasing health and well-being. In a seminal study, Emmons and McCullough (2003) found that individuals assigned to a gratitude intervention scored higher on several self- and spouse-reported measures of well-being and mental health compared to individuals in a control condition that required listing daily hassles. Subsequent interventions have also proven effective, but these studies often fail to employ rigorous double-blind designs with true neutral control groups, making this an important area for future work (Wood et al., 2010).

Compassion

Compassion arises in response to witnessing someone suffering or in need, and motivates a desire to help that individual (Goetz, Keltner, & Simon-Thomas, 2010; Lim & DeSteno, 2016). It is a broad emotional experience that encompasses narrower feelings of empathic concern, sympathy, and tenderness, each of which is often conceptualized and measured in a similar manner (e.g., Batson, Fultz, & Schoenrade, 1987; Eisenberg et al., 1994). Compassion also increases one's sense of connection and identification with others, particularly others who are relatively weak or vulnerable (Oveis, Horberg, & Keltner, 2010). At a physiological level, compassion has been shown to increase cardiac vagal tone activity, a marker of the parasympathetic nervous system that is known to promote affiliative behaviors (Stellar, Cohen, Oveis, & Keltner, 2015).

Based on these findings, some have argued that the primary adaptive function of compassion is to promote care for needy offspring, thereby enhancing inclusive fitness (Goetz et al., 2010). In fact, Buckels and colleagues (2015) found that individual differences in parental motivation are positively related to momentary feelings of compassion when imagining caregiving for infants and children.¹

Jealousy

Jealousy involves a concern about losing something valuable, particularly to a rival and within the context of a romantic relationship. It is a complex emotional experience that includes feelings of sadness, suspicion, betrayal, threat, and vengeance (Parrott & Smith, 1993). Jealousy has been conceptualized as a psychological adaptation that functions to inform a person that his or her relationship is in danger and to motivate behaviors that guard against this threat and reduce unnecessary or inefficient expenditures of mating or parenting resources (Buss & Haselton, 2005). Evolutionary logic further posits that men must contend with paternity uncertainty, making a partner's sexual infidelity a risk factor for wasted parenting resources, whereas women rely on their partners' investment of resources and child care, making emotional infidelity a larger risk factor. Supporting this account, studies across cultures have demonstrated that men report greater jealousy, and show increased physiological reactivity to thoughts of sexual infidelity than emotional infidelity, and women show the opposite (see Buss & Haselton, 2005, for a review).

This theory has, however, attracted criticism from multiple angles. For example, some have noted that supportive studies rely exclusively on forced-choice measures that require participants to choose which form of infidelity (sexual or emotional) would upset them more; when continuous measures are used and a wider range of feelings linked to jealousy assessed, both men and women report greater jealousy at the thought of sexual than emotional infidelity (DeSteno, Bartlett, Braverman, & Salovey, 2002). In addition, others have argued and have found that men show elevated physiological arousal when thinking about sexual material, regardless of whether it is about a partner's infidelity compared to when thinking about emotional content; this difference is less consistent in women (C. Harris, 2000). Together, these findings support the notion that jealousy may be a universal emotional state arising from the cognitive appraisal that a rival is threatening a valued aspect of one's relationship, and sexual infidelity may represent a

more severe threat than emotional infidelity across genders.

Envy

Whereas jealousy arises primarily in relationship contexts, envy is a broader feeling that can arise with any upward social comparison that results in an individual's belief that he or she lacks a desired personal attribute compared to the superior individual (Parrott & Smith, 1993). An early influential definition of *dispositional envy* emphasized feelings of inadequacy, injustice, and frustration, along with resentment toward the superior person; individuals who reported high dispositional envy tended to be low in self-esteem and life satisfaction, and high in neuroticism (Smith, Parrot, Diener, Hoyle, & Kim, 1999). In recent years, researchers have embraced a more nuanced formulation, in which the construct consists of two distinct emotional experiences, both elicited by upward social comparisons (van de Ven, Zeelenberg, & Pieters, 2009). First, *benign envy* involves positive feelings of admiration toward a superior individual and a desire to affiliate with this person, as well as the motivation to improve one's own standing on the desired attribute. In contrast, *malicious envy* involves feelings of frustration and injustice regarding one's inferiority, as well as a desire to harm, degrade, or otherwise impede the superior individual in the hope that he or she will lose the desired attribute or status.

Both benign and malicious envy may function to help individuals recoup a sense of relative status. Consistent with the notion that benign envy is linked to behaviors oriented toward improving one's own status relative to others, whereas malicious envy is linked to bringing others down to one's own level, adults training for a marathon showed improved race performance to the extent that they felt benign envy, and this relation was mediated by a tendency to set challenging race goals; in contrast, malicious envy was not related to performance (Lange & Crusius, 2015a). In another set of studies, individuals who witnessed another person's achievement felt benign envy if the other person conveyed authentic pride (indicating a hard-earned and status boosting success),

but malicious envy if the other person conveyed hubristic pride (indicating false bravado and arrogance). These distinct feelings were in turn functional; after losing to the proud individual in one round of a cognitive competition, participants who felt benign envy persisted more in a subsequent round, whereas those who felt malicious envy assigned their competitor more difficult problems (Lange & Crusius, 2015b).

Humility

Of all the social emotions, humility holds perhaps the most clear-cut place in personality psychology, because it has typically been conceptualized as a disposition, virtue, or character strength (e.g., Peterson & Seligman, 2004). Much like envy, existing models suggest that humility arises from an evaluation of one's own standing on a desirable personal attribute; yet, unlike envy—which includes a judgmental focus on a personal weakness—humility involves accurate but nonjudgmental perceptions of either positive or negative personal attributes, as well as an awareness or appreciation of desirable attributes in other individuals (Chancellor & Lyubomirsky, 2013). Consistent with this emphasis on accurate self-knowledge, Davis and colleagues (2011) conceptualized humility as a judgment made about others who possess an accurate view of their own abilities and a lack of any desire to self-enhance; these two traits in turn positively predicted judgments of an individual's standing on the honesty–humility factor of the HEXACO (honesty–humility, emotionality, extraversion, agreeableness, conscientiousness, openness to experience) model of personality.

A more recent model has, however, added an important layer of nuance to this overtly positive and socially desirable conceptualization. Drawing on historical accounts from philosophical and religious texts, as well as etymological and dictionary definitions, across a series of correlational and experimental studies, we found that both momentary and dispositional experiences of humility are characterized by two distinct factors, one representing “appreciative humility” and characterized by feelings such as *kind*, *graceful*, *connected*, and *understand-*

ing, and the other representing “self-abasing humility” and characterized by feelings such as *unimportant*, *shameful*, *worthless*, and *meek* (Weidman et al., 2018). Appreciative humility—which mirrors previous positive conceptualizations—tends to follow personal successes and involve action tendencies oriented toward celebrating others, and is linked to emotional and personality dispositions that underlie achievement, such as authentic pride and prestige-based status. In contrast, self-abasing humility more often follows personal failures and involves negative self-evaluative cognitions and action tendencies oriented toward hiding from others’ evaluations, and is linked to dispositions that underlie failure and withdrawal, such as low self-esteem and submissiveness. These two dimensions also emerged in conceptualizations of humility made by academic experts (i.e., editors of top-ranked philosophy and theology journals).

One important future direction is to further elucidate the functional consequences of both sides of this complex social emotion. Based on the known correlates, appreciative humility may help individuals attain prestige by demonstrating that despite their competence, they are prosocial group members who deserve admiration rather than envy. In contrast, self-abasing humility may function to signal one’s awareness of a failure or decline in status; one important question is therefore the extent to which this side of humility is distinct from shame.

Conclusion

The self-conscious and social emotions are central to personality functioning; they guide and shape many everyday social behaviors, interactions, and relationships. There is also evidence to suggest that these emotions serve important social functions and, at least in several cases, they evolved in humans to do so. The evolutionary evidence is much stronger for pride and shame compared to the other social emotions, but this may well be a result of the relatively greater research attention that self-conscious emotions have received. One important future direction is therefore continued research attention to the other social emotions; studies

are needed to examine these emotions in the same way that self-conscious emotions have been studied: in terms of their possible non-verbal displays, cross-cultural generalizability, lifespan development, and physiological correlates and impact on health. Nonetheless, as this is the first edition of the *Handbook of Personality* to include a chapter on self-conscious and social emotions, it is clear that great strides have been made, and we hope this review helps direct the next steps in these endeavors.

NOTE

1. Although Buckels and colleagues (2015) labeled this emotion “tenderness,” it was defined in the same manner as previous conceptualizations of compassion, and was measured with the word *compassion*.

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CHAPTER 24

Emotion Regulation

Basic Processes and Individual Differences

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Over the past two decades, there has been a dramatic increase in research on how we manage our emotions and what implications these management efforts have for our well-being (Gross, 2015). Much of this work has taken an experimental approach, manipulating emotion regulation in the laboratory, then documenting its effects on emotion, cognition, physiology, or social interactions (e.g., Butler et al., 2003; Gross, 1998a; Richards & Gross, 2000). More recently, researchers have begun to explore how contextual features (e.g., intensity of the emotional stimulus) impact momentary emotion regulation efforts (e.g., Sheppes et al., 2014).

However, emotion regulation can also be examined at the trait level. There are systematic individual differences in various aspects of emotion regulation, such as one's goals, beliefs, and strategy preferences. These emotion regulation patterns predict important outcomes across a range of domains (e.g., psychological well-being, social functioning; Chervonsky & Hunt, 2017; Gross & John, 2003). Past work has also documented links between emotion regulation processes and other aspects of personality (e.g., attachment, the Big Five; Laan, van Assen, & Vingerhoets, 2012; Gross & John, 2003).

In this chapter, we provide a basic framework for organizing findings on emotion regulation that would be of interest to personality researchers. We begin with a conceptual overview of emotion regulation and the process model (Gross, 1998b, 2015), a guiding framework for our discussion. Then we outline various important types of trait-level emotion regulation, and end by delineating some fruitful current and future directions for research.

Basic Processes

Despite its sense of familiarity, emotion has been difficult for researchers to characterize. A major source of the difficulty here is that the term *emotion* has fuzzy boundaries, often being used to describe a wide array of phenomena, ranging from the joy experienced at the birth of a child to the irritation of being stuck in traffic. In this section, we provide definitions for emotion and emotion regulation, then lay out the process model of emotion regulation. We use this model as the organizing structure for our discussion of individual differences in the next section.

Defining Emotion and Emotion Regulation

Across most conceptions of emotion, three features are emphasized. First, emotion requires that individuals attend to a stimulus in the environment (or “situation”) that is relevant to their goals. These goals can be commonly held across individuals or be more idiosyncratic; they can be short-term or long-term; and they can be conscious or unconscious. The nature of the emotion (or “response”) elicited depends on the individual’s specific interpretation (or “appraisal”) of this goal-relevant situation. Second, emotion is constituted by complex changes in multiple response domains. Although laypeople often equate emotion with subjective experience, it also involves loosely coupled changes in behavior and physiology (Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005). There is a recursive quality to emotion in that responses feed back into the emotion generative cycle by modifying the situation. Emotions track changes in the situation, signaling to the individual important aspects of the environment and helping to coordinate adaptive responding (Frijda, 1986; Tooby & Cosmides, 1990). For instance, emotional expressions communicate to others the internal state of the individual and thereby promote social bonding (Ekman, 1993; Izard, 1990; Keltner & Kring, 1998). Third, emotions are malleable; that is, we are not at the mercy of our emotions but rather we can exert control over them in order to allow for competing responses (James, 1884). Although emotions are often functional, this is not always the case. At times, emotions may not align well with our long-term goals, for example, when we feel too anxious to apply for a new job that could provide us with valuable opportunities, or inappropriately express our anger toward our employer, which could hurt our chances of getting promoted. In these situations, emotion regulation processes are often recruited.

Emotion regulation involves attempts to influence which emotions are elicited, when they are elicited, and how they are experienced and expressed (Gross, 1998b, 2002). Typically, individuals use emotion regulation to increase positive emotion or decrease negative emotion (i.e., prohedonically; Gross, Richards, & John, 2006; Lar-

sen, 2000). However, there are situations in which individuals are motivated to engage in contrahedonic regulation (Tamir, 2009), for example, when they want to confront others or avoid a threat (Sutton, 1991; Tamir, Mitchell, & Gross, 2008). Emotion regulation processes can also target one’s own emotions (*intrinsic* emotion regulation) or the emotions of others (*extrinsic* emotion regulation; Gross & Thompson, 2007). Closely related constructs include mood regulation (Larsen, 2000; Thayer, 1996) and coping (Lazarus & Folkman, 1984). In contrast to emotion regulation, mood regulation (Larsen, 2000) is focused on changing one’s mood (i.e., a longer lasting, often more diffuse affective state) and thereby primarily targets subjective experience. Coping (Lazarus & Folkman, 1984) centers on relieving stress stemming from an adverse event or life circumstance, whereas emotion regulation can be used to enhance, reduce, or maintain either positive or negative emotion.

The Process Model of Emotion Regulation

The process model of emotion regulation (Gross, 1998b) organizes emotion regulation strategies based on where they have their primary impact on the unfolding emotion. Five distinct families of emotion regulation are delineated in this model: *situation selection* (approaching or avoiding situations based on the expected emotional impact), *situation modification* (changing aspects of a situation that one is already in), *attentional deployment* (shifting attention away from stimuli that may elicit unwanted emotion or toward stimuli that are expected to elicit desired emotions), *cognitive change* (modifying the meaning of an emotional stimulus to change its impact), and *response modulation* (attempting to modify response tendencies once an emotion has been elicited). The first four families have been labeled *antecedent-focused* strategies because they focus on an earlier point in the emotion generative cycle. These types of strategies are generally expected to be more effective at regulating emotion than *response-focused* strategies that occur later in the emotion generative cycle.

Indeed, there is substantial evidence to support the differential impact of specific

emotion regulation strategies (Webb, Miles, & Sheeran, 2012). Much of this work has compared expressive suppression, a form of response modulation, to cognitive reappraisal, a form of cognitive change. Experiments reveal that compared to individuals who respond naturally, those who are instructed to use suppression show heightened physiological reactivity (Gross, 1998a), poorer memory (Richards & Gross, 2000), and lower rapport with interaction partners (Butler et al., 2003). In contrast, using reappraisal leads to less negative emotional experience without the physiological (Gross, 1998a), cognitive (Richards, Butler, & Gross, 2003), or social costs (Butler et al., 2003). Despite these differences in the consequences of suppression and reappraisal, it is important to note that no strategy is inherently adaptive or maladaptive (Catterson, Eldesouky, & John, 2017; Troy, Shallcross, & Mauss, 2013; Troy, Ford, McRae, Zarolia, & Mauss, 2017). Instead, effective regulation requires the ability to flexibly deploy the appropriate strategy to meet one's goals in a given context (Aldao, Sheppes, & Gross, 2015; Bonanno & Burton, 2013).

Recently, the process model was extended to further explicate how emotion regulation occurs across four different stages: iden-

tification, selection, implementation, and monitoring (Gross, 2015; see Figure 24.1). The *identification* stage involves the initial decision of whether to regulate or not. In order to make this decision, the individual needs to be able to decipher his or her current emotional state and compare it to his or her goals, then determine whether the resulting discrepancy warrants the activation of regulation processes. The *selection* stage involves choosing which type of strategy to use for regulation. Strategy selection requires knowledge of various ways to modulate emotion, including how appropriate a strategy would be to use in the current regulation context (e.g., whether distracting oneself by humming a tune will work to reduce one's anxiety in the waiting room at the dentist). The *implementation* stage involves deploying a specific regulation tactic. In order to use a tactic effectively, the regulator must have the necessary cognitive, physiological, and social resources. For example, someone who wants to seek out social support when feeling sad might not be able to if he or she lives far from family and friends. Once a tactic is deployed, the individual must engage in *monitoring* the situation and his or her emotional state in order to determine whether to continue regulating in the same way,

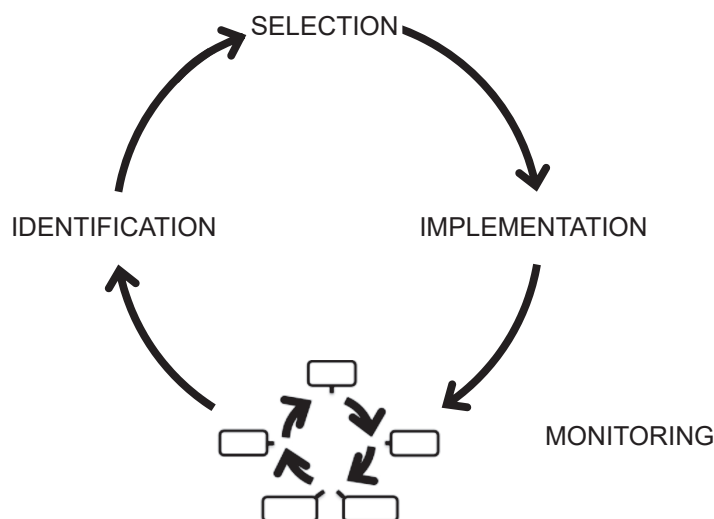


FIGURE 24.1. A simplified version of the extended process model of emotion regulation adapted from Gross (2015). The labels refer to the four stages in emotion regulation, and the small boxes refer to the five families of emotion regulation processes by which emotion can be changed.

change strategies, or cease regulation altogether. Monitoring is highly important given that situational features can change (Aldao, 2013), and even a typically adaptive strategy might not always be effective (e.g., Troy, Shallcross, & Mauss, 2013). For example, if one is finding it difficult to reappraise one's anger toward a friend, it might be useful to distract oneself, at least until one cools down. Different types of trait-level emotion regulation are represented at each of these stages, as we describe in the next section.

Individual Differences

Emotion regulation efforts vary based on characteristics of both the regulation context and the individual (Aldao, 2013; Sheppes et al., 2014). Systematic individual differences exist in various aspects of emotion regulation, such as the frequency with which we regulate our emotions, the ways we regulate our emotions, and how successful we are in our regulation attempts. In this section, we describe how emotion regulation can be evaluated at the trait level. Specially, we highlight important individual differences that are relevant for the identification, selection, implementation, and monitoring stages of emotion regulation. We also dis-

cuss how other personality traits may be related to individual differences in emotion regulation across these different stages (see Figure 24.2).

Identification Stage

The identification stage of emotion regulation involves various processes, including the detection of an emotion that could be targeted for regulation, judgment of the target emotion's value, and activation of an emotion regulation goal. There are a number of traits relevant to these processes that can influence whether an individual ultimately will decide there is a need to regulate his or her emotions. We focus on three specific factors: perception, goals, and beliefs.

Perception of emotions is one key factor that can impact whether emotion regulation is deemed necessary. For instance, the likelihood of initiating regulation attempts may depend on emotional awareness, the attention that individuals allocate toward their emotions and the clarity with which they experience their emotions (Salovey, Mayer, Goldman, Turvey, & Palfai, 1995). People may be more likely to detect a need for emotion regulation if they are aware of their emotions and have a clear sense of what exactly they are feeling. Some indirect evidence

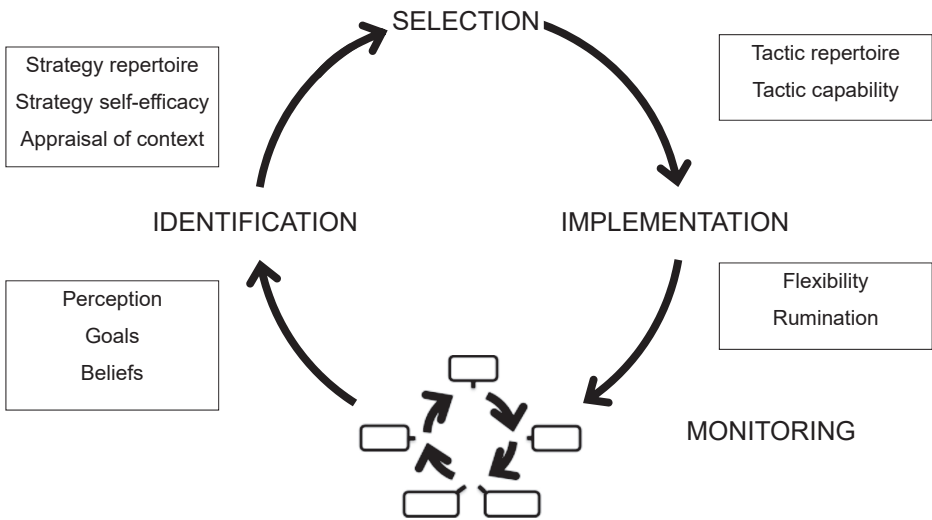


FIGURE 24.2. Examples of key individual differences in emotion regulation mapped onto the different stages of the extended process of emotion regulation (Gross, 2015).

for this idea comes from work showing that individuals who have greater awareness of bodily signals (e.g., heartbeats) are more successful at using reappraisal than those who have lesser interoceptive awareness (Füstös, Gramann, Herbert, & Pollatos, 2013). Individual differences in emotional awareness can also be assessed through self-report with instruments such as the Trait Meta-Mood Scale (TMMS; Salovey et al., 1995) and the Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT; Mayer, Salovey, & Caruso, 2002). Studies suggest that individuals higher in openness to experience are highly aware of their own others' emotions (Costa & McCrae, 1995; Terracciano, Merritt, Zonderman, & Evans, 2003), so they might therefore be more likely to regulate emotions. Emotional differentiation, or the granularity with which individuals represent emotion, can also impact decisions of whether to regulate emotions (Barrett, Gross, Christensen, & Benvenuto, 2001; Tugade, Fredrickson, & Barrett, 2004). Similar to emotional clarity, those who have greater emotional differentiation, or a more fine-grained representation of emotion, would be more likely to detect undesirable emotional states that may need to be regulated.

A second factor that can impact whether individuals see the need to regulate their emotions is goals. People have distinct emotional preferences (Ford & Tamir, 2014; Tamir & Ford, 2012), and these preferences guide the recruitment of emotion regulation processes by acting as a comparison against which one can evaluate one's current emotional state (Eldesouky & Gross, 2019). Emotion regulation processes can be recruited to maintain a desirable emotional state, or bring an undesirable state into alignment with one's preferences. Work on ideal affect (Tsai, 2007) has shown there are stable individual differences in the emotions that people deem most desirable, as reflected in self-reports using the Affect Valuation Index (AVI; Tsai, Knutson, & Fung, 2006). Ideal affect tends to vary based on culture (Tsai et al., 2006) and age (Scheibe, English, Tsai, & Carstensen, 2013), such that lower-arousal positive states (e.g., relaxed) are preferred over high-arousal affective states (e.g., excited) among East Asians and older adults.

These distinct emotional preferences can then impact the motivation underlying emotion regulation efforts, such as hedonic goals (i.e., short-term goal of feeling positively or negatively; Tamir, 2009), or instrumental goals (i.e., long-term goals besides hedonic pleasure; e.g., Mauss & Tamir, 2014; Tamir, 2016), which can also vary across individuals (Eldesouky & English, 2019a; English, Lee, John, & Gross, 2017). Moreover, research suggests that personality traits are also linked to individual differences in specific emotion-related goals. For example, extraverts exhibit a stronger desire to feel happiness than do introverts (Tamir, 2009) and are more motivated to regulate their emotions to feel positively (Eldesouky & English, 2019a).

Beliefs are a third factor that can influence identifying the need to engage in emotion regulation. People differ in their perceived utility of emotions, such as how useful specific emotions are for achieving certain goals (e.g., whether happiness is more useful for collaborating with others than anger; Tamir & Ford, 2012). To the extent that someone finds an emotion useful, he or she may be more motivated to experience that emotion and therefore engage in regulation efforts to experience it more often and for longer. The motivation to regulate one's emotions may also partly depend on the regulator's attributional style, or on how individuals explain the causality of good and bad events that occur to them (Peterson, 1991). In general, individuals who are more pessimistic tend to attribute bad events to causes that are internal, stable, and global, and good events to causes that are external, unstable, and specific (Friedlander, Traylor, & Weiss, 1986). This is largely rooted in a belief that they lack control over the events that happen to them. Given the beliefs associated with these attributional styles, individuals who believe they lack control over events that happen to them may also believe that emotions are difficult to control and therefore engage in less emotion regulation. Along these lines, beliefs about how much control one has over outcomes might predict the use of certain strategies, such as situation selection. Specifically, individuals higher in general control beliefs might be more likely to seek out positive situations given that they are

more confident in their ability to proactively regulate their emotions (Rovenpor & Isbell, 2018). There are also individual differences in implicit theories about emotion, which can predict regulation efforts. Although some people see emotions as fixed and uncontrollable (i.e., entity beliefs), those who see emotions as more under their own control and open to change (i.e., incremental beliefs) have a greater sense of self-efficacy or perceived ability to manage their emotions (Tamir, John, Srivastava, & Gross, 2007). Thus, people may also be more likely to engage in emotion regulation if they think they can change their emotions.

Selection Stage

After identifying the need for emotion regulation, individuals must select a method or strategy for regulating their emotion that is contextually appropriate. Before they can activate the goal of deploying a specific strategy, they must first represent the strategies available to them and evaluate the utility of each strategy. We focus on three types of factors that can influence strategy selection: the regulator's strategy repertoire, his or her strategy self-efficacy, and his or her appraisal of the regulation context.

First, a regulator's emotion regulation habits can impact strategy selection to the extent that it reflects his or her perceived repertoire of strategies. A large body of research has demonstrated that individuals differ in the extent to which they habitually rely on certain emotion regulation strategies (John & Eng, 2014). For instance, the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) assesses the frequency with which individuals use cognitive reappraisal or expressive suppression, and the Ruminative Response Scale (RRS; Nolen-Hoeksema & Morrow, 1991) assesses the frequency with which individuals use rumination. Certain personality traits have also been shown to predict the extent to which individuals use some of these strategies. For example, greater optimism (Scheier & Carver, 1992), the coping style of positive reinterpretation and growth (Carver, Scheier, & Weintraub, 1989), lower neuroticism (Gross & John, 2003), and higher levels of extraversion and openness (Gresham &

Gullone, 2012) are associated with higher levels of trait reappraisal. The likelihood of using reappraisal or other forms of cognitive change may also be linked to a regulator's attributional style, in which those who see negative emotion events as coming from internal, stable, and global causes may be less likely to use cognitive change. Meanwhile, higher levels of trait suppression have been linked to the coping style of venting (Carver et al., 1989), lower extraversion (Gross & John, 2003), higher neuroticism (Gresham & Gullone, 2012), being more avoidant, and having lower self-esteem (Gross & John, 2003). Little is known about how personality traits predict other families of strategies, however. Extraverts, especially those high on the dominance or assertiveness facet of extraversion, may be more likely to regulate their emotions by changing features of the situation (i.e., situation modification), while those who are more conscientious may be more likely to use attentional deployment strategies (e.g., distraction) that draw on their executive control.

Second, strategy selection may in part be dictated by how well the individual thinks he or she can deploy different emotion regulation strategies (Goldin, Manber-Ball, Werner, Heimberg, & Gross, 2009; Goldin et al., 2012). Given that self-efficacy drives motivation and behavior (Bandura & Cervone, 1986), individuals with greater self-efficacy for using a specific strategy may be more likely to use it. Some indirect evidence for this idea comes from work on beliefs about the malleability of emotions, in which individuals who believe emotions can be changed are more prone to use of strategies that target changing emotional experience, such as reappraisal (Tamir et al., 2007). On a related point, a strategy is more likely to be selected if the regulator has the resources needed to effectively deploy it, such as cognitive control (Urry & Gross, 2010) and physiological allocation, or how energy is distributed throughout the body to facilitate mental processes (e.g., self-control; Beedie & Lane, 2012). For instance, individuals with greater cognitive control abilities tend to habitually use reappraisal more, and perhaps unsurprisingly, have greater reappraisal ability as well (McRae, Jacobs, Ray, John, & Gross, 2012). Similarly, cognitive resources have

been linked to the ability to spontaneously use suppression (Gyurak et al., 2009).

Third, there are also a number of traits that may result in differential strategy preferences because of the effects they have on perceptions of what is contextually appropriate. Individuals who value emotional restraint, for example, may be more prone to use suppression (Butler, Lee, & Gross, 2007, 2009). Strategy selection has been shown to vary based on various aspects of the regulation context. However, the impact of these factors may depend on how much the regulator personally cares about them. For instance, while individuals generally use suppression more when interaction partners are present (e.g., English et al., 2017), this tendency may be exacerbated among those high in impression management concerns (Eldesouky & English, 2019b). The emotion being targeted is also centrally important for regulation (Raio, Orederu, Palazzolo, Shurick, & Phelps, 2013; Sheppes & Gross, 2011). As a result, traits tapping emotional reactivity, impulse strength, and expressivity may play an important role in strategy selection. For instance, given that distraction is preferred over reappraisal when regulating emotions at high-intensity levels (Sheppes, Catran, & Meiran, 2009), individuals who experience emotions more strongly may exhibit a greater bias toward distraction.

Implementation Stage

Once individuals have selected a strategy to regulate their emotions, they must deploy a specific tactic or form of the chosen emotion regulation strategy tailored to the context at hand. This step requires representing relevant features of the environment and different ways to enact the previously selected strategy, evaluating options of regulation tactics, then activating the goal to deploy a particular tactic. Individual differences can again play a role at this point in the emotion regulation process, influencing which tactic is deployed and how successful a regulator is in implementing that tactic. We focus on two factors that may be particularly relevant at this stage: the regulator's tactics repertoire and capability of deploying different tactics.

Similar to the selection stage, a person's repertoire of emotion regulation tactics may

also influence how successful that person is in his or her regulation efforts. Most research has only examined habitual strategy use broadly rather than delineating specific underlying tactics associated with a strategy. However, there is some evidence that people vary in the emotion regulation tactics they use and that certain tactics are generally more effective than others (McRae et al., 2012). For instance, positive reappraisal (i.e., creating a more positive interpretation or looking on the bright side) often results in greater positive emotional experience than detached reappraisal (i.e., trying to neutralize negative stimuli or emotionally distance oneself). Regulators who typically rely on a given tactic (e.g., positive reappraisal), or perceive that tactic to generally be particularly effective, may be biased toward using it and therefore be less likely to consider using other tactics.

There are also individual differences in capability, or how well the person is able to use different emotion regulation tactics (Troy, Wilhelm, Shallcross, & Mauss, 2010). Researchers have examined perceived emotion regulation ability more broadly through self-reports, such as the Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004). Thus far, however, emotion regulation capability has only been examined with regard to overarching strategies, not specific tactics. For example, McRae et al. (2012) examined reappraisal ability by computing the reduction in negative affect after instructing individuals to use reappraisal while viewing negative emotion-inducing images. This ability tends to be higher in those with greater executive resources (Opitz, Lee, Gross, & Urry, 2014), and it has been shown to buffer individuals against the adverse effects of stress on well-being (Troy et al., 2010).

In terms of other links to other personality traits, there is reason to expect that individuals who are high on conscientious or openness may be particularly efficient in implementing tactics. For conscientiousness, this may not necessarily be due to actual differences in regulatory ability per se, but rather an increased motivation to successfully regulate one's emotions, which will ultimately serve one's goals. The increased goal striving of conscientious individuals (Gollwitzer & Oettingen, 2011) may allow for

more adaptive regulation and fine-tuning of strategy use to a given context. Meanwhile, the increased emotional awareness exhibited by highly open individuals (Terracciano et al., 2003) may motivate them to attend to their environment and the way they regulate their emotions in order to reach their emotion regulation goals. High openness may also facilitate comfort relying on different strategies other than the ones typically used.

Monitoring Stage

To successfully regulate their emotions, individuals must not only be able to effectively deploy a tactic, but they must also know when to stop using it. Individuals need to monitor their emotional state to determine whether they should continue using the same strategy, switch to a different strategy, or stop regulating. In order to make this decision, the regulator needs to monitor the environment for relevant contextual factors and track how contextual factors are changing. Individuals need to be able to stop or change their strategy use when a strategy is not adaptive in a given context. We focus on two individual differences relevant to this stage: flexibility and rumination.

Emotion regulatory flexibility is the ability to switch between different emotion regulation strategies based on contextual demands (Aldao, Sheppes, & Gross, 2015; Bonanno & Burton, 2013). For example, an individual high in emotion regulatory flexibility may choose to stop using distraction, an attentional deployment strategy, once the situation is no longer high intensity, and switch to using a strategy that is more useful for a low-intensity situation, such as reappraisal (Sheppes et al., 2014). This would not only be crucial to helping them successfully accomplish their goal, but it would also likely prevent them from wasting resources. Individual differences in strategy use and emotional beliefs could influence their ability to flexibly regulate their emotions. To the extent that one has a tendency to chronically rely on a particular strategy (e.g., suppression), one might be less likely to turn to alternative strategies (e.g., reappraisal) when necessary, and therefore exhibit low flexibility. Individuals who believe emotions are uncontrollable or that they cannot effective-

ly use a particular strategy may also be less likely to rely on a diverse set of strategies. In addition, if conscientious and open individuals are better at implementing tactics due to their increased motivation and emotional awareness, respectively, they might also be more flexible in their strategy use for similar reasons. Indeed, one study found that during an emotion regulatory task, conscientious individuals were more willing to try different emotion regulation strategies if their prior efforts were unsuccessful (Southward et al., 2018).

In contrast to emotion regulatory flexibility, rumination represents a failure to switch to another regulation strategy when a change may be useful. Rumination is characterized by repeatedly thinking about or dwelling on one's emotions (Nolen-Hoeksema, 2000). When individuals ruminate, they engage in this maladaptive cycle of repetitive thinking without identifying a solution to what may be bothering them (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Rumination might narrow an individual's perception of his or her situation and prevent him or her from more holistically looking at the demands of the situation. For example, given that emotional flexibility requires being able to weigh the costs and benefits of using a given strategy (e.g., Aldao, 2013; Bonanno & Burton, 2013), rumination might prevent individuals from making an accurate cost-benefit analysis of different strategies. In turn, they might be less likely to turn to a strategy that is beneficial for meeting their contextual demands. Rumination might also more broadly make it difficult for individuals to recognize that various strategies are available to them, because rumination makes them less optimistic, thereby decreasing their motivation to seek out effective solutions and increasing the likelihood that they will continue to rely on negative thoughts to make sense of their situation (Nolen-Hoeksema et al., 2008).

Directions for Future Research

In this chapter we have delineated a number of important individual differences that might interest researchers studying personality and emotion regulation. Next, we pro-

pose four areas for future research that will advance our understanding of emotion regulation processes and individual differences: developing new methods, examining stability and change in emotion regulation patterns, incorporating sociocultural considerations, and predicting long-term adjustment.

Developing New Methods

One step in moving research forward is developing new ways to assess emotion regulation constructs. This includes (1) developing new self-report survey measures and validating existing ones; (2) taking a more multimethod approach that incorporates informant and observer reports, as well as behavioral measures; and (3) capturing daily regulation efforts via ecological momentary assessments.

Thus far, efforts have primarily centered on creating self-report measures. There are a number of existing instruments to assess individual differences in various aspects of emotion regulation, as described earlier, such as the TMMS (Salovey et al., 1995), which measures individual differences in emotional clarity, the ERQ (Gross & John, 2003), which measures individual differences in strategy use, and the ERGS (Eldesouky & English, 2019a), which measures individual differences in emotion regulation goals. However, we do not currently have a full representation of individual differences in emotion regulation. For instance, there are no existing measures to assess beliefs about emotion regulation strategies. In addition, the reliability and validity of many existing measures have not been documented. Some measures, such as the ERQ, have been validated in different samples of varying demographic characteristics (e.g., age, culture; Balzarotti, John, & Gross, 2010; Cabello, Salguero, Fernández-Berrocal, & Gross, 2013; Gullone & Taffe, 2012), but this is not the norm.

More attention to measurement is also needed with regard to alternatives to self-report. Although self-reports are valuable, especially when assessing internal traits (Vazire, 2010), there are a number of advantages to also using other types of measures, such as informant reports or behavioral coding. For instance, highly evaluative traits

are often rated more accurately by outside observers rather than by the target (Vazire, 2010). Although there is some concern about the feasibility of these kinds of measures for emotion regulation, which largely involves internal processes, researchers have found relatively high self–other agreement among peers (Gross & John, 2003) and romantic partners (Eldesouky, English, & Gross, 2017; Impett, Le, Kogan, Oveis, & Keltner, 2014) for habitual use of suppression and reappraisal. These findings suggest that outside observers may be able to accurately detect emotion regulation traits in others, at least for some strategies. However, strategies that may be more easily observable, such as suppression, are still easier to detect (Eldesouky et al., 2017). Thus, more work is needed to determine specific behavioral cues of emotion regulation, as has been done for other personality traits (Funder & Sneed, 1993). There may be systematic changes in posture, gestures, or body movement when people use certain strategies, such as in the case of suppression (e.g., increased fidgeting, less conversational turn taking). The use of informants and outside observers might mitigate some of the disadvantages that come with self-report. Additionally, even if others' perceptions are not accurate, they can still be useful for identifying social consequences of emotion regulation (Ambady & Rosenthal, 1992). For example, if a partner perceives that a person is suppressing his or her emotions, this might predict lower relationship satisfaction, regardless of actual suppression use.

In addition to relying on measures other than self-report, future work should expand its investigation of emotion regulation to ecological momentary assessments. A number of researchers have in fact begun to examine emotion regulation in daily life using daily diaries and experience sampling. This work has been invaluable in identifying how various aspects of emotion regulation typically manifest in the context of everyday experience. For example, while laboratory work has documented how individuals can regulate their emotions for contrahedonic reasons (Tamir et al., 2008; Tamir, 2009), this type of regulation is actually quite uncommon in daily life (English et al., 2017; Gross et al., 2006; Kalokerinos, Tamir, &

Kuppens, 2017). Individuals are much more likely to regulate for pro-hedonic reasons and they use a wide range of strategies to do so (Brans, Koval, Verduyn, Lim, & Kuppens, 2013; Nezlek & Kuppens, 2008). Future research should continue the use of daily methods and capitalize on the unique advantage of being able to capture important situational variance (English & Elde-souky, 2020). Contextual information can help researchers determine the conditions under which individuals might regulate for certain reasons or use certain strategies, as well as when strategies are most functional. For instance, individuals regulate their emotions more in social contexts than when they are alone (Heij & Cheavens, 2014), and they use antecedent-focused strategies, such as distraction and reappraisal more on days when they regulate for prohedonic reasons (English et al., 2017). Reappraisal has also been found to be more beneficial for emotional well-being in controllable situations than in uncontrollable situations (Haines et al., 2016). Naturalistic and experimental methods are both needed to fully understand how emotion regulation patterns fluctuate based on contextual factors, and how these factors impact regulation outcomes. For example, would activating a prohedonic goal in a laboratory setting increase one's reappraisal use, or would using reappraisal in an uncontrollable situation elicit more negative emotion than using it in a controllable situation?

Behavioral measures could be combined with daily methods to better understand the cues associated with emotion regulation and the contexts in which people use emotion regulation. For instance, future studies could gather video recordings of participants while they regulate their emotions in the laboratory (Levenson & Gottman, 1983), or use more flexible recording tools such as the electronically activated recorder (EAR; Mehl, Pennebaker, Crow, Dabbs, & Price, 2001) and wearable cameras (Brown, Blake, & Sherman, 2017) to capture regulation in daily life. Behavioral tasks could also be leveraged as another way of assessing emotion regulation. For instance, in prior work, situation selection has been measured by tracking how individuals navigate viewing of emotional stimuli (Sands & Isaacowitz,

2017). Other instances can be seen in work on emotion regulation ability, as measured via neural responding when using reappraisal while viewing neutral and negative images (Davis et al., 2014), as well as emotion regulation flexibility, measured by having outside observers code for emotional expressions when participants were instructed to express or suppress their emotions (Bonanno et al., 2004).

Stability and Change in Emotion Regulation Patterns

A second area of work on emotion regulation concerns stability and change. There are at least three important directions in this area: testing whether patterns of emotion regulation are trait-like, or relatively enduring over time and consistent across contexts; examining development or long-term change; and exploring variability or short-term fluctuations.

Traits are patterns of thought, feeling, or behavior that are generally consistent over time and across situations (McCrae & Costa, 1994). There is some evidence of the trait-like nature of certain aspects of emotion regulation. For instance, past work has documented the temporal stability for self-reports of emotional intelligence (Brackett & Mayer, 2003) and emotional preferences (Tsai et al., 2006). Similarly, in terms of emotion regulation strategy use, self-reports of habitual use of suppression and reappraisal show reasonable test-retest reliability, at least across 3 months (Gross & John, 2003). However, there is still much to be learned about stability of emotion regulation tendencies, including the frequency and success of emotion regulation in general and using specific tactics. Another useful approach may be directly comparing trait and daily measures of emotion regulation. A recent experience sampling study found only a weak link between trait-level and daily strategy use for mindfulness, reappraisal, and suppression (Brockman, Ciarrochi, Parker, & Kashdan, 2017). It is possible that certain aspects of emotion regulation may be more trait-like than others and thus, more consistent across contexts. It is also possible that trait and daily measures are somewhat capturing different outcomes (Finnigan & Vazire, 2018),

such as self-perceptions versus actual behavior. That being said, 1 or 2 weeks of daily measures may not be sufficient to capture the stability of emotion regulation patterns; ecological momentary assessment measures might only provide reliable assessments that correlate with trait-level measures after a more extended period of sampling.

Work on child and adult development suggests there are normative changes in many aspects of emotion regulation throughout the lifespan (Thompson, 1991). There is evidence of age-related differences in emotion regulation strategy use in childhood (Gullone, Hughes, King, & Tonge, 2010; Zimmerman & Iwanski, 2014), adolescence (Lantrip, Isquith, Koven, Welsh, & Roth, 2016; Riediger & Klipker, 2014; Voon, Hasking, & Martin, 2014), and adulthood (cf. Eldesouky & English, 2018; John & Gross, 2004). For example, reappraisal use tends to be lower in older children compared to younger children (Gullone et al., 2010), but greater in adolescents (Lantrip et al., 2016) and older adults (John & Gross, 2004). The overall motivation to regulate one's emotions and the specific reasons for doing so also seem to differ across age groups. In terms of daily emotion regulation goals, *contrahedonic* regulation is more common during adolescence, while *prohedonic* regulation is more common in old age (Riediger, Schmiedek, Wagner, & Lindenberger, 2009). Socioemotional selectivity theory (Carstensen, Isaacowitz, & Charles, 1999) suggests that motivation shifts across adulthood, such that people become more focused on emotion-related goals as they age. Consistent with this idea, older adults are more likely than their younger counterparts to attend to and remember positive stimuli rather than negative stimuli (Mather & Carstensen, 2005). Given increased motivation to pursue emotion-related goals and accumulated life experience, emotion regulation ability is thought to improve later in life. However, although older adults report having greater control over their emotions than younger adults (Gross et al., 1997) and use some strategies more effectively (Shiota & Levenson, 2009), there is still mixed evidence about whether emotion regulation actually becomes more effective (Livingstone & Isaacowitz, 2019).

Nearly all of the current research has used cross-sectional methods, so longitudinal data are now needed to help determine how individuals change over time, as well as when and why these changes might occur. For example, at what point in young adulthood might individuals begin to rely more on reappraisal than on suppression, and what aspects of biology and social roles might contribute to this change? In light of recent theories highlighting the importance of cognitive resources for emotion regulation (Charles, 2010; Urry & Gross, 2010), when might use of certain strategies begin to be harmful for older adults? Moreover, longitudinal research will also be useful for determining whether changes in certain aspects of emotion regulation are contingent on changes in other traits, or whether these changes occur independently. For instance, comparing goal and strategy trajectories within individuals can provide evidence of whether changes in motivation precede or trigger changes in strategy use. Advancing understanding about changes in emotion regulation strategy use might also be a result of some of the changes in other personality traits we see in older adulthood. For example, decreased suppression use in older adulthood (John & Gross, 2004) may be partly due to an age-related decline in neuroticism (McCrae et al., 1999; Lucas & Donnellan, 2011), in light of work showing a positive link between suppression and neuroticism (Gresham & Gullone, 2012).

In addition to this long-term change, there is also variability in emotion regulation across different situations or contexts. For instance, prior work has documented changes in emotion regulation patterns in response to a major life transitions or changes in roles. Specifically, a longitudinal study comparing emotion regulation the summer before college and after college orientation found an increased reliance on expressive suppression after starting college (Srivastava et al., 2009). Work using ecological momentary assessments has not only documented the relative pursuit of emotion regulation goals (e.g., English et al., *in press*; Kalokerinos, Tamir, & Kuppens, 2017) and use of various emotion regulation strategies (e.g., Brans et al., 2013; Heij & Cheavens, 2014), but it also highlights daily fluctuations in

these constructs (Blanke et al., 2020; Eldesouky & English, 2018). These kinds of designs also allow researchers to calculate variability in emotional experience to assess individual differences in emotional stability (Carstensen, Pasupathi, Mayr, & Nesselroade, 2000). Extending this approach to emotion regulation, researchers can identify which aspects of emotion regulation are most stable and least stable across contexts. This issue has important implications because stable aspects of emotion regulation might be more resistant to change. Furthermore, these designs can be used to identify how aspects of emotion regulation fluctuate in response to different types of contextual factors (Benson et al., 2019). For example, in line with work showing that individuals higher in suppression are lower in extraversion (Gross & John, 2003), Catterson et al. (2017) found that daily suppression use is greater in situations in which people feel less extraverted.

Sociocultural Considerations

Given that emotion and emotion regulation are socially and culturally embedded, it is important to take into account how these individual differences may also depend on one's sociocultural context. This is especially important, since emotion regulation often occurs in the presence of others (Heiy & Cheavens, 2014; Gross et al., 2006), and social factors are linked to various aspects of emotion regulation, such as why we manage our emotions (Eldesouky & English, 2019a) and how we choose to manage them (English et al., 2017). Here it is worth noting though that the bulk of the work we have reviewed thus far has focused on *intrinsic emotion regulation*, or attempting to control one's own emotions, but regulation efforts can also be used to target someone else's emotions, in which case it is considered *extrinsic emotion regulation* (Zaki & Williams, 2013). Although the child development literature has consistently examined this type of extrinsic regulation, only recently has it been explored in adult samples. Just as being with others might impact how we regulate our own emotions, there is reason to expect that it might also impact how

we regulate others' emotions. For instance, there are differences in the extent to which people use capitalization, which involves seeking out individuals to share good news, as well as how people react to hearing this good news (Gable, Reis, Impett, & Asher, 2004). Future research can begin to further investigate individual differences in emotion regulation by considering individual differences in extrinsic regulation strategies. For instance, do individuals tend to rely on the same strategies to regulate their own as well as other's emotions? Moreover, might there be certain individuals who are more likely to engage in extrinsic regulation than others? For example, agreeableness might be more likely to predict extrinsic regulation than intrinsic emotion regulation given its association with increased concern for others' well-being (Graziano, Habashi, Sheese, & Tobin, 2007). Research shows that individuals higher on agreeableness are at least more likely to regulate their own emotions for pro-social reasons (Eldesouky & English, 2019a).

At a broader level of analysis, culture may also influence the prevalence of certain emotion regulation traits. Display rules play a large role in shaping beliefs about when emotions should be controlled (Ekman & Friesen, 1969), and regulated (Tsai et al., 2006). For example, collectivistic cultures (e.g., East Asian) emphasize emotional restraint in order to avoid expressing emotions that would not be acceptable to display or disrupt group harmony (Markus & Kitayama, 1991). In contrast, individualistic cultures (e.g., Western) emphasize the importance of expressing one's thoughts and feelings. These differences in display rules may hold important implications for emotion regulation strategy use, as shown by some past research. For example, suppression tends to be used more often by East Asians (English & John, 2013; Matsumoto, Yoo, & Nakagawa, 2008) and Americans who endorse Asian values (Butler et al., 2007), potentially because East Asian cultures emphasize emotional restraint. Relatedly, there are differences in cultural values regarding social order and autonomy (Matsumoto et al., 2008) that can also shape people's motivation for regulating their emotional goals (Tsai, Miao, Seppala,

Fung, & Yeung, 2007; Tsai, 2007). As mentioned earlier, East Asians have been shown to value low-arousal emotions, such as calm and peaceful, whereas Westerners are more likely to value high-arousal emotions, such as excitement and enthusiasm. This work suggests that culture may influence the emotional states people want to reach with their regulation efforts. As with many areas of research, however, this work is largely limited to comparisons between Western and East Asian cultures, and more research on emotion regulation is needed in other cultures. Furthermore, while there has been some research on the role of culture in emotion regulation goals and strategies, there has been little work on the role of culture in other aspects of emotion regulation, such as self-efficacy beliefs or flexibility. To the extent that a person identifies with a culture that strongly values social order, for example, he or she might have less flexible strategy use given that using an alternative strategy might be socially costly.

Predicting Long-Term Adjustment

A large body of research has shown that personality consistently predicts several important outcomes, such as subjective well-being (Costa & McCrae, 1980), social adjustment (Dyrenforth, Kashy, Donnellan, & Lucas, 2010), psychopathology (Kotov, Gamez, Schmidt, & Watson, 2010), and physical health (Friedman, 2000). Similar to other aspects of personality, individual differences in emotion regulation may have important consequences for these and other domains of long-term adjustment.

There is in fact growing evidence that patterns of emotion regulation are key predictors of adjustment. Most research in this area has focused on how the cumulative impact of chronic use of certain strategies in daily life is reflected in differential well-being profiles. Habitual use of reappraisal is correlated with higher emotional and social well-being (English, John, Srivastava, & Gross, 2012; English & John, 2013; Gross & John, 2003; Haga, Kraft, & Corby, 2009; Moore, Zoellner, & Mollenholt, 2008), whereas habitual use of suppression is associated with lower life satisfaction, less close

relationships (English & John, 2013; Gross & John, 2003; Haga et al., 2009; Kashdan & Stegar, 2006; Moore et al., 2008; Srivastava et al., 2009), and declines in social adjustment across college (English et al., 2012). The ability to effectively reappraise emotional stimuli has also been associated with greater emotional well-being (McRae et al., 2012). In contrast, believing emotions are fixed and uncontrollable predicts lower self- and peer-reported emotional and social well-being (Tamir et al., 2007). Interventions aiming to improve emotional and social adjustment often prominently feature emotion regulation. Examples include cognitive-behavioral therapy, which encourages patients to use cognitive change strategies (Berenbaum, Raghavan, Le, Vernon, & Gomez, 2003), and mindfulness-based therapy, which aims to create emotional balance (Kabat-Zinn, 1990).

Emotion regulation difficulties have long been considered a core element of many forms of psychopathology, especially affective disorders (e.g., depression, bipolar, anxiety; Berenbaum et al., 2003; Gross & Muñoz, 1995). The process model of emotion regulation has recently been applied to psychopathology to identify how difficulties in various stages of emotion regulation might predict psychopathology (Sheppes, Suri, & Gross, 2015). For example, at the identification and implementation stages, individuals with social anxiety disorder believe they are less able to control their emotions (De Castella et al., 2014; Spokas, Luterek, & Heimberg, 2009) or use reappraisal (Goldin et al., 2009, 2012), suggesting that individuals with social anxiety disorder might be less likely to regulate their emotions and less successful in implementing certain strategies. Relatedly, other work has shown differences at the selection stage, in which individuals with major depressive disorder and bipolar disorder tend to have higher habitual use of typically maladaptive strategies, such as suppression (Beblo et al., 2012; Campbell-Sills, Cohan, & Stein, 2006; Gruber, Harvey, & Gross, 2012) and rumination (Ghaznavi & Deckersbach, 2012; Gilbert, Nolen-Hoeksema, & Gruber, 2013; Nolen-Hoeksema et al., 2008). Individuals with these disorders may in part underrepresent the diverse set of

strategies available to them and continually rely on the same set of strategies to regulate their emotions. Future research should consider further investigating how difficulties in these various stages of emotion regulation might predict psychopathology and adjustment outcomes. For instance, individuals who believe they are less able to control their emotions or who frequently rely on typically maladaptive strategies may be at greater risk for psychopathology.

As with the recent surge in research on personality and physical health (Shanahan, Hill, Roberts, Eccles, & Friedman, 2014; Takahashi, Edmonds, Jackson, & Roberts, 2013; Weston, Hill, & Jackson, 2015), there has also been increased interest in the link between individual differences in emotion regulation and physical health. Much of this research has focused on individual differences at the selection stage. For instance, individuals higher in reappraisal use are at lower risk for cardiovascular diseases (e.g., coronary heart, atherosclerotic), while individuals higher in suppression use are at lower risk (Appleton, Buka, Loucks, Gilman, & Kubzansky, 2013; Gianaros et al., 2014). Relatedly, both the onset and a faster progression of cancer has been linked to greater habitual use of suppression (Bahnsen, 1981; McKenna, Zevon, Corn, & Rounds, 1999; Spiegel & Giese-Davis, 2003). More work is now needed to examine a wider range of individual differences in emotion regulation beyond simply strategy use. For instance, low emotional flexibility might cause one to accumulate more negative affective and social consequences that ultimately take a toll on one's health. The mechanisms by which emotion regulation could influence health also need to be explored (DeSteno, Gross, & Kubzansky, 2013). For example, do strategies influence the motivation to engage in certain health behaviors or decisions in the ways that other personality traits (e.g., conscientiousness) might or serve as health behaviors in themselves (e.g., physical exercise)?

Relatedly, it will be important to determine the predictive value of emotion regulation compared to other personality traits (e.g., the Big Five), as well as their relative consequences for a broader set of life do-

main, such as job success. For instance, given suppression's negative social costs (e.g., English et al., 2012; Srivastava et al., 2009), heightened use of this strategy might prevent people from forming social connections that have the potential to create new job opportunities. Meanwhile, reappraisal could promote job success by encouraging individuals to overcome anxiety that comes with pursuing new job opportunities or allowing them to persevere when they experience failures.

Concluding Comments

Emotion regulation should be of interest to personality researchers for at least three main reasons. First, there are reliable individual differences in various aspects of each stage of emotion regulation. Second, a wide range of personality factors, such as the Big Five and attachment, predict individual differences in emotion regulation processes. Third, emotion regulation processes play a key role in determining long-term adjustment.

It is clear from our review of the literature that most research has focused on how people typically regulate, but there are individual differences in several other emotion regulation processes, ranging from what people think they can do (self-efficacy) to how effective they are in regulating (capability). More work will be needed to test the specificity or generality of our approach to individual differences in emotion regulation compared to affect regulation more broadly. There are likely not only many points of overlap but also some important differences. For instance, similar to how individuals differ in the emotion regulation strategies they tend to use, they also differ in their mood regulation strategies (Carver et al., 1989). However, we might expect mood regulation patterns to be more stable because mood occurs over a longer period of time than emotion. Drawing on the strengths of various approaches, such as self-report and behavioral tasks, future research can continue to investigate the stability of these individual differences, how they relate to other traits, and how they predict important outcomes.

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CHAPTER 25

Self-Regulatory Processes, Stress, and Coping

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This chapter addresses three topics: stress, coping, and some of the self-regulatory structures and processes that we believe underlie personality. The topics of stress and coping typically go hand in hand, since stress leads to coping. In our view, however, coping essentially constitutes efforts at self-regulation (of action and emotion) in times of duress (stress). Thus, to discuss coping in a meaningful way entails making some assumptions about the nature of self-regulation. That, then, is where we begin.

At their core, self-regulatory models of action are organized around people's efforts to create and maintain desired conditions in their lives (Carver & Scheier, 2019). Some desired conditions are relatively static (e.g., a house being set up the way you want it, good health, food in the refrigerator). Others are more dynamic (e.g., developing a career, helping a child grow into a responsible adult, taking an enjoyable and enriching vacation). Whether the goal is to maintain a stable picture or to make something happen, the process by which the goal is realized is a kind of self-regulation.

Self-regulatory efforts often run off smoothly, untroubled by external impediments or personal shortcomings. Sometimes, however, people encounter difficulties

in doing what they want to do, being what they want to be, or keeping their reality ordered the way they want it. Self-regulatory models also address what happens in such situations.

In what follows, we explore what self-regulation models tell us about the experience of stress and the processes of coping. We begin by describing some orienting assumptions and principles of self-regulation. Then we move to a more explicit consideration of how stress arises from the experiences of life, and how these self-regulatory principles relate to models of stress and coping. We describe in the final section of the chapter a few of the findings that have emerged from attempts to integrate the literatures on stress, coping, and self-regulation.

Self-Regulation

A common view in contemporary psychology is that human behavior is organized around an ongoing pursuit of goals, which themselves are relatively consistent across cultures (Grouzet et al., 2005). Theorists use diverse terms to refer to goals, owing to differences in emphasis, but for our purposes the differences are unimportant.

Feedback Processes and Self-Regulation

Goals give us something to aim for, but how should we think about the mechanics of reaching them? We have found it useful to think about goals as reference values for feedback processes. A *feedback loop* (Miller, Galanter, & Pribram, 1960; Powers, 1973) is generally seen as consisting of an input, a reference value, a comparator function, and an output. The *input* is a source of information about a current condition—a perception. The *reference value* is a desired or intended condition—a goal. The *comparator function* compares input to reference value, with one of two outcomes: Either the values are discriminably different from each other or they are not.

The output function can be thought of as behavior (though sometimes the behavior is internal). If the comparison yields “no difference,” the output stays as it was: no output, or output ongoing at its current level. If the comparison yields “discrepancy,” the output function changes.

There are two kinds of feedback loops, which have different effects (Carver & Scheier, 1998). In a *discrepancy-reducing loop*, the output acts to diminish any difference between the reference value (standard of comparison) and the input. The attempt to make input match the standard can be interpreted as an attempt to approach or attain a desired goal. In a *discrepancy-enlarging loop*, the reference value is not one to match, but one to avoid. Values to be avoided might include pain, interpersonal rejection, and parking tickets. A *discrepancy-enlarging loop* senses present conditions, compares them to the to-be-avoided value, and tries to keep the present condition away from the comparison point.

Discrepancy-enlarging processes are often constrained in some way by discrepancy-reducing processes (Carver, Lawrence, & Scheier, 1999; Carver & Scheier, 1998). To put it differently, avoidance often segues into a compatible act of approach (a pattern often called *active avoidance*).

Hierarchical Organization

Goals differ in their level of abstraction (Carver & Scheier, 1998; Powers, 1973). A

man might have the goal, at a fairly high level of abstraction, of being a good father. He may also have the goal, at a lower level of abstraction, of taking his son to soccer practice. The first goal is to be a particular kind of *person*, the second is to complete particular kinds of *action*. There are also goals even more concrete than the latter one, for example, the goal of turning the wheel to park the car. Such goals are closer to specifications of individual acts than was the second, which was more a summary statement about the desired outcome of intended action patterns.

These examples of concrete goals link to the earlier example of an abstract goal, making the point that goals can be organized in a hierarchy. Long ago, William Powers (1973) made the argument that feedback loops underlying behavior are organized that way. He proposed that the output of a high-level loop consists of resetting reference values at the next lower level. To put it differently, high-order systems “behave” by providing goals to the systems just below them.

Powers said little about the levels of most interest to personality psychologists, except to suggest labels for several levels whose existence makes intuitive sense. *Programs* are activities involving conscious decisions at various points. *Sequences*, the next level down, are sets of acts that run off autonomously, once cued. Above programs are *principles*, abstract qualities that are implemented by programs.

The idea of hierarchical organization has some implications that have been widely adopted in today’s psychology. For example, moving toward a lower goal can contribute to attaining a higher goal (or even several at once). It implies that a given higher goal often can be attained by diverse action possibilities at lower levels. Thus, people sometimes shift radically the way in which they try to reach a goal, when the goal itself has not changed. The notion of hierarchical organization also implies that a given lower-level action can be done in the service of diverse higher-level goals. Thus, a given act can have different meanings, depending on its purpose.

Another point implied by a hierarchy is that goals differ in importance. The higher in the hierarchy, the more fundamental is the goal to the overriding sense of self.

Emotion

Self-regulatory models also have a place for emotion. Carver and Scheier (1990, 1998) suggested that the core of emotions arises through the operation of a second layer of feedback processes. This layer operates simultaneously with behavior guidance and in parallel to it. One way to characterize what this second process does is to say that it checks continuously on how well the behavior system is doing. Thus, the input for the affect-creating loop reflects the *rate of discrepancy reduction in the action system over time*.

Velocity input does not create affect by itself, because a given rate of progress has different meanings in different circumstances. Rather, the input is compared against a reference value (cf. Frijda, 1986, 1988): a targeted or desired (or expected) rate of action progress. Carver and Scheier (1990, 1998) suggested that the outcome of this comparison is reflected as a hazy sense of confidence or doubt, and as affective valence. Several studies have yielded evidence consistent with this view (for review, see Carver & Scheier, 2013).

Earlier we said that action regulation involves both approach and avoidance. The view of affect just described holds that positive feelings arise when an action system is doing well at *doing what it is organized to do*. Approach systems act to reduce discrepancies. When they are making better than targeted progress toward desired goals, positive affect arises. When progress is not satisfactory, affect turns more negative. Avoidance systems act to *enlarge* discrepancies. If avoidance systems are doing well at that—keeping the person distant from threats—positive affect should arise. If they are doing poorly, affect should be negative.

This much would seem to be the same across the two types of systems. On the other hand, there is also a difference in the specific affects involved (Carver & Scheier, 1998). Drawing in part on work by Higgins (1987, 1996), we think that an affect dimension relating to approach runs (in its purest form) from depression to elation (via anger and excitement; Carver, 2004). An affect dimension relating to avoidance runs (in its purest form) from fear to relief or content-

ment (for more on this and other issues concerning affect, see Carver, 2003; Carver & Scheier, 2013).

The Interface between Affect and Action

The two-layer viewpoint just outlined implies a natural relation between affect and action; that is, if the input function of the affect loop is a sensed rate of progress of action, the output function of the affect loop must be a change in rate of that action. Thus, the affect loop has a direct influence on what occurs in the action loop.

Some changes in rate output are straightforward. If you are lagging behind, you try harder. If you are way ahead of schedule, you might reduce your effort (Thürmer, Scheier, & Carver, 2020). Other changes are less straightforward. The rates of many “behaviors” are defined not by pace of physical action but in terms of choices among potential actions, or entire programs of action. For example, increasing your rate of progress on a project at work may mean choosing to spend a day working rather than relaxing with family and friends. Increasing your rate of being kind means choosing to do an act that reflects kindness, when an opportunity arises. Thus, change in rate must often be translated into other terms, such as concentration, or allocation of time and effort.

Confidence and Doubt

In describing the origin of affect earlier, we suggested that one mechanism yields two subjective readouts: affect, and a sense of confidence versus doubt. These readouts are intertwined. Thus, what we have said about affect applies equally well to the vague sense of confidence and doubt that also accompanies action.

This hazy sense of confidence or doubt does not operate in a psychological vacuum, however. When people experience adversity in trying to move toward goals, they sometimes interrupt themselves and assess more deliberately the likelihood of a successful outcome (Carver & Scheier, 1981, 1990, 1998). In doing this, people presumably use memories of prior outcomes in similar situations, while considering such possibilities as

additional resources they might bring to bear or alternative approaches to the problem. For such possibilities to influence expectancies, their consequences must be evaluated, perhaps as behavioral scenarios (S. Taylor & Pham, 1996), leading to conclusions that affect the expectancy (e.g., “If I try approaching it this way instead of that way, it should work better”; “This is the only thing I can see to do, and it will just make everything worse”). It seems likely that mental simulation engages the same mechanism as creates the sense of affect and confidence during action. Playing through a scenario with a positive outcome yields faster perceived progress, and a more optimistic assessment. If the scenario is negative and hopeless, it implies further loss of progress, and further doubt.

Efforts and Giving Up

Whatever their source, expectancies influence subsequent behavior. If expectations for the desired outcome are favorable enough, the person renews effort. If doubts are strong enough, the result is an impetus to disengage from further effort, and even from the goal itself. Sometimes the disengagement is overt. Sometimes it is mental—off-task thinking, daydreaming, wishful thinking, and so on. Often mental disengagement cannot be sustained, as situational cues force one to confront the obstacle and consequently the self-regulatory challenge. In such cases, the result is repetitive negative rumination, focusing on self-doubt and perceptions of inadequacy.

These two classes of responses to adversity (effort vs. disengagement) form a dichotomy. One class involves continued comparisons between present state and goal and efforts at movement forward. The other involves avoidance of comparisons, and quitting (Gendolla, Wright, & Richter, 2012; Klinger, 1975; Richter, Gendolla, & Wright, 2016; Wortman & Brehm, 1975). Behaviors ultimately flow to one or the other of these two. The theme of divergence in responses as a function of expectancies is an important one, applying to a surprisingly broad range of literatures (Carver & Scheier, 1998; Gendolla et al., 2012; Richter et al., 2016).

Expectancies Vary in Specificity

The fact that goals vary in specificity—from very general to very concrete and specific—suggests that people may have a comparable range of variations in expectancies (Armor & Taylor, 1998; Carver & Scheier, 1998). You can be confident or doubtful about having an interesting life, about not boring other people, about being able to speak clearly in public, or about buttoning your shirt correctly.

Which of these expectancies matter? Probably all of them. It is often assumed that behavior is predicted best when the specificity of the expectancy matches that of the behavior. Sometimes it is argued that prediction is best when taking into account several levels of specificity. But many outcomes in life have multiple causes, and people often face situations they have never experienced before. It may be that in this kind of circumstance, generalized expectations are particularly important (Scheier & Carver, 1985).

The same principles that apply to a focused sense of confidence also apply to generalized confidence: optimism versus pessimism. When we talk about optimism and pessimism, the sense of confidence is just more diffuse and broader in scope. Thus, when facing a challenge (any type of challenge), optimists should tend to be confident and persistent, assuming that the adversity can be handled in one way or another. Pessimists should be more doubtful and hesitant, more ready to anticipate disaster. We return to this point later on.

Sometimes when people give up trying to reach a goal, they quit, and that is the end of it. Sometimes, however, something else happens. Sometimes when things are going poorly, expectancies of success are dim and people want to quit, but they do not quit altogether. Rather, they swap the out-of-reach goal for a less demanding one, in a kind of limited disengagement. This limited disengagement has an important positive consequence: It lets people remain engaged in the general domain they had wanted to quit (or felt the need to quit). By scaling back (giving up in a small way), they keep trying to move ahead (thus *not* giving up, in a larger way).

Self-Regulation and Stress Models

The model of self-regulation sketched in the preceding pages was intended to characterize the structure of everyday behavior. Although examples used as illustrations often came from achievement- or task-related contexts, the model is not one of achievement, or even of “task” behavior. Rather, the principles apply to behavior in general. Some goals concern achievement; others concern the nourishment of human relationships (Fitzsimons, Finkel, & vanDellen, 2015). We believe, however, that the actions linked to these goals have a common structure, and that the structure is partially captured by the principles we outlined earlier.

Although this model is about behavior in general, we believe it provides a useful window on the experiences of stress and coping. From a self-regulatory viewpoint, stress is a particular class of experiences, and coping is the responses that follow from these experiences. From this viewpoint, stress occurs when people encounter obstacles to attaining desired goals or avoiding threats. Coping is efforts to create conditions that foster continued moving toward desired goals (or away from threats), or efforts to disengage from goals that are seen as no longer attainable.

It may not be fully apparent, but this line of thought resembles other analyses of stress and coping per se. In this section we briefly consider two such analyses and their relations to these principles of self-regulation.

Stress and Coping

Most contemporary views of stress and coping trace in one way or another to the work of Lazarus and Folkman and their colleagues (e.g., Lazarus, 1966; Lazarus & Folkman, 1984). Their model assumes that stress exists when people confront circumstances that tax or exceed their ability to manage them. This places the experience of stress squarely in the domain of behavior in which difficulties are being confronted. When people find themselves hard-pressed to deal with some serious impediment or some looming threat, the experience is stressful.

The Lazarus and Folkman (1984) model incorporates several themes. One is that

stress entails the perception (appraisal) of threat, loss, or challenge (though challenge has held up less well in this respect than the other two as a stressor). *Threat* is a perception of the impending occurrence of something bad or harmful. *Loss* is a perception that something bad or harmful has already happened, or that something of value has been taken away. *Challenge appraisal*, in contrast, is a perception that one can gain or grow from what nonetheless will be a demanding encounter.

Although work in the Lazarus and Folkman tradition has not always emphasized this point, threats and losses are conditions that prevent or impede maintenance or attainment of desired goal values. Loss prevents the continued existence of a desired state of affairs (e.g., death of a spouse prevents a continued relationship). Threat suggests imminent interference with continued pursuit of desired activities or conditions (e.g., serious illness threatens one's life goals, one's golf game, and one's perception of reality).

We focused here on interference with desired goals. It should be clear, however, that the principles apply just as well to avoidance of threats. Perceptions that imply the imminent occurrence of a punishing condition (Affleck, Tennen, Pfeiffer, & Fifeield, 1987), or suggest the inability to escape from such a condition, will also be stressful.

Another point of similarity between self-regulation models and the Lazarus–Folkman model concerns the dynamic, continuous evaluation of the situation and one's responses to it. In the Lazarus–Folkman model, people do not always respond to stressful encounters in a reflexive, automatic way. Rather, they often weigh various options and consider the consequences of those options before acting, via secondary appraisals. Decisions about how to cope depend in part on confidence or doubt about the usefulness of a given response. Thus, issues of confidence and doubt, as well as the disruption of intended behavior, are embedded in this model.

Conservation of Resources

Another view on the experience of stress, developed by Hobfoll (1989), begins with the

idea that people have a set of resources that they try to protect, defend, and conserve. Resources can be physical (e.g., a house, car, clothing); they can be conditions of one's current life (e.g., friends and relatives, stable employment, sound marriage); they can be personal qualities (e.g., a positive view of the world, work skills, social prowess); or they can be energy resources (e.g., money, credit, or knowledge). A resource is anything the person values.

This theory holds that people try to sustain the resources they have and acquire more. Stress occurs when resources are threatened or lost, or when people invest their resources and do not receive an adequate return on the investment. Hobfoll (1989) argued that loss is the central experience in stress (Hobfoll, Freedy, Green, & Solomon, 1996). Threat is an impending loss. One might think of the failure to receive an adequate return on investment of resources as the loss of an anticipated new resource.

This theory uses an economic metaphor for experience. People acquire resources, defend them, and use them to acquire more resources. Stress occurs when the market has a downturn in the value of your resources or when an event of some sort wipes out part of your resource base. In our view, however (and nothing about this view contradicts Hobfoll's position), these resources matter to people inasmuch as they facilitate movement toward desired goals (or avoidance of threats).

What good is having a car? It can take you places, and it can make an impression on people. What use are friends? They can help you feel better when you are upset, and you can do things of mutual enjoyment with them. What use is a positive life view? It keeps you moving toward a variety of goals. Work skills permit you to complete projects, achieve things, and hold a job that fosters continued movement toward goals. Money and influence are means to a variety of ends.

In short, for most people, resources are intimately bound up in the continuing pursuit of goals. Thus, we think that any attempt to conserve resources occurs in the implicit service of eventual continued goal attainment. A loss of resources represents a threat to that continued goal attainment. Once again, we see a strong implicit connection to principles of self-regulation.

The Structure of Coping

These approaches to stress have a good deal in common with self-regulatory principles. The self-regulatory principles also have important implications for conceptualizing the activities of coping. Coping responses have been organized in several ways by different authors (e.g., Carver & Connor-Smith, 2010; Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001; Skinner, Edge, Altman, & Sherwood, 2003). However, two distinctions in particular among coping responses have become ingrained in the literature.

A distinction that was made early on (Lazarus & Folkman, 1984) was between problem-focused and emotion-focused coping. Problem-focused coping consists of attempts to remove the obstacle or to minimize its impact. Emotion-focused coping is attempts to reduce the distress emotions caused by the obstacle (either by reappraising it or by management of the emotions; Gross, 1998). Although these two classes of responses have different proximal goals, they also facilitate one another (Carver & Connor-Smith, 2010). Problem-focused coping diminishes the threat, but thereby also diminishes the distress generated by that threat. Emotion-focused coping diminishes distress, which makes it possible to consider the problem more calmly, perhaps yielding better problem-focused coping.

Another, more recent, distinction is between engagement coping and disengagement or avoidance coping (Carver & Connor-Smith, 2010; Skinner et al., 2003). Engagement coping encompasses problem-focused coping and many sorts of emotion-focused coping. In contrast, avoidance coping is a set of responses that appear to be aimed either at avoiding acknowledgment that the problem exists (via self-distraction, denial, substance use, wishful thinking, etc.) or at giving up the attempt to do anything about it (by substance use, giving up goals that are being interfered with, etc.). Sometimes disengagement coping is almost literally an effort to act as though the stressor does not exist, so that it does not have to be reacted to, behaviorally or emotionally.

This distinction between engagement coping and disengagement coping has a very

strong resemblance to the distinction made earlier between continued effort and disengagement in the self-regulatory principles on which this chapter is based. This further illustrates our main theme about stress and coping: that coping is self-regulation under conditions of adversity.

Threat, Loss, Disruption, and Normative Life Processes

We outlined in the first section of this chapter a set of principles as a model of self-regulation. In the second section, we indicated some broad similarities between that model and two views on the nature of stress. We now turn to a different point. Here we consider the pervasiveness of stress in life, and some of the diverse ways in which it can arise and be dealt with.

Although it is certainly possible to think of stress in terms of such events as natural disasters, life-threatening illnesses, and human-inflicted cruelties, not all of what gets termed *stress* is so distinct from the normal flow of behavior. Much of the stress in life arises from being boxed into corners or experiencing conflict within oneself. These experiences have the same structure as we earlier argued underlies stress in general; that is, in each case, there is an impediment to forward movement toward desired goals or away from threats.

As a way of illustrating the breadth of applicability of this idea, in this section we consider several sorts of impediments that originate fairly commonly in the flow of ordinary behavior. We do so within the framework of self-regulation we outlined earlier (Carver & Scheier, 1998; for related views, see Vohs & Baumeister, 2016; Fitzsimons et al., 2015). This is largely a conceptual analysis, as research on most of these points is relatively sparse.

Problems as Conflicts among Goals

One way in which stress can arise follows from the fact that the goal structures that people adopt often contain the potential for conflict. One circumstance in which conflict occurs is when you are committed to two or more goals that cannot be attained

easily at the same time (e.g., being a successful physician while being an involved wife and mother; having a close relationship while being emotionally independent). You cannot do two mutually exclusive things at once. The very act of making a strong effort to attain one goal can constitute an impediment to attaining the other goal, by virtue of slowing down progress toward it and sometimes even literally reversing progress. To the extent that this unintended side effect is salient, the person may experience stress.

There is evidence that conflict among goals does create stress. Emmons and King (1988) had people report the personal strivings that motivate their lives, then rate those strivings. This included rating the extent to which success in one striving tended to create problems for another one. The researchers found that conflicts between personal goals were tied to psychological distress and physical symptoms. In contrast, people who value their strivings and see them as important express greater satisfaction with their lives (Emmons, 1986; see also Lecci, Okun, & Karoly, 1994).

Given the distress produced by goal conflict, people often try to avoid its occurrence. One strategy is to alternate between conflicting goals, addressing first one goal, then the other. Jumping back and forth can be exhausting, however, and it is inefficient (e.g., Altmann, Trafton, & Hambrick, 2014; Pashler, 1994). It is also hard to keep the conflict from reemerging. Another solution is to conclude that one goal matters more to your higher-order values than the other, and to reorganize or reweight your hierarchy accordingly. But this is not easy to do, either. The self as an organization of values is relatively stable. Still, although reorganization of the self is hard and painful (and thus resisted), it does sometimes happen (cf. Crocker & Major, 1989; Heatherton & Nichols, 1994; Kling, Ryff, & Essex, 1997).

Automatic Doubts

Another source of stress is the residue of doubt that can build up in people's minds from extended experiences of adverse outcomes in some domain. As noted earlier, encountering difficulty while acting induces a hazy sense of doubt, which may promote

a more conscious deliberation on the likelihood of success. If the person has had a lot of experience in some domain, memories from those experiences are encoded with a great deal of redundancy. When things get difficult in that domain, people often rely heavily on those memories to inform them about the likely outcome of the current effort.

This sometimes works to people's advantage (if the memories are mostly successes). But all too often, the residual sense is one of doubt or inadequacy. If that residual sense is strong enough, the person will experience an impulse to give up at the first signs of adversity. When doubts are deeply ingrained, you may not even attend well to what's *going on* in the current situation. Being convinced that the situation will end badly, you fail to realize that the difficulty you are experiencing is minor and easily resolved. You give up trying, and the doubt strengthens further. This can eventuate in a tendency to "catastrophize" (Turk & Rudy, 1992).

This automatic overreliance on heavily encoded doubts might be viewed as a case in which people bring their own "stress readiness" to the situation. There are many situations in life in which real but minor impediments arise. The person who brings a heavy burden of doubt into the situation is creating further impediments that need not be there. These further impediments constitute a source of stress for some people in situations that are not stressful for others.

Premature Disengagement of Effort

Consider further the consequences of doubt. As we described earlier, doubt can cause people to scale back on goals or to give up on goals entirely. It can be bad for this to happen too readily. A person who gives up whenever things get difficult will have trouble reaching any goal in life. Disengaging too fast keeps you from trying your best, and it short-circuits potential successes (cf. Steele, 1997).

Sometimes the result is a repetitive pattern of quitting and going on to something else. Such a lack of persistence, moving the person endlessly from goal to goal, can be a serious problem. It is not clear that it involves great stress, however. If people really can put the failures behind them and move

on, the stress of failure should be brief. Only if the recurring lack of commitment serves as a source of problems in and of itself will stress be maintained.

There is also a more subtle pattern associated with premature disengagement. It involves disengagement of *effort*, but a continued commitment to the goal. This person is no longer trying, but has not gotten the goal out of mind. This combination may be reflected in rumination, efforts at self-distraction, off-task thinking, temporarily leaving the scene of the behavior, or cognitive interference (Sarason, Pierce, & Sarason, 1996). Despite these goal-irrelevant activities, the goal has not been abandoned. But any attempt to move toward it is sporadic, disrupted repeatedly.

The process is presumed to go like this: Difficulty leads to an interruption, and the person's doubts prompt disengagement, which is deflected into mental disengagement. This cannot be maintained, because the person has not given up the goal and eventually re-confronts it. There then is a reengagement of effort, which may quickly lead to renewal of doubts and renewal of the impulse, too. Because there is continued commitment to the goal but no movement toward it, the person also experiences distress (Carver & Scheier, 1990, 1998; Klinger, 1975; Pyszczynski & Greenberg, 1992).

In summary, premature disengagement of effort represents another case of an impediment to movement toward a goal. The impediment in this case is the lack of effort, following from doubt. This situation could be made less stressful by devoting greater effort to goal attainment (and making progress in that direction), by abandoning the goal altogether, or by scaling the goal back to something more attainable.

Struggling Too Long toward Unattainable Goals

If there are drawbacks to withdrawing effort too quickly from goals that might be attained, then it is also bad to keep struggling toward goals that are unattainable. Giving up is an indispensable part of self-regulation, because people need to be able to retrace their steps, back out of corners, free themselves to go elsewhere (Mens, Wrosch, & Scheier, 2015; Wrosch & Scheier, 2020;

Wrosch, Scheier, & Miller, 2013). Continued commitment to a goal that is unattainable wastes resources in futile efforts. If the futile efforts are extensive, so is the waste of resources.

Continued commitment to an unattainable goal shares two consequences with the case just considered—premature disengagement of effort while retaining commitment. In both instances, the person is prevented from taking up new, viable goals, because he or she is prevented from noticing, recognizing, or responding to new opportunities (Baumeister & Scher, 1988; Feather, 1989). Both cases also result in distress. The person who is unable to move forward and unable to let go is condemned to suffer. These consequences suggest how important it can be to accept the reality of a permanent change in one's situation (Carver et al., 1993; Scheier & Carver, 2001; Wrosch et al., 2013). Pursuit of the unattainable is another case of an impediment to forward movement. The impediment in this case is real, because the goal is truly out of reach.

Thus, stress can arise both from lack of effort (stemming from doubt) and from commitment to a goal that is impossible to attain. In the former case, there are two ways to reduce the stress; in the latter, there is only one. If the goal is attainable, renewed effort can potentially reduce the stress. This will not happen for an unattainable goal. Whether the goal is truly attainable or not, disengagement from it (or scaling it back to something that is attainable) will have the effect of reducing stress.

Hierarchicality and Importance Can Impede Disengagement

There is an important qualification regarding disengagement, however. There are many reasons why a person might find it hard to disengage. A key reason follows from the idea that goals are hierarchically arranged. Recall that goals are more important and central to the self as one moves from lower to higher levels of a goal hierarchy. Furthermore, lower-order goals vary in how strongly they connect to higher-order goals. It seems likely that disengaging from higher-order goals is always troublesome. Disengaging from a higher-order goal means

giving up on a core element of the self, which people resist (Greenwald, 1980). Less obvious is that disengagement from concrete goals is also difficult if those concrete goals are closely linked to higher-order goals. Under such circumstances, giving up on a lower-order goal means more than simply abandoning the action in question. It also means creating a problem for the higher-order goals to which the lower goal is linked. As a result, disengagement from the concrete goal is more difficult.

Thus, the emergence of stress in people's lives is determined partly by the nature of the organization among their goals and values. It may be easy to step away from a particular unattained goal, in and of itself. But sometimes the relationship of that goal to core values of the self makes it harder to do so. The attempt to give up and step away then induces stress, because it creates an impediment to the attainment or maintenance of the higher value.

When Is Disengagement the Correct Response?

It will be apparent from the foregoing that a critical question in life is when to keep trying and when to give up (Pyszczynski & Greenberg, 1992). On the one hand, disengagement (at some level, at least) is a necessity. Disengagement is a natural and indispensable part of self-regulation (Wrosch & Scheier, 2020; Wrosch, Scheier, Carver, & Schulz, 2003). If we are ever to turn away from efforts at unattainable goals, if we are ever to back out of blind alleys, we must be able to disengage, to give up and start over somewhere else.

The importance of disengagement is particularly obvious regarding concrete, low-level goals: People must be able to remove themselves from literal blind alleys and wrong streets, to give up plans that have been disrupted by unexpected events. Disengagement is also important, however, with regard to some higher-level goals. A large literature attests to the importance of moving on with life after the loss of close relationships, even if the moving on does not imply a complete putting aside of the old (e.g., Cleiren, 1993; Orbuch, 1992; Stroebe, Stroebe, & Hanson, 1993). People sometimes must even be willing to give up values that are

deeply embedded in the self, if those values create too much conflict and distress in their lives. Remaining stuck in the past instead of moving on has been found to create problems for people who have experienced a variety of life traumas (Holman & Silver, 1998).

Giving up is most functional and adaptive, though, *when it leads to taking up other goals*, whether these are substitutes for the lost goal or simply new goals in a different domain. By facilitating the pursuit of alternative goals, giving up a particular goal can potentially increase the opportunity to reengage in something else and move ahead again (Carver & Scheier, 1998; Scheier & Carver, 2001; Wrosch & Scheier, 2020). In such cases, giving up subserves the broader return of the person to engagement with life (Mens, Wrosch, et al., 2015; Wrosch & Scheier, 2020; Wrosch et al., 2013). People need multiple paths to the values that extend deeply into the sense of self. If one path is barricaded, people need to be able to jump to another one.

There is suggestive evidence that there are age differences in the role disengagement plays in overall well-being. In particular, the evidence suggests that it is particularly problematic for older people to have difficulties disengaging (Mens, Wrosch, et al., 2015; Wrosch & Scheier, 2020). Whether this finding is a specific manifestation of the psychological experience of aging more generally will likely be a subject for future research.

It seems likely that substituting a new path for an obstructed one is made easier by having clarity about one's goals at the abstract level. For example, if a person who strongly values a sense of connectedness in a close marriage loses his or her spouse, the sense of connection can be recreated in different ways. A person in this situation who understands that his or her core desire is to *experience closeness* can more readily recognize that there are many ways to do this than can someone who is less clear about the nature of the higher-level goal. Similarly, it seems likely that a person who already recognizes the multiple paths that exist to a given goal will be better prepared to make such shifts, as necessary.

In any case, it seems apparent that the ability to shift to a new goal, or a new path

to a continuing goal, is an important part of remaining goal-engaged. What happens if there is no alternative to take up? No shift occurs, because there is nothing to which one can shift. This is the worst situation, when nothing is there to take the place of what is seen as unattainable (cf. Moskowitz, Folkman, Collette, & Vittinghoff, 1996). Commitment to the unattainable means distress. Waning commitment in this sort of situation means emptiness.

Coping Research Revealing Self-Regulatory Principles: The Case of Optimism

An important theme in our discussion of self-regulatory models was that expectations play a pivotal role in people's responses to adversity. When impediments are encountered (and stress commences), what happens depends on whether the person feels the obstacles can be overcome, the problems solved or circumvented. When people expect to succeed (given the opportunity for further effort), they keep trying, and even try harder. When people see success as being out of reach, they withdraw effort, even give up completely the attempt to reach the goal.

Optimism, Pessimism, and Coping

This reasoning has also been examined in research on an individual-difference variable that influences the ways people cope. It follows from our emphasis on expectancies as an influence on self-regulation that the classes of coping responses outlined earlier should occur in different proportions as a function of people's expectancies. There is considerable evidence that this is so, and we describe a little of it here, focusing on research in which expectancies were operationalized in terms of generalized optimism versus pessimism. This is by no means an exhaustive review of these studies, but rather an attempt to illustrate the broader themes (for broader treatment, see, e.g., Carver & Connor-Smith, 2010; Carver & Scheier, 2017; Segerstrom, Carver, & Scheier, 2017).

Differences in coping responses that are used by optimists and pessimists have been found in a substantial number of studies

(Carver & Scheier, 2003; Scheier & Carver, 1992). In one very early project, Scheier, Weintraub, and Carver (1986) asked undergraduates to recall their most stressful event of the previous month and rate a list of responses with respect to that event. Optimism was related to greater problem-focused coping, especially when the situation was judged to have been controllable. Optimism also related to positive reframing and (when the situation was seen as uncontrollable) with the tendency to accept the reality of the situation. In contrast, optimism related inversely to the use of denial and the attempt to distance oneself from the problem.

The fact that optimists and pessimists differed in their use of problem focused-coping is entirely consistent with the self-regulation model. Not directly predicted, however, was the fact that optimists and pessimists also differed on other responses, including accepting the reality of difficult situations and putting the situations in the best possible light. In retrospect, however, the findings make sense within the self-regulation framework; that is, it may be easier to accept and take on the reality of a negative situation if one is confident of favorable eventual outcomes.

This general pattern of effects has continued to emerge in work on optimism and coping across many years. In 2006, Solberg Nes and Segerstrom published a meta-analysis of 50 studies of optimism and aspects of coping. They organized the coping responses measured in the various studies according to the conceptual framework we described in the preceding section: dividing them into problem-focused versus emotion-focused, crossed by approach versus avoidance. Across the studies, optimism was positively related both to problem-focused approach coping and to emotion-focused approach coping. This was especially true for problem-focused coping with stressors that were characterized as being academic and health-related, but less so for stressors that were trauma-related. On the other hand, the positive association for emotion-focused approach coping was stronger for traumatic stressors than for academic stressors.

Optimism was even more strongly associated—inversely—with avoidance cop-

ing, with pessimists reporting greater avoidance. In this case, the associations were stronger with both aspects of avoidance coping in circumstances that were characterized as academic- or health- related than those characterized as trauma-related (Solberg Nes & Segerstrom, 2006).

Optimism, Coping, and Emotional Well-Being

These studies establish that optimists cope in different ways than do pessimists. Other work has linked such differences in coping to differences in emotional outcomes. One early study examined how women cope with treatment for early stage breast cancer during the first year after treatment (Carver et al., 1993). Optimism, coping (with the diagnosis of cancer), and mood were assessed the day before surgery, 10 days postsurgery, and at three follow-up points. Both before and after surgery, optimism was associated with a pattern of coping that revolved around accepting the reality of the situation, placing as positive a light on it as possible, trying to relieve the situation with humor, and (at presurgery only) taking active steps to do whatever there was to be done. Pessimism was associated with denial and behavioral disengagement at each measurement point.

These coping tactics also related strongly to subjects' distress. Positive reframing, acceptance, and the use of humor all related inversely to distress, both before and after surgery. Denial and behavioral disengagement related positively to distress at all measurement points. Not unexpectedly, given the pattern of the correlations, the effect of optimism on distress was largely indirect through coping, particularly postsurgery. Similar results were found in another study examining head and neck cancer patients (Allison, Guichard, & Gilain, 2000).

Patients are not the only ones affected by health problems: Caregiving for patients is also stressful, and caregivers' well-being is sometimes affected even more than that of the patients (Roach, Averill, Segerstrom, & Kasarskis, 2009). Higher optimism among cancer caregivers has been associated with less depression and less adverse impact of caregiving on the caregivers' physical health (Given et al., 1993). Similar results have been found for spousal caregivers of Al-

zheimer's patients (Shifren & Hooker, 1995; for more extensive review of associations between optimism and physical health, see Mens, Scheier, & Carver, in press; Scheier & Carver, 2018).

Other researchers have also found that coping mediates the relationship between optimism and well-being in circumstances that might be seen as stressful but are more normative. For example, in a study that examined optimism, stress, depressive symptoms, and the development of social support among college freshmen, Brissette, Scheier, and Carver (2002) found that optimism predicted lower stress and depressive symptoms throughout the semester. In addition, those who were more optimistic at the beginning of the semester experienced greater increases in their social support networks by semester's end. The findings of this study suggest that the better emotional outcomes of optimists may be fostered partly by their ability to recruit social support networks. In another study that lends additional support to that interpretation, the partners of optimists saw their partners as being more supportive in resolving conflicts than did the partners of pessimists (Srivastava, McGonigal, Richards, Butler, & Gross, 2006).

The influence of this individual-difference variable on emotional well-being has a number of further reverberations in other spheres of life. For example, one study of Mexican American families found that mothers' optimism was related to lower levels of concurrent internalizing symptoms, which in turn were related to more positive involvement in parenting. Those differences in parental involvement at Time 1 predicted better social adjustment among the children a year later (Z. Taylor et al., 2012).

Optimism, Coping, and Physical Well-Being

Much of the research on optimism has been in health psychology. Some of it has examined optimism and physical well-being. The general line of thinking behind this research is that optimists may be less reactive than pessimists to the stresses of life, and better copers with those stresses. The lower physiological stress responses may (over many years) result in less physical wear and tear on the body. The result may be better physical health and

even greater longevity. We describe in this section a couple of examples of this research (for broader treatment, see Carver & Scheier, 2017; Mens et al., in press; Rasmussen, Scheier, & Greenhouse, 2009; Scheier et al., in press; Scheier & Carver, 2018).

An important source of evidence linking optimism to lower levels of cardiovascular disease comes from the Women's Health Initiative (WHI), a large-scale project studying quality of life, chronic disease, morbidity, and mortality across time among American women. Using WHI participants, Tindale et al. (2009) studied over 95,000 women over an 8-year period. All were free of cancer and cardiovascular disease at study entry. Optimists were less likely than pessimists to develop coronary heart disease (CHD), less likely to die from CHD-related causes, and had lower total mortality across the 8 years of study. The advantage due to optimism ranged from 9% for incident cases of CHD to 30% for CHD-related mortality.

Healing and immunity also appear to be affected by optimism. In one study, men were classified as "slow healers" or "fast healers" after a skin biopsy. Fast healers were more optimistic than slow healers (Ebrecht et al., 2004). Optimism also has predicted better immune response to an influenza vaccine among older adults (Kohut, Cooper, Nickolaus, Russell, & Cunnick, 2002). Immune responses are tricky to interpret, though, because they are sometimes suppressed when there are other behavioral demands, in a process of conservation of energy (Segerstrom, 2010). Under very high challenge, optimism has been related to lower, rather than higher, immune responses. This seems to suggest a pattern of greater engagement with demanding goals, resulting in suppression of immune responses (Segerstrom, 2005, 2006).

Concluding Comments

In this chapter we have pointed to links between a model of the self-regulation of action and the experiences of stress and coping, along with some illustrations of how the concepts can be integrated. We pointed to conceptual links between the elements of the self-regulation model and two views of stress;

to distinctions among aspects of coping that seem to flow readily from the self-regulation model; to a series of ways in which stress can arise in the course of ordinary behavior; and to some research findings that reveal both the divergent self-regulatory functions involved in coping (effort and disengagement) and individual differences in the manner in which people cope with adversity as a function of their expectations.

In closing, we make one last point about the links among stress, coping, and self-regulation. This point is not unique to the perspective we have taken here, but it seems to be implied with particular clarity by it. The point is this: Stress is not an all-or-none phenomenon, and coping is not fundamentally different in kind from other behavior. Disruptions in life fall along a continuum, ranging from minor frustrations to devastating losses. All disruptions raise issues that need to be resolved by the people experiencing them. The approach we have taken here suggests that the underlying structure of those issues is the same, whether the disruption is due to a minor frustration or a devastating loss. A confrontation with adversity (regardless of its source) can be seen as the origin of stress, whether mild or severe. The person's effort to dissolve the adversity, to dampen its subjective impact, or to accommodate to the new life situation that the adversity brings with it, are the essence of coping—and of self-regulation.

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PART VI

SELF- AND SOCIAL PROCESSES

Relationships, Culture, Environment

CHAPTER 26

Naturalizing the Self

Richard W. Robins

Late in his life, Michelangelo began carving what many art historians consider his most mature and provocative sculpture, the *Florentine Pieta*, an enormous 8-foot statue he intended to place at the top of his own tomb. After working intensely for a decade on this monumental project, the artist entered his studio one day and, in a fit of rage, assaulted the sculpture with a sledgehammer. He broke off the hands and legs and nearly shattered the work before his assistants dragged him away. Why would Michelangelo attempt to destroy one of his greatest creations, a sculpture considered among the finest works of the Renaissance?

How would a personality psychologist answer this question? A trait researcher might infer that Michelangelo was highly impulsive and dispositionally prone to aggression. A biologically oriented researcher might speculate that he had a deficiency in the monoamine oxidase A gene, low levels of serotonin, and an atypical pattern of activation in the frontal and temporal lobes. A motivational researcher might assume that Michelangelo's goals shifted and the *Florentine Pieta* came into conflict with other important life goals. Yet none of these explanations provides a completely satisfactory account of Michelangelo's seemingly irrational act.

It is only through a consideration of self-processes—identity, self-esteem, and self-regulation—that one can begin to understand Michelangelo's behavior. An analysis of Michelangelo's "self" allows us to formulate hypotheses concerning a heightened sense of perfectionism and shame that likely accompanied his reputed narcissistic tendencies, a failure to live up to his own expectations and those of his father (who equated sculpting with manual labor), a breakdown in self-regulation, and an identity crisis due to his impending death and an (arguably) inaccurate self-perception that his accomplishments were inadequate compared to those of his greatest rivals, Leonardo da Vinci and Raphael.

Many aspects of human behavior are inexplicable without the notion that people have a self. In fact, an understanding of the self is necessary for a complete understanding of personality processes—the processes that generate and regulate thoughts, feelings, and behaviors. An understanding of the self helps explain not only such exceptional behaviors as Michelangelo's destructive act but also many aspects of everyday social life: Why do some individuals feel shy in social contexts, whereas others do not? Why are some individuals boastful in some situations but insecure in others? Why are

some individuals preoccupied by achievement, whereas others crave intimacy?

Psychology's Most Puzzling Puzzle

In *Principles of Psychology*, William James (1890) referred to the self as psychology's "most puzzling puzzle" (p. 330). For the past century, psychologists have debated whether it is a puzzle worth puzzling about. In an article titled "Is the concept of self necessary?" Allport raised the possibility that the self is "an impediment in the path of psychological progress" (1955, p. 25). Skinner (1990, p. 1209) argued that "there is no place in a scientific analysis of behavior for a mind or self." Pinker (1997) described self-awareness as an intractable problem that we as a species are not sufficiently evolved to grasp, and Ramachandran (2007, 2011) characterized the self as "science's greatest riddle and "the most challenging problem of all."

Despite this daunting level of pessimism, I believe that a scientific understanding of the self is not only possible but is, in fact, fundamental to a science of personality. Research over the past few decades has documented many ways in which the self influences how people think, feel, and act in particular situations, the goals they pursue in life, and the ways they cope with and adapt to new environments. Many prominent areas of personality research assume a central role for the self, including the study of self-conscious emotions such as pride and shame (e.g., Tracy, Robins, & Tangney, 2007; Tracy & Weidman, Chapter 23, this volume), traits such as narcissism (e.g., Donnellan, Ackerman, & Wright, Chapter 29, this volume), internal working models of attachment (e.g., Collins & Allard, 2004; Fraley & Shaver, Chapter 30, this volume), narrative identity (McAdams, 2013; McLean & Lilgendahl, 2019), self-regulation (Carver & Scheier, Chapter 25, this volume; Hoyle & Davison, Chapter 28, this volume), goals and motivation (e.g., Sommet, Elliot, & Sheldon, Chapter 4, this volume), and the study of personality development (McAdams, Shiner, & Tackett, 2019; Roberts & Nickel, Chapter 11, this volume). In fact, self and identity processes are considered a key mechanism underlying consistency and change in personality (Roberts & Wood, 2006). Finally,

and perhaps most important, the science of the self is in many ways the science of our field's most cherished and widely used methodological tool, self-reports. Much of what we know about personality is based on self-report measures that depend critically on self-perception processes and accurate self-knowledge (Robins & John, 1997; Vazire & Wilson, 2012).

A Naturalist View of The Self

In the early days of scientific psychology, the self was an integral part of many general theories of the person. Indeed, many "classic" readings on the self come from the writings of the most influential theorists of the first half of the 20th century: James (1890), Baldwin (1897), Cooley (1902), Mead (1934), McDougall (1908/1963), Murphy (1947), Hilgard (1949), and Allport (1955). Three basic themes recur in these broad conceptions of the person. First, the self was seen as fundamental to understanding social behavior and personality processes, and many early theorists attempted to link self-processes to other basic psychological processes, such as memory, attention, and emotion. Specifically, the self was seen as an executive body coordinating the thoughts, feelings, and behavior of a highly complex, dynamic organism. Second, many of these perspectives emphasized the interplay between biological and social forces: The self is constructed out of the raw materials endowed by nature and shaped by nurture. Third, the self was conceptualized from an evolutionary and functionalist perspective. The early theorists were working in the immediate aftermath of Darwin, and many drew heavily on evolutionary thinking. In particular, James (1890) was committed to a *naturalistic* explanation of the origin and function of self-awareness, assuming that conscious mental life "emerged by way of natural selection because it gave our species certain survival, and therefore reproductive, advantages" (p. 52).¹

For most of the latter half of the 20th century, research on the self moved away from these three themes, as researchers came to conceptualize the self as a social and cultural construction. In the past few decades, however, there has been renewed interest in

a naturalist view of the self, spearheaded by neuroscientists such as Crick (1994), Gazzaniga (1998), Edelman (2005), Ramachandran (2007, 2011), Dehaene (2014), Koch (2017), Stevens and Woodruff (2018), and others who study the neural mechanisms underlying consciousness in an attempt to understand how a sense of self emerges from the activity of the brain. Memory researchers have linked various forms of memory to the conscious experience of self (e.g., Tulving, 2005; Rowlands, 2016), and examined neural activation during processing of self-relevant information (Kelley et al., 2002; Magno & Allan, 2007). Baron-Cohen (2008), Ramachandran (2011), Ananthaswamy (2015), and others provide vivid illustrations of how neurological disorders such as autism can produce profound deficits in self and identity. Finally, numerous clinical disorders involve self-related problems such as distorted self-perceptions and low, fragile, and contingent self-esteem.

Thus, researchers from a wide range of perspectives outside of the traditional boundaries of personality psychology are grappling with basic issues about the self. Moreover, within personality (and social) psychology, an explosion of recent research has linked brain mechanisms to self-related processes, including research on the neural bases of self-esteem (Izuma, Kennedy, Fitzjohn, Sedikides, & Shibata, 2018), self-control (Berkman, 2018), pride (Takahashi et al., 2008), autobiographical memory (Levine, 2004), and cultural influences on self processes (Han, 2017; Han & Ma, 2015). Building on this emerging biological account, researchers have speculated about the evolutionary origins of the self (Sedikides & Skowronski, 2003) and explored the genetics of self-esteem and other self processes (e.g., Cai & Luo, 2017; Jonassain, 2010; Neiss et al., 2005).

What unites many of these perspectives is a naturalist view of the self—a belief that the human self can be studied like any other natural phenomenon. One goal of this chapter is to help self research recover its roots by reconnecting it with broader scientific concerns. To accomplish this goal, I will return to a set of foundational issues—the ontogeny, biological basis, and evolutionary function of the self—that preoccupied William James when he formulated his naturalist perspective of the mind.

Overview of the Chapter

The literature on the self is enormous. A survey of personality psychologists indicated that 43% of respondents study the self-concept and 35% study self-esteem (Robins, Tracy, & Sherman, 2007). A PsycINFO search for the subject “self” identified over 225,000 articles published in the past 30 years, with over 1,500 articles appearing just in the *Journal of Personality and Social Psychology*.²

It is difficult to write a chapter about a topic that is so vast, arguably as vast as the entire field of personality psychology. Instead, in this chapter, I have chosen to focus on a particular perspective on the self, the naturalist perspective. Why a naturalist perspective? Because this perspective highlights aspects of the self that best connect with the realist orientation adopted by many, if not most, personality psychologists. In contrast to social constructionist accounts of personality, a realist view takes as a given that people have an essential nature that forms the core of human personality. In the same way, a naturalist view of the self assumes that our self-views are not simply self-presentations, sociocultural constructions, or stories we tell about ourselves. They are real, essential qualities substantiated in memory and exerting causal force on our thoughts, feelings, and behaviors.

Thus, my goal in this chapter is *not* to provide a comprehensive review of the voluminous literature on the self, but rather to step back and reflect on some broader questions about the self: What is the self? When does the self first emerge, and how does it change over time? Is the self distinctive to humans? How does the brain build a sense of self? Is the self a product of evolution? What are the adaptive functions of the self? These questions return us to James’s (1890) initial set of concerns when he formulated his naturalist perspective on self and consciousness.

Basic Questions about the Self

What Is the Self?:

Definitional and Conceptual Issues

The question—what is the self?—has been an abiding concern of philosophers, writers, scientists, and laypeople. Although self

theorists have offered numerous definitions, there is no consensual framework for conceptualizing the various aspects of the self. Some researchers embrace the theoretical richness of the field, whereas others bemoan its conceptual muddiness. One source of confusion is that “the self” refers not to a single entity but rather to myriad structures and processes (Leary, 2004). Consider the example of happiness. One aspect of the self is the feeling or experience of happiness. This conscious experience is what philosophers refer to as *qualia* or *sentience*. A second aspect is the conscious recognition that my feeling of happiness belongs to me—it is I who feels happy. As Flanagan (1991) observed, “Thoughts, feelings, and the like do not sit around disembodied. All thoughts and feelings are ‘owned,’ that is, all thoughts and feelings occur to someone” (p. 31). A third aspect refers to attentional focus—I can be aware (i.e., conscious) or not aware of my current state of happiness. For example, I could be feeling happy but not pay attention to this, because I am focused on skiing down the mountain. Finally, I can have a stable representation of myself as happy; for example, I can think of myself as a generally happy person. These four examples are only a sampling of the many ways researchers have defined the self.

Self-Awareness and Self-Representations

Despite the complexity of the self literature, all of the extant definitions fall into two basic classes of phenomena: (1) an ongoing sense of self-awareness and (2) stable mental representations. These two aspects of the self correspond to James’s (1890) classic distinction between the self-as-perceiver (the “I”) and the self-as-object of perception (the “Me”). Figure 26.1 shows some of the phenomena that relate to these two aspects of the self. What unites the different conceptions listed under *ongoing sense of self-awareness* is a view of the self as an active agent that processes information and regulates behavior. Our ongoing sense of awareness is the one psychological phenomenon for which we seem to have direct and irrefutable evidence—we all know what consciousness feels like from the inside. As Farthing (1993) notes, “Casual introspection seems to reveal a self: the unique entity

Ongoing Sense of Self-Awareness	Stable Self-Representations
• “I” • Self as subject • Self as perceiver • Self-awareness • Self-consciousness • Subjective experience • Sentience • Phenomenology • Qualia • Agent/homunculus • Self-monitoring • Global availability	• “Me” • Self as object • Self as perceived • Self-representation • Self-concept • Self-knowledge (semantic memory) • Linguistic/symbolic self • Self-schema • Self-theories • Ideal/ought/possible selves

FIGURE 26.1. Two classes of self phenomena.

that is the perceiver of our perceptions, the thinker of our thoughts, the feeler of our emotions and desires, and the agent of our actions” (p. 139). *Self-awareness* refers to a particular form of consciousness in which the object of attention is the self. Thus, I can be conscious that I am talking, but my consciousness becomes self-consciousness when I reflect on the fact that I am not speaking as lucidly as usual. Our self-awareness provides us with an ongoing status report about what we are sensing, feeling, and thinking in the moment, and allows us to conceive and make use of internal representations of our own knowledge, abilities, and actions (Dehaene, Lau, & Kouider, 2017). The aggregate of these inputs may be what generates a sense of self in humans—the feeling of ownership over our own agency.

A second class of self phenomena involve *stable mental representations* (see Figure 26.1). The self as mental representation (“Me”) is a product of reflexive activity rather than the reflexive activity itself (“I”). These mental representations can be of the person as a physical, psychological, social, or moral being in the past, present, or future. In many ways, self-representations are no different than representations of any other objects in the natural world, including chairs or zebras.

Self-representations can vary in how abstract they are. At the most specific level are personal or autobiographical memories, such as “I remember feeling shy when I was with this person,” which are related to episodic memory. At the next level are semantic representations or generalized knowledge about the self, such as “I am a shy person.” Finally, at the most abstract or conceptual level are meta-theories about oneself such as growth mindset (Dweck, 1999) and personal narratives (McAdams, Chapter 5, this volume; McAdams, 2013; McLean & Lilgendahl, 2018).

Both self-awareness (“I”) and self-representations (“Me”) have been conceptualized as individual-difference variables (although, as noted below, the basic capacity for self-awareness and self-representation is assumed to be common to all humans). For example, people differ in the degree to which they are chronically self-aware, and focus attention on themselves (Carver & Scheier, 1998). Similarly, people’s self-representations (the “Me”) vary in content, valence, structure, and complexity. Individual differences in the descriptive content of the Me—some people see themselves as shy and others outgoing, some as anxious and others calm, and so on—are the essence of personality self-reports, and predict a wide range of real-world outcomes (e.g., Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007).

Each self-representation, as well as the collective set of representations characterizing a person’s self-concept, can vary in valence, or social desirability. A person who sees him- or herself as shy, cruel, inconsiderate, anxious, and unimaginative would have a more negatively valenced set of self-representations than a person who sees him- or herself as outgoing, kind, considerate, calm, and imaginative. Some researchers have argued that individual differences in self-esteem reflect the aggregated valence of people’s domain-specific self-representations. For example, when one perceives oneself as shy and considers shyness to be a negative trait, one will have a more negative self-evaluation (e.g., “I feel bad about myself because I am shy, and shyness is a bad thing”). When such negative self-representations permeate the self-concept, low self-esteem is likely to result. Longitudinal studies have demonstrated that low

self-esteem prospectively predicts antisocial behavior, depression, relationship problems, lower occupational status, and other aspects of psychosocial functioning (Cameron & Granger, 2019; Mier & Ladny, 2018; Orth, Robins, & Widaman, 2012; Orth & Robins, 2019; Trzesniewski et al., 2006). Thus, both the content and the valence of individuals’ self-representations have important consequences for a wide range of outcomes.

Furthermore, there are individual differences in the structure of self-representations: One person may associate “shyness” with being quiet, reserved, and polite, whereas another person may associate “shyness” with being anxious, fearful, and defensive. Consequently, the two networks of activation will result in distinct patterns of behavior when the concept of “shyness” is salient due to the structure of this self-representation (McConnell, 2011).

Finally, there are individual differences in the complexity of self-representations. Higher self-complexity, or *self-concept differentiation*, refers to variability in self-representations across different social roles or contexts. For example, someone high in self-concept differentiation might see himself as “adventurous and extraverted” with friends but “risk-averse and introverted” with his parents, whereas someone low in self-concept differentiation might see himself as “adventurous and extraverted” in all social contexts (Donahue, Robins, Roberts, & John, 1993). Individuals with high levels of self-concept differentiation tend to exhibit worse psychological adjustment and mental health, demonstrating the importance of having an integrated, rather than fragmented, sense of self (Bleidorn & Ködding, 2013; Donahue et al., 1993).

In conclusion, complex self processes derive largely from more low-level processes, namely, the capacity to form stable self-representations (the “Me”) and an ongoing sense of self-awareness (the “I”) that focuses attention on discrepancies between actual and ideal identities. Although all typically developing humans have stable self-representations and a sense of self-awareness, there are meaningful individual differences in both capacities, and these individual differences are linked to a number of important psychosocial outcomes.

How Many Selves Do We Have?

Some theorists question the assumption that each person has a unique stable self that represents his or her distinctive personal experiences and traits (Brewer & Chen, 2007; McConnell, 2011; Turner & Onorato, 1999). Instead, these theorists argue that society enmeshes the individual in multiple specific social contexts, each imposing a role that confers a distinctive sense of self. Consequently, people have multiple selves reflecting their various group memberships and associated role identities.³

Within psychology, the idea that the “Me” encompasses multiple selves dates back to James’s *The Principles of Psychology* (1890), which included a summary table classifying the levels and structures of the self (p. 329). Table 26.1 shows a revised and expanded version of this table. The first row shows the *personal* or individual self, which reflects people’s beliefs about their private self, including their traits, values, and abilities. The second row shows the *relational* self, which reflects how people see themselves in intimate relationships. The third row shows the *social* self, which reflects how people see themselves in more general interpersonal contexts, including their social roles and reputation. The fourth row shows the *collective* self, which reflects people’s identities concerning their various reference groups, such as their religion, ethnicity, and nationality. Some aspects of identity, such as gender, permeate all levels of the self from the personal (e.g., self-perceptions of feminine characteristics) to the collective (e.g., one’s identity as a “feminist”). Cultures vary in the degree of emphasis on these different levels, with individuals from Western cultures (e.g., United States) focusing on the personal (“independent”) self, and individuals from Eastern cultures (e.g., China, Japan) focusing on the collective (“interdependent”) self (e.g., Markus & Kitayama, 1991; Triandis, 1997; but see Oyserman, Coon, & Kimmelmeier, 2002; Vignoles et al., 2016).

Clearly, the structure of self-representations does not parallel the structure of personality, as embodied in models such as the five-factor model (FFM; John, Chapter 2, this volume). Our self-representations include far more than just perceptions of per-

sonality traits. The FFM was not intended as a complete model of personality, but rather as a model of individual personality traits. Thus, relational, social, and collective aspects of the self were not included in the research that led to the discovery of the FFM, and most lexical studies of personality structure have explicitly excluded social roles and relationships. Moreover, many aspects of the self do not reflect content domains such as the Big Five, but rather how the content of the self is organized, including the degree of differentiation, complexity, and compartmentalization (Bleidorn & Ködding, 2013; Donahue et al., 1993; McConnell, Strain, Brown, & Rydell, 2009; Pilarska & Suchańska, 2014; Showers & Kling, 1996). Consequently, although the FFM effectively captures the trait-relevant aspects of the personal self, it fails to capture many other important aspects of the self, including its organizational structure and features of the relational, social, and collective self.

When Does the Self Emerge and How Does It Change across the Lifespan?

By adulthood, our beliefs about ourselves seem to be relatively enduring. When we wake up in the morning, we have the sense that we are the same person we were the previous day. Even when we experience changes in our identity, such as starting a new job or having a baby, we still know that these changes apply to *our* self. Where does this enduring sense of self come from? At what age does it develop?

Emergence of Self-Awareness

Infants, and virtually all animals, have at least one basic aspect of self-awareness: They can distinguish self from non-self and consequently do not eat themselves when they are hungry. Beyond this rudimentary sense of self, Rochat (2018) argued that “infants possess an implicit sense of their embodied self as a differentiated (distinct), substantial (occupying space), agentive (causing effects in the world), and situated (relatively located) entity among other distinct entities in the world” (p. 2). It is difficult to determine when children develop even more complex forms of self-awareness, because they cannot

TABLE 26.1. Layers and Structures of the Self

Levels/locus of audience	Orientation	Description	Example	Basis of self-regard	Cultural differences	Individual differences
Personal	Private	Traits, values, and abilities	"I am a kind person."	Personal aspirations and standards	Independent/individualistic	Personal Identity Orientation Rosenberg Self-Esteem Scale Authentic and Hubristic Pride Scales Private Self-Consciousness Individualism Scale
Relational	Intimate	Other people with whom we have close personal contact	"I am Katie's best friend."	Mutual regard; pride in oneself as a relationship partner; validation from intimate others		Inclusion of Other in Self Scale Mutuality Scale Interdependent Self-Construal Scale Internal Working Models
Social	Interpersonal	Social roles and reputation	"I am a popular professor."	Public recognition; praise from others; pride in role		Social Identity Orientation Public Self-Consciousness Scale Social Self-Confidence (vs. Shyness)
Collective	Communal	Social categories to which we belong	"I am Italian."	Ethnic pride; pride in one's social groups	Interdependent/collectivistic	Collective Identity Orientation Collective Self-Esteem Scale Inclusion of Other in Group Scale Collectivism Scale

clearly communicate what they are thinking and feeling. Instead, researchers must infer the presence of a self from three forms of evidence (Hart & Karmel, 1996): linguistic markers, cognitive-behavioral markers, and emotional markers.

Linguistic markers include self-referencing (e.g., use of personal pronouns such as “my toy”) and similarly for narrative language use (e.g., reference to events of personal significance that happened in the past, “I was happy when I got the toy”). These behaviors signify an emerging sense of self and typically begin around 18–24 months.

Cognitive-behavioral markers include mirror self-recognition, imitation, and role taking. Mirror self-recognition is often assessed in young children with the “Rouge Test,” in which a spot of rouge is covertly placed on a child’s nose while he or she is playing. The child is then placed in front of a mirror, and his or her behavior is recorded. Starting at around age 2, children respond to their reflected image by pointing to the spot of rouge on their nose (instead of pointing to the mirror). This behavior suggests that the “I” in the child’s mind can recognize the “Me” in the mirror, and understand, at some level, the distinction between the two. Interestingly, Priel and de Schonen (1986) found that Bedouin children without previous exposure to mirrors showed mirror self-recognition at the same age as children habitually exposed to mirrors, suggesting that it is more than simply a learned response.

Emotional markers include empathy and self-conscious emotions. Children exhibit empathy as early as 18 months, displaying helping behaviors in the absence of an explicit reward (Warneken & Tomasello, 2006). Soon after, children begin to exhibit self-conscious emotions such as shame, pride, guilt, and embarrassment, all of which require a sense of self. Pride, for example, occurs when individuals construe a positive outcome as relevant to their personal goals and aspirations (i.e., relevant to their identity) and as caused by their own actions or attributes (Robins & Schriber, 2009; Tracy & Robins, 2004, 2014; Tracy & Weidman, Chapter 23, this volume). Thus, to feel a sense of pride (or, conversely, shame), a child must have stable self-representations that include knowledge of his or her goals and identity

concerns, and the capacity to make internal attributions (e.g., to understand that “something about me or my actions caused that to happen”). These capacities seem to emerge around age 2 or 3 (Lagattuta & Thompson, 2007; Stipek, Recchia, & McClintic, 1992). For example, 3-year-olds express pride after success on a difficult (but not an easy) task and shame after failing to complete an easy (but not a difficult) task (Lewis, Alessandri, & Sullivan, 1992).

Together, these three forms of evidence—linguistic, cognitive-behavioral, and emotional markers—suggest that there is a timetable for the emergence of self-awareness, beginning around 18 months and continuing through early childhood.

Development of the Self-Concept (the “Me”)

The emergence of self-awareness sets the stage for the development of the self-concept, as the “I” gazes at the “Me” and begins to form stable representations of the self. Just like the development of self-awareness, our self-representations become increasingly complex over time. By the age of 3, children can describe who they are using concrete descriptors. These descriptors include beliefs about their physical appearance, interests, and abilities (e.g., “I am a boy”; “I am good at soccer”). Although these self-descriptive statements provide clear evidence of a psychological self-concept, each representation is made in isolation of the others, with no coherence or organization to the self-concept. These self-descriptions also tend to be positively biased, because young children have difficulty distinguishing between their actual and desired ability.

Improvements in episodic memory during early and middle childhood contribute to changes in self-concept structure and content between ages 3 and 8 years (Coughlin, Robins, & Ghetti, 2019; Lee, Wendelken, Bunge, & Ghetti, 2016). As episodic memory improves, so does the child’s ability to form autobiographical memories (e.g., “I ran fast and won a medal at the race”) that can be incorporated into his or her self-concept. In addition, reminiscing about these memories helps the child develop a sense of self that is extended in time. For example, discussing a past experience with

a parent or peer reinforces the feeling that the experience happened to him or her and supports a self-concept that extends into the past. Importantly, children's ability to hold dual representations in mind also increases during middle childhood. This allows children to become aware of patterns across their self-representations, from which they extrapolate higher-order information about who they are. For example, a child may infer that he or she is an athletic person based on self-representations including "I play soccer well," and "I ran fast and won a medal at the race." Critically, viewing oneself as athletic represents a higher-order generalization or trait, which results in a self-concept that is more coherent, organized, and complex, as well as more consequential for future behavior. As children develop more complex and abstracted self-representations, they also begin to form stable *evaluations* of their overall worth as a person, providing reliable and valid reports of their global self-esteem by around age 5 (e.g., Harris, Donnellan, & Trzesniewski, 2018; Measelle, John, Ablow, Cowan, & Cowan, 2005).

Late childhood to early adolescence (ages 9–14 years) is a period of increasing complexity and organization for the developing self-concept. Some of these changes arise because children become more aware that others are evaluating them, and consequently engage in more frequent social comparisons (e.g., "I am smarter than all the other kids in my class"; "I am less attractive than my friends"). There is also an increase in self-conceptions concerning interpersonal traits (e.g., "I'm a caring friend") due to the individual's increased focus on peer and romantic relationships. Important changes in self-concept differentiation and abstraction also occur during this period. Differentiation occurs when individuals perceive themselves differently across contexts, such as having an *academic self* that is distinct from their *social self*. For example, they may view themselves as irresponsible in school but as dependable and trustworthy with friends. Abstraction occurs when individuals attempt to make meaningful inferences about who they are based on an integration of traits. For example, a child may infer that she is a conscientious person because she sees herself as responsible, punctual, and

organized across contexts. Abstraction represents a significant advance in self-concept development, allowing the individual to organize self-concept content in ways that lead to greater coherence.

In late adolescence, increases in abstract thinking ability and introspection lead to further differentiation of the self-concept. Importantly, individuals begin to differentiate between their actual and ideal selves. They consider not only what they want to be when they get older but also which psychological traits and abilities they would like to possess, and which future goals they would like to achieve. This period is therefore marked by an increasing orientation toward the future self, which promotes positive change by motivating individuals to engage in behavior aimed at achieving future goals.

By early adulthood, most individuals have developed the cognitive capacities needed to support a self-concept that is coherent, stable, complex, and abstract. However, this does not mean that people's self-conceptions do not continue to change across the lifespan, just that the basic cognitive system underlying self-conceptions is fully mature by early adulthood. As people go through life and face new challenges and opportunities, and experience successes and failures, they learn more about themselves and, in many cases, change their self-conceptions. However, these changes are the result of new information about the self, not further maturation of the underlying cognitive capacities that support the development of self-conceptions. The only exceptions to this developmental sequence are changes in the underlying cognitive system due to a severe mental health disorder or neurological damage, both of which can radically alter a person's self-concept.

In summary, the development of the self-concept (the "Me") follows a specific time course that corresponds to the development of a set of basic cognitive capacities. Parallel to this developmental sequence, systematic changes also occur in the overall valence of the self-concept (i.e., self-esteem). Mean levels of self-esteem tend to increase slightly from the preschool years to middle childhood, plateau (but do not decline) in early and middle adolescence, increase sharply from around age 15 into young adulthood,

continue to increase across adulthood, and then decline in old age, with a sharp drop among those over 90 years of age; this pattern holds across gender, country, ethnicity, and birth cohort (Orth, Erol, & Luciano, 2018; Orth & Robins, 2019).

The increasing crystallization and coherence of the self-concept also leads to developmental changes in the rank-order stability of self-esteem, that is, the tendency for individuals with relatively high (or low) self-esteem at one point in time to have relatively high (or low) self-esteem at a subsequent point in time. Specifically, self-esteem stability tends to be relatively low in childhood, becoming increasingly stable across adolescence and adulthood before declining in old age (Trzesniewski, Donnellan, & Robins, 2003), a developmental pattern mirroring that found for personality traits such as the Big Five (Lucas & Donnellan, 2011; Specht, Egloff, & Schmukle, 2011). By adulthood, longitudinal studies of self-esteem show very strong trait effects (about 80% of the inter-individual variance) and relatively weak state effects (about 20% transient variance or measurement error) for self-esteem (Donnellan, Kenny, Trzesniewski, Lucas, & Conger, 2012; Kuster & Orth, 2013; Wagner, Lüdtke, & Trautwein, 2016). Overall, the evidence supports the notion that self-esteem is an enduring characteristic, comparable in stability to basic personality traits.

The previous sections have shown that the self emerges fairly early in life, is relatively stable over time, and has universal aspects. These conclusions suggest that self-awareness, self-concept, self-esteem, and other aspects of the self may be a product of our evolutionary history. If so, we might expect to see early forms of self in nonhuman animals with a shared phylogenetic history.

Is the Self Distinctive to Humans?

If omniscient beings from another planet were to study the inhabitants of the earth, what would stand out about the human species? Our use of tools? Our leisure time and range of creative endeavors? Our complex social organization and interactions? Certainly, all of these. But what would be most salient about the human species would be our inner world—the richness of our mental

life. Tapping into the inner life of other species is unlikely to reveal the same rich stream of thoughts, feelings, and intentions.

The capacity for self-awareness and self-representations seems to be a universal characteristic of humans. In all human cultures, people have an awareness of their own thoughts and feelings, and have relatively stable mental representations of themselves. The universality of these basic aspects of the self is a striking and highly significant fact that is often overlooked in light of the substantial individual and cross-cultural variability in the way the self is manifested.

Whenever universal (i.e., species-typical) characteristics are found, scientists generally proceed to comparative, cross-species studies. The self may be part of human nature, but is it unique to humans? Comparative psychologists have discovered that a number of other species show advanced forms of self-awareness, based on the same three indicators of self-awareness studied in young children: linguistic, cognitive-behavioral, and emotional markers.

Linguistic Markers

Language-trained great apes (chimps, gorillas, orangutans) show both linguistic markers of self-awareness. Koko the gorilla, for example, displayed the capacity for reflexive self-referencing and narrative language use when she signed “me love happy Koko there” after being shown a picture of herself at a birthday party (Patterson & Linden, 1981, p. 86). As Koko’s statement suggests, gorillas might also have personal memories that serve as the basis for some forms of linguistic self-referencing. Monkeys and nonprimates do not show any of these linguistic markers.

Cognitive-Behavioral Markers

In a series of seminal studies, Gallup (1970) showed that chimpanzees have the capacity to recognize themselves in a mirror, leading him to conclude that “man may not be evolution’s only experiment in self-awareness” (Gallup, 1977, p. 333). In subsequent studies, dozens of animal species have been subjected to the mirror test, but only chimpanzees (Gallup, 1970), orangutans (Suarez & Gal-

lup, 1981), gorillas (Parker, 1994; Patterson & Cohn, 1994), dolphins (Reiss & Marino, 2001), killer whales (Delfour & Marten, 2001), Asian elephants (Plotnik, de Waal, & Reiss, 2006), magpies (Prior, Schwarz, & Güntürkün, 2008), and manta rays (Ari & D'Agostino 2016) have demonstrated the capacity for self-recognition.

The other two cognitive-behavioral markers—imitation and role taking—are present in humans by 2 years of age but extremely rare in other species. Nonetheless, they have been observed in chimps, orangutans, gorillas, and possibly monkeys, suggesting that these animals have at least some capacity for imitation and role taking.

Emotional Markers

Like human children, nonhuman primates exhibit behaviors that suggest the capacity to experience self-conscious emotions and related social emotions, such as compassion and empathy. Much of this evidence, however, is anecdotal. In one incident, Supinah, an orangutan, was observed attempting the difficult task of hanging a hammock from two trees. After successfully hanging the hammock, Supinah “threw herself back in the hammock” and “hugged herself with both arms” in apparent pride (Hayes, 1951, p. 188). In the primate literature, researchers have described dominant, or alpha male, chimpanzees walking with a “cocky” gait, upright posture, and piloerected fur, suggesting the possibility of a precursor to the pride display among these animals (de Waal, 1989). However, more controlled studies are needed.

Evidence for empathy in primates is also mostly anecdotal. For example, it is not uncommon for a wounded chimp to be attended to—fed, groomed, and protected—by other members of the social group; dominant adult males even chase away playing infants or noisy group members to keep them from disturbing the injured chimp (Boesch, 1992). Warneken and Tomasello (2006) provided more direct support for empathy and altruism in chimps. After observing an experimenter “drop” an object and act as if she could not reach it, chimps were found to help out by retrieving the object and giving it to the experimenter, suggest-

ing that they understood the experimenter’s dilemma and empathized. However, in tasks where the experimenter’s goal was more difficult to understand (e.g., trying to get around physical obstacles), chimps failed to provide help, whereas children as young as 18 months did. Similarly, in a study of 40 chimps, Rosati, DiNicola, and Buckholz (2018) found evidence for empathy-based helping behaviors in some contexts (handing an out-of-reach object to an experimenter) but not others (showing no preference for a plate that included snacks for the chimp and the experimenter vs. the chimp alone). Thus, like other aspects of human nature—personality, memory, attachment—we share many capacities with our phylogenetic cousins but differ in the complexity and frequency with which we display these capacities.

The findings of cross-species research on the self have several implications. First, they illustrate the value of a comparative perspective in personality psychology. Comparative research helps identify which aspects of the self are uniquely human and which are common across species. Second, the finding that other species share certain aspects of the human self implies that self-awareness and self-recognition may be evolved capacities. Any capacity that is common to several species of primates is probably not crucially dependent on any species-specific factors, such as culture or language. (Conversely, the fact that certain aspects of the self, such as the experience of guilt, seem to be unique to humans raises the question of whether these aspects are newly evolved differences, or the products of human culture.) Third, comparisons with other species reveal what our conscious mental life might have been like at an early period in our evolutionary history; that is, early humanoids may have had the same level of self-awareness as chimps. A phylogenetic perspective suggests that the self may have evolved from the most basic form of self-awareness (distinguishing self and nonself) to more complex forms of self-awareness seen in nonhuman primates (e.g., self-recognition) to the most complex forms of human self-representations (e.g., identity).

Finally, the existence of cross-species similarities and differences suggests one route to understanding the neural bases of the self. Can we identify brain regions or neural

activation patterns that humans share with other animals who also show evidence of having a self?

How Does the Brain Build a Sense of Self?

The self is clearly dependent, in some manner, on the brain. If we did not have a brain, we would not have a self. But, as Hofstadter and Dennett (1981) pondered, “Who, or what, is the you that has the brain?” (p. 5). At the heart of the mind–body debate is the puzzle of how a mass of tissue and the firing of brain cells can possibly produce a mind that is aware of itself and that can experience the color orange, the feeling of pride, and a sense of agency. Historically, the primary philosophical stance was to accept the mind–body duality and assume that the self is not a physical entity but rather arises from a soul or spirit. For example, Van Leeuwenhoek (1632–1723) believed that the brain contains a special, vital animal spirit that embodies consciousness.

Most scientists have rejected dualism and generally champion some form of materialism. Francis Crick (1994) illustrates this position: “You, your joys and your sorrows, your memories and your ambitions, your sense of personal identity and free will, are in fact no more than the behavior of a vast assembly of nerve cells and their associated molecules” (p. 3). More recently, Dehaene et al. (2017) argued that: “What we call consciousness results from specific types of information processing computations, physically realized by the hardware of the brain. . . . Although centuries of philosophical dualism have led us to consider consciousness as unreducible to physical interactions, the empirical evidence is compatible with the possibility that consciousness arise from nothing more than specific computations” (p. 492). Reflecting the central message of these quotes, Dennett (2005, 2018) asserts that, ultimately, a mechanistic approach to consciousness will explain it just as deeply and completely as other seemingly more concrete natural phenomena, such as metabolism and reproduction.

Those adopting a computational view of the mind believe that at least some aspects of the self can be explained by neural information processing: “Computation has finally demystified mentalist terms. Beliefs are in-

scriptions in memory, desires are goal inscriptions, thinking is computation, perceptions are inscriptions triggered by sensors, trying is executing operations triggered by a goal” (Pinker, 1997, p. 78). From this perspective, self-representations, self-awareness, self-regulation, and other self processes can be explained through the same neural mechanisms that account for the way the mind encodes, stores, retrieves, and manipulates information about the world. The computational view of the mind has also spawned the provocative thesis that the self is an illusion—there is no central executive coordinating our thoughts and feelings (Dennett, 2015, 2017, 2018). Artificial intelligence pioneer Marvin Minsky (1985) describes the mind as a “society of agents,” organized hierarchically into nested subroutines with a set of master decision rules. Although it may seem like there is an agent running the “society,” in fact, it is just the collective action of neural information processing in multiple parts of the brain. Consciousness emerges as different groups of neurons—dealing with vision, memory, touch, and other capacities—are activated. From this perspective, “There is no seat of consciousness, no internal theater where consciousness is a permanent spectator. Instead, what we experience as consciousness is this constant procession of waxing and waning of neuronal groupings” (Greenfield, 1996, p. 159).

Unfortunately, attempts to understand exactly how the brain builds a sense of self have not been particularly successful and speculative accounts abound. For example, two Nobel laureates—Crick (1994) and Edelman (1989, 2005)—have each provided accounts of the neural substrates of consciousness, but these accounts have little in common. Clearly, our current understanding of the neural mechanisms underlying the self is woefully inadequate. If we accept the materialist position and search for the neural mechanisms involved in self processes, we need to go further than grand speculation about a “society of agents” or the “waxing and waning of neuronal groups.” We need to approach the problem of how the brain produces a sense of self using the full array of methods used by cognitive neuroscientists. Below, I discuss several neuroscientific methods that have been used to study the self and self-related phenomena.

Neuroanatomical Studies

An understanding of the gross anatomy of the brain can help us to better understand cross-species comparisons in self-processes. For example, what distinguishes the brains of chimps (who show evidence of mirror self-recognition) from the brains of monkeys (who do not)? Which neuroanatomical areas are common to animals that show the capacity for self-recognition or linguistic self-referencing, or self-conscious emotions? One clue is that humans begin to show evidence of mirror self-recognition around ages 18–24 months, which is when the prefrontal cortex begins to mature in structure and function. Although there are likely many reasons why the neuroanatomy of two species might be similar or different, cross-species comparisons can at least identify possible anatomical regions that merit further exploration.

Neurological Disorders and Brain Damage

Some of the most fascinating avenues for understanding the self have come from the study of neurological disorders. Although the complete loss of a sense of self is extremely rare, it has been known to occur in individuals suffering from dissociative fugue (a feature of DSM-5 dissociative amnesia disorder). These individuals wake up one day with no access to their autobiographical memory and no understanding of who they are—they become strangers to their own minds, forced to construct an entirely new identity or experience a complete absence of selfhood.

Many other neurological disorders also produce profound changes in the self (Feinberg & Paul, 2005; Moe & Docherty, 2014; Ramachandran, 2011). Individuals with autism exhibit widespread deficits in self-awareness, self-understanding, and self-related processes such as empathy and theory of mind (Huang et al., 2017; but see Schreiber, Robins, & Solomon, 2014). Other disorders are characterized by bizarre distortions in body image, including macropsia and micropsia (an Alice-in-Wonderland-like feeling of having grown incredibly large or incredibly small in size), asomatognosia (e.g., a denial that the left side of one's body is part of oneself and assertions that any actions by one's left side were caused by someone else),

and exosomesthesia (a pathological extension of the body image in which touches to the body are experienced as touches to nearby physical objects, and vice versa). Sufferers of Lesch–Nyhan syndrome have a pathological tendency toward self-harm, engaging in dramatic self-injurious behaviors such as biting off their fingers and poking out their eyes; they often feel as if their hands and mouth do not belong to them and are under the control of someone or something else, suggesting that their sense of agency—the feeling that “I” am the one controlling my body—is severely distorted. This same lack of “ownership” over self-generated thoughts and actions is believed to account for the severe delusions experienced by individuals with schizophrenia (Robinson, Wagner, & Northoff, 2016).

Studies of patients with brain damage due to strokes or accidents indicate that the frontal lobes are involved in self-regulation. Phineas Gage is perhaps the most well known example. After an iron rod penetrated his frontal lobes, he showed a diminished capacity to self-regulate, as well as dramatic personality changes, becoming more irreverent, obstinate, and impatient. In general, patients suffering from frontal lobe damage show deficits in the capacity to monitor and reflect on their own mental states (Beer, Shimamura, & Knight, 2004), suggesting that aspects of the self related to self-awareness (the “I”) may be associated with activity in the frontal lobes. Pinker (1997) describes the case of a 15-year-old boy with frontal lobe damage who would stay in the shower for hours at a time, unable to decide whether to get out. Patients with damage to a specific region of the frontal lobes, known as the orbitofrontal cortex, often show highly inappropriate social behaviors that are believed to be caused by impairments in self-insight, the capacity to experience self-conscious emotions, and the ability to use emotional information in the service of self-regulation (Beer, John, Scabini, & Knight, 2006; Beer, Lombardo, & Bhanji, 2010). Patients with damage to the right parietal or prefrontal cortex are unable to recognize themselves in the mirror, suggesting that they have lost the capacity for self-recognition (Keenan, Wheeler, Gallup, & Pascual-Leone, 2000).

Another provocative set of studies has examined self-awareness and self-

representations in patients with amnesia. Tulving (1993) relates the story of K. C., an amnesic patient who lost the capacity to form new episodic memories. K. C. has a sense of self-awareness but not autonoetic awareness (autobiographical remembering, or the feeling that one “owns” one’s memories). K. C. may be conscious in a similar way that a dog is conscious, but not in the same way as individuals without neurological damage. Interestingly, K. C. seems to have the capacity to revise his self-representations even without memories of his specific behaviors and experiences: K. C.’s self-descriptions converge with his mother’s descriptions of his current personality more closely than with her descriptions of his preamnesic personality (Tulving, 1993). Similarly, Klein, Loftus, and Kihlstrom (1996) found evidence that another patient with amnesia, W. J., showed stable and seemingly accurate self-ratings of personality traits across a time period when she lacked the capacity to remember any personally experienced events. These findings suggest that one’s current self-representations are not dependent on consciously accessible memories about personal experiences, that trait self-ratings reflect different cognitive and neural mechanisms than self-reports of specific past behaviors.

Despite the promise of patient studies, the brain damage associated with neurological disorders or lesions is often highly diffuse, making it difficult to pinpoint the specific brain region involved in any observed deficits. Moreover, it is impossible to determine whether the damaged region is responsible for receiving or sending the necessary neural signals, or whether the damaged area simply blocks messages from being relayed between two adjacent brain areas that actually regulate the aspect of self-functioning that is showing a deficit.

Studies of Neural Functioning in Healthy Individuals

Advances in neuroimaging techniques, including methods based on electrical signals (electroencephalography [EEG], event-related potential [ERP], magnetoencephalography [MEG]) and those based on functional imaging (positron emission tomography [PET], functional magnetic reso-

nance imaging [fMRI]), permit more precise measurement of the functioning of the brain. Although these methods are correlational, they allow researchers to see which part of the brain becomes particularly active when someone performs a self-evaluative, self-perceptual, or self-regulatory task. Research in this area converges with patient studies in showing that several regions within the frontal and temporal lobes, including the medial prefrontal cortex (mPFC), dorsolateral prefrontal cortex, medial frontopolar-retrosplenial cortex, orbitofrontal cortex, and anterior cingulate, are more heavily recruited when individuals engage in self-related processes or experience self-conscious emotions (Beer et al., 2006; Beer, 2007; Beer, 2016; Martinelli, Sperdutti, & Piolino, 2013; Qin & Northoff, 2011; Tacikowski, Berger, & Ehrsson, 2017; Takahashi et al., 2008). Even trait-like aspects of the self, such as self-esteem, have been linked to activity in some of the same regions (Izuma et al., 2018).

One interesting question emerging from this research is what happens in the brain when participants are not performing any mental tasks but are simply engaging in self-reflection. It turns out that a set of brain regions in the frontal, parietal, and medial temporal lobes consistently become active when people let their minds wander and engage in self-reflection, mentally traveling back and forth through time to learn from the past and plan for the future (Axelrod, Rees, & Bar, 2017; Mason et al., 2007). Neuroscientists refer to this activity as the brain’s “default mode network,” suggesting that we spend much of our time exploring past and future selves.

Together, this body of research illustrates various ways in which the brain can affect self processes. The ultimate goal of neuroscience research on the self is to understand how the brain generates self-awareness.⁴ This goal is complicated because, like other higher-order mental functions, self processes emerge out of a complex interplay among multiple brain regions. Moreover, there is a crucial issue of determining the direction of causal relations; for example, does conscious self-reflection cause behavior, or is behavior initiated through unconscious brain processes that the conscious mind then watch-

es and reflects? To address this issue, one promising avenue of research is the increasing use of transcranial magnetic stimulation (TMS), which uses a powerful yet noninvasive magnet to alter or suppress activity in a specific region, providing a stronger basis for making causal inferences than brain imaging techniques. For example, Luber, Lou, Keenan, and Lisanby (2012) found that suppressing activity in the mPFC using TMS led to a reversal of the self-enhancement effect, providing causal support for the claim that the mPFC plays a role in self-evaluative processes (see also Kwan et al., 2007).

Finally, the research to date does not conclusively demonstrate that there are any brain networks linked to self processes that are physically and functionally distinct from those used for more general-purpose cognitive processing (e.g., processing information about other people; Beer, 2016). In other words, there is little evidence for a self-specific module or network in the brain. As a result, the field may be moving away from essentialism, which asks where in the brain psychological phenomena are located, toward a constructivist approach, which asks how the brain creates perceptions, beliefs, feelings, and actions (Barrett, 2017).

At least in principle, new knowledge about the brain can help us refine our theoretical conception of the self and self-related processes. A basic premise of the naturalist approach is that the way we conceptualize the self should be consistent with, and constrained by, what we know about how the brain works. For example, if one function of the self is to coordinate and regulate internal body signals and behavioral responses (i.e., self-regulation), then the brain should be doing something different when the self is “in control” than when it is “out of control.” If one motive governing the self system is self-enhancement, then there must be some neural mechanism that “tags” the valence of a self-relevant experience and causes positive experiences to be encoded more deeply than negative ones. And, if there is selective retrieval of positive (vs. negative) autobiographical memories, then there should be identifiable neural processes that enables this to occur (e.g., preferential pathways to representations tagged as positively valenced).

Clearly, we have a long way to go before we truly understand the neural mechanisms underlying these and other aspects of the self. However, the advancing methods of neuroscience hold a great deal of promise and could ultimately lead to discoveries that provide a stronger foundation for a naturalist view of the self.

Is the Self a Product of Evolution?

The eminent geneticist Theodosius Dobzhansky (1964) remarked that the self is the chief evolutionary novelty possessed by humans. Evidence that self-esteem and other self processes are moderately heritable (e.g., Cai & Luo, 2017; Neiss et al., 2005) is consistent with an evolutionary account of the self. However, there are four possible interpretations. First, the self may be “genetic junk,” a characteristic that neither contributes to nor detracts from the organism’s fitness but is nonetheless passed on to succeeding generations. A second possibility is that the self is a functionless by-product of another adaptation that does not solve any adaptive problems on its own but is carried along with the more functional characteristic. For example, the self has been described as an incidental by-product of high-level intelligence and complex sensory processing associated with large brains.

However, it is difficult to write off the self as an evolutionary accident or a functionless by-product. As much as any other component of the mind, the self fulfills the criteria of an adaptive design as outlined by Williams (1966): It is universal, complex, reliably developing, well engineered, and reproduction promoting. Aspects of the self are clearly universal (i.e., species-typical); although there is individual variability in self-awareness and self-representations, all humans have both capacities. The self is also clearly complex, reliably developing, and, as I argue subsequently, promotes survival and reproduction.

Yet even if the self meets the criteria of adaptive design, it may not be an adaptation in the technical sense but rather an “exaptation”—a characteristic that was selected for a different purpose than its current function; for example, a fly’s wings were originally selected for thermoregulation.

tion but were later used for flying (Gould, 1991). However, it seems unlikely that the self is an exaptation, because the environmental features (e.g., complex social interaction) that created selection pressures for self-awareness and self-representations in our ancestral environment and continue to exist in our current environment.

Finally, the self may be a full-fledged adaptation that is part of our genetic programming. If self-related processes serve an adaptive function, then the mechanisms that underlie these processes should be hardwired into the brain, which seems to be the case, as noted previously. The strongest version of this evolutionary account is that the brain has an evolved module governing aspects of the self, such as self-awareness and self-deception, just as it seems to have for language acquisition (Pinker, 1997). More likely, humans have a genetic blueprint for the basic components of the self, but the self is assembled through interaction with the current environment. It is possible that we share with other great apes the same neurologically rudimentary self, but through language development and complex social interaction we simply do more with the raw materials. This position nicely integrates universalist and cultural relativist positions on the self.

The assumption that the self is an adaptation leads to the questions: What function does it serve? What reproductive or survival advantage is conferred by the capacity to reflect on one's internal states and form stable self-representations?

Why Do We Have a Self? What Are Its Adaptive Functions?

How did the self facilitate survival and reproduction during our evolutionary history? The two core aspects of the self, self-awareness and self-representation, can be seen as adaptive solutions to the complex social problems that emerged when our ancestors began living in large, flexibly structured social groups. Individuals who survived and reproduced in our ancestral environment were able to navigate an intricate social system in which they had to negotiate dyadic and group-level coalitions, address cheating and detection of cheaters, deal with

intergroup and intragroup (particularly intrasexual) competition, and undertake novel coordinated activities with other equally flexible and complicated human beings. In such a dynamic and complex environment, the adaptive strategies used by other animals (e.g., instinct and automated behavioral patterns) would not be sufficient.

How does the self help an individual solve these adaptive problems? In our view, the various functions of the self can be subsumed within four broad categories: self-regulation, information processing filter, understanding others, and identity processes. Below I describe each category and discuss how it is linked to adaptive outcomes.

Self-Regulation

One unique aspect of human nature is that we are goal directed, and not only toward proximal goals such as finding food but also long-term goals such as planting crops, finding relationship partners, and parenting our children. These long-term goals are represented in the self system as various forms of self-representations—ideal selves (e.g., “to be a good husband”), possible selves (e.g., “to be a good parent”), dreaded selves (e.g., “to become like my mother”), and so on. These goal representations serve as reference points for self-regulation, motivating us to engage in behaviors that move us toward the attainment of desired identities and away from undesired or feared identities; they function as both goals to be pursued and standards against which outcomes are measured.

Self-awareness also plays a role in self-regulation, providing a sense of volition that facilitates goal-directed behavior and a means to evaluate goal-relevant outcomes (e.g., awareness of discrepancies between actual and ideal selves). Self-awareness provides a mechanism for greater flexibility of response in a social environment filled with competing and often conflicting goals; it allows us to monitor and regulate not only our overt behavioral responses but also our internal responses (e.g., fear, shame, optimism) to external stimuli and circumstances. Self-awareness, according to Dehaene et al. (2017), endows humans with the capacity for “global information availability,” allow-

ing us to efficiently pool information from multiple specialized neural subsystems (e.g., sensory, memory, etc.), then consider the available options, select the best course of action, and coordinate all of the specialized subsystems toward the achievement of the selected goal. In some sense, self-consciousness creates a centralized workspace that imperfectly represents in one part of the brain what the rest of the brain is doing. Together, the two aspects of the self enable us to prioritize and organize goal-directed behavior amid a complex and multiply-nested structure of goals and subgoals. Interestingly, chimpanzees, our close evolutionary cousins, are also able to engage in fairly complex forms of self-regulation: For example, they use various strategies such as distraction, to resist the temptation to eat right away when they know they will get more food later on (Evans & Beran, 2007; see also, Rosati et al., 2018).

The adaptive consequences of self-control (and related self-regulatory traits such as effortful control and conscientiousness) are well-established and span multiple domains of functioning, including achievement and wealth, health and longevity, relationship functioning, and substance use and psychopathology (Atherton, Conger, Ferrer, & Robins, 2015; Atherton, Lawson, Ferrer, & Robins, 2020; Atherton, Zheng, Bleidorn, & Robins, 2019; Barrick & Mount, 1991; Duckworth & Seligman, 2005; Halford, Lizzio, Wilson, & Occhipinti, 2007; Hill, Turiano, Hurd, Mroczek, & Roberts, 2011; Moffitt et al., 2011; Nofle & Robins, 2007; Strauman, 2017).

Information Processing Filter

In a complex social environment, it is inefficient for individuals to attend to and encode all of the information that is constantly bombarding them. The self addresses this dilemma by serving as a filter, or lens, through which the world is perceived and experienced. Our self-representations consist of cognitive structures, or schemas, that organize and direct processing of information about the self. What guides this top-down process? I believe that four basic motives—accuracy, consistency, popularity (i.e., social status and acceptance), and

enhancement—influence which information the self attends to, encodes, retrieves, and acts upon. These motivational orientations can be conceptualized in terms of four basic metaphors (Robins & John, 1997).

According to the *scientist* metaphor, individuals are driven to acquire *accurate* information about themselves and the world (Bem, 1972; Kelly, 1955; Trope, 1986). Just as the scientist develops empirically based theories, laypeople use facts and observations to develop theories about themselves, engaging in a dispassionate search for accurate self-knowledge. Clearly accurate self-representations can serve an adaptive function, helping us to formulate realistic goals and act in accordance with our actual social status, mate value, and other objectively based self-representations. However, as Pinker (1997) notes, “Our brains were shaped for fitness, not for truth” (p. 305). Consequently, we sometimes adopt biased information processing strategies, oriented toward maximizing consistency, popularity, or self-enhancement instead of accuracy.

According to the *consistency seeker* metaphor, individuals strive to see themselves in a *consistent* manner, confirming their preexisting self-views regardless of reality (Swann, 1997; Swann & Bosson, Chapter 27, this volume). There is considerable evidence that people actively seek out and create contexts in which their self-views will be confirmed, even when these views are inaccurate and/or negative. Although consistency seeking may lead to information processing errors, it can be a useful and efficient heuristic in a complex and chaotic social environment. Consistency also serves an interpersonal function, ensuring that people honor the identities they negotiated in previous social interactions and act similarly over time.

According to the *politician* metaphor, people strive to present themselves in ways that create the most favorable impressions on others, thereby enhancing their *social status* and *acceptance*. Like politicians, people target their public performances to different audiences (or constituencies) that place multiple and often conflicting demands and expectations on them. The person-as-politician seeks to “maintain the positive regard of important constituencies to whom he or she feels accountable” (Tetlock, 1992,

p. 332), which should increase status, reduce conflict, and facilitate coalition building.

Finally, according to the *egotist* metaphor, people strive to see themselves in a positive light and will distort self-relevant information to accomplish this goal. Virtually every theory of the self posits some variant of the motive to protect and enhance self-worth, and a large body of research has documented numerous positivity biases in self-perception (Dunning, 2005; Taylor & Brown, 1994). These self-enhancement biases may facilitate goal striving, emotional well-being, academic attainment, mate attraction, and other adaptive behaviors, at least in the short term (e.g., Chung, Scriber, & Robins, 2016; Dufner, Gebauer, Sedikides, & Denissen, 2019; Lockard & Paulhus, 1988; Robins & Beer, 2001; Taylor & Brown, 1994). Relatedly, individuals with high self-esteem tend to have more satisfying social and romantic relationships, more success in school and work, better health, and lower levels of depression and criminal behavior (Cameron & Granger, 2019; Kuster, Orth, & Meier, 2013; Mier & Ladny, 2018; Orth & Robins, 2013, 2019; Orth, Robins, & Widaman, 2012; Trzesniewski et al., 2006; Von Soest, Wichstrøm, & Kvale, 2016).

Together, the four motives that drive processing of self-relevant information—accuracy, consistency, social status/acceptance, and enhancement—provide a flexible arsenal that help us (and presumably our evolutionary ancestors) adapt to a complex, multistructured social environment. From an evolutionary perspective, the ideal mind would be able to convince itself that it is better, smarter, and faster than it really is when this view facilitates survival and reproduction, but switch to a reality mode when needed for increased fitness. Thus, different motives may be prioritized at different stages in the processing of self-relevant information. Specifically, enhancement may drive the first stage (“Does it make me feel good?”), consistency the second stage (“Is it consistent with how I see myself?”), and more deliberate and effortful cost–benefit analyses the third stage (“Is it accurate? Does it facilitate my social status and reputation?”). This possibility makes sense from an evolutionary perspective and shows how processing of information about the self may

indeed reflect the workings of a specialized adaptive design.

Understanding Others’ Minds

In a complex social environment, survival and reproduction depend partly on the ability to explain, predict, and manipulate others. The capacity for self-awareness facilitates introspectively based social strategies such as empathy, sympathy, gratitude, deception, and pretense. Some theorists have even argued that self-awareness evolved for the specific purpose of helping us to understand others (e.g., Leary, 2007). For example, children may learn to understand others by reflecting on their own internal states, feelings, and intentions, and simulating what might be happening in the mind of others (e.g., Harris, 1992).

The capacity to reflect on our internal states and feelings and project them onto others contributes to another capacity: the experience of self-conscious emotions (Tracy & Robins, 2007a; Tracy & Weidman, Chapter 23, this volume). These emotions, which require the ability to evaluate oneself from the perspective of actual or imagined others, guide behavior by compelling us to do things that are socially valued. We strive to achieve, to be a “good person,” or to treat others well, because doing so makes us feel proud of *ourselves*, and failing to do so makes us feel guilty or ashamed of *ourselves*. By reinforcing adaptive social behaviors—encouraging us to act in ways that promote social status (getting ahead) and acceptance (getting along)—self-conscious emotions facilitate interpersonal reciprocity, a social arrangement that is highly beneficial in the long term (Trivers, 1971). In short, self-conscious emotions help us thrive in a social world in which attaining status and acceptance is essential to our ability to survive and reproduce. As Kemeny, Gruenewald, and Dickerson (2004) stated, emotions such as shame and pride “may be one way that individuals feel their place in the social hierarchy” (p. 154).

Despite their adaptive benefits, emotions such as pride and shame can also be maladaptive. For example, in the Greek myth, Narcissus ultimately dies from his excessive pride, endlessly gazing at his own reflection and ignoring the love of a beautiful nymph

with whom he could have produced offspring (a particularly consequential outcome from an evolutionary perspective). Narcissistic pride, in the form of inflated beliefs about the self, has short-term adaptive benefits but long-term negative consequences (Robins & Beer, 2001). Thus, narcissistic pride may have evolved as a “cheater” mechanism to convince others of one’s success in the absence of real accomplishments, granting social status that is immediate but fleeting (Tracy & Robins, 2007b).⁵

Identity Processes

Human social life can be viewed as a series of games in which the rules reflect cultural norms and social roles shape the parts that individuals play. Winning this game requires that humans form dyadic and group coalitions, and navigate within a social structure that has, more than for any other species, complex layers of multiple, overlapping, and sometimes nontransitive social hierarchies (e.g., the highest-status hunters were not always the highest-status warriors). Imagine living in such a complex environment without a self—that is, without any stable awareness of your position in the social structure and the roles you play in different contexts and with different people. The fact that our identities comprise self-representations at multiple levels—personal, relational, social, and collective—further enhances our ability to juggle our often competing social goals and needs. These multilayered identities allow us to differentiate ourselves from others, provide a sense of continuity over time, and help us adapt to and navigate complex social environments.

Social identities also facilitate identification with the social group to which a person belongs. In any social group, the young, low-status members are tempted to defect to other groups. A sense of identity—and associated ingroup biases and outgroup derogation—may help prevent individuals from leaving their social group and disrupting their kinship network. Stable identities are also efficient. It is more adaptive to have social interactions that are predictable, structured, and even ritualized, and to have identities that internalize the rules of each social context, so that individuals do not

have to relearn their social roles each day. In some ways, the self provides a bridge between the individual (and his or her personality characteristics) and the collective (and its associated social roles). For example, by eliciting collective feelings of pride when the group with which one identifies has an achievement (e.g., in the Olympic Games, or a high school soccer team), the self promotes solidarity among group members and helps reinforce the social inclusion of each proud group member.

In summary, I am proposing that self-awareness and self-representations, the two core aspects of the self, are evolved mechanisms that serve four adaptive functions: self-regulation, information processing filter, understanding others, and identity formation. It seems plausible that these four functions helped our evolutionary ancestors survive, reproduce, and attain social status and acceptance in a complex social environment. Yet one may question what an evolutionary perspective, with its emphasis on ultimate function, can contribute beyond more proximate functional accounts. Thus, one challenge facing researchers working toward a naturalist account of the self is to provide more precise empirical demonstrations of how the specific functions of the self enhance aspects of fitness such as reproductive success.

Toward A Naturalist Approach to Understanding the Self

In this chapter, I have reviewed the current state of the field with regard to several fundamental questions about the nature, structure, development, and functions of the self. My review was guided by a particular theoretical vantage point. Inspired by James’s naturalist perspective, I have proposed that research on the self should be central to any theory of personality; informed by an evolutionary perspective and organized around functionalist explanations; informed by comparative, cross-species research; and linked to basic psychological processes such as attention, memory, and emotion, and their associated neural mechanisms.

Although the self continues to be a “puzzling puzzle,” much progress has been made.

In particular, research and theory on the self supports the following conclusions: (1) All humans have a sense of self, an “I” and a “Me,” but there is considerable individual variability in both self-awareness (the “I”) and self-representations (the “me”); (2) humans have self-representations that exist at multiple levels (personal, relational, social, and collective), and these self-representations are evaluative in nature, contributing to our overall feelings of self-worth, or self-esteem; (3) humans start developing a sense of self around the age of 18 months, but the self does not reach full complexity until much later, following a timetable dictated, at least in part, by maturation of the underlying cognitive capacities that support the development of self-awareness and self-conceptions; (4) other animals also have a sense of self, but one that lacks the complexity of the human self; (5) neuroimaging studies and studies of patients with neurological damage have identified specific brain regions and neural circuitry associated with different self-related processes; and (g) the two core features of the self—self-awareness and self-representations—seem to be evolved aspects of human nature that facilitated survival and reproduction in a complex social environment. Just as Darwin (1859) commented on the beauty and variation found in the natural world, one might similarly reflect on the richness and complexity of the human self, which is arguably the feature of humanity that makes us most distinct from other animals.

I hope that this review of the literature has demonstrated that our understanding of many personality processes would be impoverished without the concept of self. Personality psychology is an unusually broad field, because it covers a wide spectrum of phenomena and levels of analysis, from genetic markers of traits to neural mechanisms underlying emotions, to lexical studies of trait adjectives, to motives in personal life stories, to sociocultural perspectives on identity development. What provides coherence in these diverse themes is an emphasis on understanding consistencies in people’s thoughts, feelings, and behaviors, and the mechanisms that underlie these consistencies. From my perspective, it is the self that ties together these various personality pro-

cesses and, as Allport (1960) aptly put it, “makes the system cohere in any one person” (p. 308).

The psychology of the self has an important role to play in the integration of evolutionary biology and neuroscience into personality psychology. The self sits in a privileged position, encompassing and integrating all levels of the person from the biological to the social. This privileged position is fundamentally inclusionary: There is ample room, and indeed serious need, for a variety of approaches to understanding the structure and function of the self and its relation to other basic psychological processes.

An evolutionary perspective on the self was central to many early theories of personality and social behavior, and it must be considered a central issue for contemporary personality theories. The naturalist agenda outlined by James (1890) remains a worthwhile path for research on the science of the self. By naturalizing the self, we can move the field of personality toward a truly biopsychosocial perspective.

NOTES

1. Although James argued for a naturalist view early in his career, he later adopted a more spiritual stance toward the self, proposing in his 1909 book, *Pluralistic Universe*, that consciousness may not be amenable to scientific explanation.

2. The keyword “self” is clearly overinclusive and will detect articles examining psychological phenomena beyond the scope of research on the self. However, any other keyword (e.g., “self-esteem,” “self-concept,” “self-awareness”) is necessarily underinclusive and would fail to detect important aspects of the self literature.

3. A related perspective, promoted by cognitive scientists and philosophers working in the field of “extended cognition,” rejects the notion of a sealed off unitary self and instead views conscious awareness as an extension of, and interdependent with, the external world (e.g., Clark, 2008; Menary, 2010).

4. How the brain generates self-representations is considered a much simpler problem, since this is assumed to be the same process through which the brain generates any kind of semantic knowledge, such as knowledge about other people and things.

5. Narcissistic behavior also seems to be present and in some cases adaptive in nonhuman animals. Sapolsky (1997) described an orangutan named Hobbes the “cocky son of a high-ranking

female” (p. 83), who immediately began acting like the alpha male after migrating to a new troop. To Sapolsky’s surprise, Hobbes was quickly treated by others as a high-status animal, despite his initial low status in the group. Although we clearly do not know whether Hobbes had an overly positive self-representation, his narcissistic behavior does seem to have served the adaptive function of helping him attain social status and, consequently, mates. Similar benefits may accrue to humans who believe they are more brilliant and powerful than they really are. At the same time, it is worth noting that Hobbes’s narcissistic nature had a downside, unusually high cortisol levels; as Sapolsky pointed out, “It doesn’t come cheap to be a bastard twelve hours a day—a couple of months of this sort of thing is likely to exert a physiological toll” (p. 86).

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CHAPTER 27

Identity Negotiation

A Theory of Self and Social Interaction

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Only in man does man know himself.
—GOETHE, *Torquato Tasso*,
Act 2, Scene 3

To a remarkable degree, the survival of people's identities rests not in their own hands, but in the hands of others. In fact, only those who enjoy a steady supply of “nourishment” for their identities—confirming feedback from others—will likely retain those identities. We focus in this chapter on the processes through which people give, receive, and interpret such nourishment, a set of processes known collectively as *identity negotiation*.

By “identity” we mean thoughts and feelings about the self, or self-views. Two broad classes of identities or self-views exist. *Personal self-views* refer to qualities that make people unique and distinct from others (e.g., intelligence, dominance). *Social self-views* refer to roles, group memberships, and other qualities that people share with others (e.g., American, Democrat, bowling league member). These dual components of identity are integrated by personal narratives that organize and contextualize self-knowledge into a dynamic, coherent, and internally consistent whole (see McAdams, Chapter 5, this volume).

Identities are not merely historical repositories of past actions, accomplishments, and liaisons; they also regulate action. In particular, identities systematically influence the personas people assume, as well as the conditions under which they assume them. Generally speaking, people avoid personas that are disjunctive with their highly-certain and important identities, preferring instead personas that exemplify their enduring conceptions of who they are.

Identity negotiation involves a broad set of processes through which people strike a balance between achieving their interaction goals and satisfying their identity-related goals, such as needs for agency, communion, and psychological coherence. To this end, people generally conform to various principles of identity negotiation (discussed later in this chapter) that not only facilitate smooth interpersonal interactions but also promote intrapersonal harmony.

Several influential sociologists sowed the intellectual seeds of the identity negotiation formulation during the middle of the previous century (for an overview, see Swann

& Bosson, 2008). An interactionist flavor that characterizes identity negotiation may also be found in formulations of personality and social psychologists such as Endler and Magnusson (1976), Erikson (1959), John, Hampson, and Goldberg (1991), McAdams (1999), Michel and Shoda (1999), Snyder and Ickes (1985), Sullivan (1953), and Swann (1987). Within sociology, interactionism is evident in the work of Thomas, who argued that people both shape and are shaped by their experiences (Thomas & Thomas, 1928), and McCall and Simmons (1966), who emphasized the tendency for people to maximize interpersonal harmony by gravitating toward social settings that support their identities.

The identity negotiation formulation follows in the interactionist tradition of Cooley (1902) and Mead (1934) by assuming that behavior grows out of the interplay of interaction partners, who can be arbitrarily designated “target” and “perceiver.” Two prominent theories within this tradition are expectancy theory (Rosenthal & Jacobson, 1968; Snyder & Klein, 2005) and self-verification theory (Lecky, 1945; Swann, 1983, 2012). *Expectancy theory* emphasizes the ways in which the expectancies of “perceivers” shape the reactions of “targets.” In contrast, *self-verification theory* emphasizes the tendency for targets’ stable identities to guide their choices of social partners and situations, as well as their reactions to the overtures of perceivers. In the tradition of all of these formulations, we assume that the reactions of others to the self exert a powerful influence on people’s identities, both in the short term and more permanently.

In addition to targets’ identities and perceivers’ expectancies, targets’ personality traits represent a third, somewhat independent influence on the identities that they negotiate (see Robins, Chapter 26, this volume). *Personality traits*, which are characteristics of people that theoretically regulate behavior, emotion, and thought, can be distinguished from *identities*, which are beliefs about what the self is like. Notably, personality traits emerge and become evident quite early in life, before people develop the self-awareness needed for constructing identities. Thus, personality traits, to some

degree, constrain the identities that people formulate, as well as the expectancies that perceivers’ develop of targets. An individual who is extremely shy, for example, will be hard pressed to develop and maintain an identity of herself as an extrovert, because it will be challenging for her to behave in an extroverted manner. In the absence of such behavior, she will be unable to convince herself and others that she is extroverted. However, the identity negotiation formulation also posits that identities and expectancies may, at times, produce changes in personality. For instance, a moderately introverted person who views himself as outgoing may accordingly choose to enact extroverted roles and behaviors. Over time, with nourishment from interaction partners, his extroverted identity may override his introverted temperament and cause a change in personality.

Some personality traits may also allow more flexibility in identity negotiation than their opposites. Whereas temperamental extroverts may find it relatively easy to negotiate an introverted identity, temperamental introverts may find it extraordinarily challenging to act the part of an extrovert. The interplay of temperaments and identities may also have implications for the temporal stability of behavior; that is, identities that are supported by compatible temperaments should foster behaviors that consistently support the identities, whereas identities that are not supported by compatible temperaments will likely foster behaviors that offer only sporadic support for the identities.

This discussion of three influences on the identity negotiation process (i.e., self-views, expectancies, and personality) raises intriguing questions regarding the accuracy of the identities that people negotiate. For example, of these three inputs to the identity negotiation process, which most represents the true or authentic self? Although this question defies a simple answer, recent investigations of authenticity and the true self provide insights into the factors that lead to the *perception* of authenticity (e.g., Newman, Knobe, & Bloom, 2014; Strohminger, Knobe, & Newman, 2017; Strohminger & Nichols, 2015) as well as *actual* authenticity (Carlson, 2013).

The Nature of Identity Negotiation

Identity negotiations regulate the identities that people assume in their relationships. In fact, identity negotiation processes are typically the first order of business when people meet one another, as they address the crucial issue of “who is who.” Although identity negotiations are potentially influenced by a wide range of motives, the three motives we discuss below are particularly important (for an earlier discussion, see Swann & Bosson, 2010).

Function and Motives

The three most important motivational influences on identity negotiation are *agency* (which encompasses feelings of autonomy and competence), *communion* (which encompasses feelings of belonging and interpersonal connectedness), and *psychological coherence* (which encompasses feelings of regularity, predictability, and control). For example, to gratify their desire for agency, people negotiate identities that reflect the self-views that make them unique from others (i.e., their personal self-views). To satisfy their desire for communion, people negotiate identities that reflect the self-views that link them to other people (i.e., their collective self-views). Finally, to gratify their desire for coherence, people seek identity-consistent feedback and experiences (i.e., information that fits with their stable self-views).

Of course, people cannot always meet all of these needs simultaneously, nor is it always essential that they do so. For example, people who recognize their powerlessness in a given situation may (wisely) refrain from pursuing their agency needs, whereas those who are suspicious of a partner’s motives may refrain from pursuing their desire for communion. Furthermore, conflicts may sometimes emerge between various motives, for example, when an identity linked to a personal self-view (e.g., “independent”) clashes with an identity linked to a social self-view (e.g., “family man”). The identity negotiation formulation suggests that most people learn to negotiate identities in ways that minimize tensions among their needs for agency, communion, and coherence. For

example, the family man may meet his need for agency by negotiating a self-reliant identity in the context of his workplace, and at the same time meet his need for communion by negotiating a warm and involved identity in his relationships with his family. In each context, he may also meet his need for coherence by repeatedly seeking verification of the (independent or warm) identity that he has negotiated in that context.

Communication Channel and Longevity

The process of identity negotiation is often implicit, informal, and open-ended. Moreover, although some identity negotiations occur verbally and explicitly, others are nonverbal and implicit (Swann, Stein-Seroussi, & McNulty, 1992). In fact, many identity negotiations involve behaviors that are overlearned and automatic (Bargh & Williams, 2006) or are guided by self-views that are implicit (Falk & Heine, 2015). Moreover, people may engage in identity negotiations without consciously realizing that they are doing so, or they may shift into and out of awareness of their ongoing negotiations. This point is reflected in Swann’s (1983) notion of routine versus crisis self-verification, as well as McAdams’s (1999) ideas regarding the waxing and waning of the self-narrative process. Both authors note that the process of establishing identities tends to become routine and recedes from consciousness once identities have been successfully negotiated, only to return to consciousness during times of change, disruption, and/or challenge.

Often, people may only become aware that they want others to recognize and validate a given identity when they receive identity-discrepant feedback. From this vantage point, feedback that causes an individual to question his or her identity, rapid and unpredicted life changes, and novel environments or negotiation partners may all bring identity negotiations to the fore of consciousness. In this sense, the motives that drive identity negotiations may resemble those psychological and physical need states (e.g., hunger, thirst, loneliness) that enter awareness only when the relevant need is not being met.

Finally, identity negotiations should persist as long as the relationships between the

relevant parties persist. As noted earlier, however, ongoing identity negotiations may be imperceptible to outsiders if the identity-relevant behaviors of the interaction partners are subtle. Even the interaction partners themselves may not realize that an identity negotiation is underway given the tendency for such negotiations to become automatic and to fade from consciousness.

Principles of Identity Negotiation Processes

The foregoing discussion suggests that identity negotiation is a special form of negotiation processes that is unique in its function, ubiquity, and structural properties. Given these distinctive qualities, it is not surprising that a unique set of principles governs the identity negotiation process. People presumably learn these principles in the same way that they learn all rules of social interaction: through trial and error (Goffman, 1959). As noted earlier, people routinely conform to these principles even though they are seldom aware of them. Rather, their adherence to these principles typically occurs automatically and implicitly (Jones & Pittman, 1982). Although there could be many such principles, we focus here on four of the most important ones.

Clarity

Ambiguity regarding matters of identity and relationship goals can be misleading, put partners off balance, undermine trust, and produce disappointing outcomes. Hence, the first principle of interpersonal identity negotiation is that to ensure clarity, targets should communicate their desired identities and interaction goals to perceivers as early in the interaction as possible. Moreover, targets should communicate their desired identity and relationship goals via as many channels of communication as possible, because redundancy provides perceivers with corroborating information and thereby diminishes the probability of misunderstanding and conflict. Thus, for example, people may simultaneously communicate their identities through verbalizations and through the display of *identity cues*: overt signs and symbols of who they are (Goffman, 1959; Schlenker,

1980; Swann, 1983). Such cues may range from T-shirts to titles and honorifics (e.g., “Dr.”), bedroom and office décor (Gosling, Ko, Mannarelli, & Morris, 2002), and on-line posts on social network sites such as Facebook (Back et al., 2010).

Of course, maximal clarity is only possible or desirable insofar as people are certain about the identity that they want to negotiate. If someone is uncertain of a given identity, either for situational reasons (e.g., the situation is a novel one) or dispositional reasons (e.g., the individual is low in self-concept certainty; Pelham, 1991), then clarity may suffer. In such circumstances, people may achieve clarity by looking to their interaction partner for cues regarding the identity that he or she expects them to assume. When this occurs, people are particularly likely to adopt identities that provide behavioral confirmation of perceivers’ expectations (e.g., Snyder & Klein, 2005; Snyder & Swann, 1978).

Cooperation

Targets should cooperate with perceivers by honoring the identities that they negotiate. One obvious way to uphold the cooperation principle is to behave in an identity-consistent manner throughout a given interaction. In this way, targets can avoid identity renegotiation, which can be highly disruptive and may undermine the interaction goals of one or both partners.

For targets to communicate that they are following the cooperation principle, the timing of their behaviors can be critical. At times, identity negotiations resemble asset negotiations, in that people may bargain back and forth in an offer-counteroffer fashion (e.g., Goffman, 1959; Homans, 1974). In such scenarios, people may uphold the cooperation principle by following each concession on their partner’s part with a concession of their own (Axelrod & Hamilton, 1981). For example, after receiving feedback indicating that a perceiver accepts a target’s desired identity, the target should reciprocate by accepting the identity that the perceiver offers. Such reciprocal concessions should reinforce the mutual confirmation of identities that provides the basis for successful identity negotiation.

Although the foregoing discussion may imply that identity negotiations typically consist of equally weighted contributions on the part of each negotiator, this is often not the case. At times, targets may be strongly invested in identities that perceivers are reluctant to honor. At other times, perceivers may enter interactions with strongly held expectations about a target's identity, only to discover that the target has different ideas about who he or she is. In such cases, cooperation is still possible, provided that both parties are able and willing to be flexible. In general, to the extent that a target's investment in a given identity is high, cooperation is facilitated by the perceiver's willingness to offer identity-consistent appraisals. To the extent that a perceiver is strongly invested in his or her expectations, cooperation is facilitated by the target's willingness to conform to those expectations. When both the perceiver and target are strongly invested in conflicting perceptions of the target's identity, cooperation may not be possible, and both parties are likely to be dissatisfied with the outcome of the negotiation.

Continuity

People expect their relationship partners to be fairly predictable and consistent over time (Rempel, Holmes, & Zanna, 1985). Thus, in addition to honoring the identities that they negotiate within the context of a given interaction (the cooperation principle), people maximize interpersonal harmony if they also negotiate identities that are stable over time; that is, people should remain faithful to the identities that they negotiate in the context of ongoing relationships with specific others.

A challenge to the continuity principle may occur when people mature, shift status, or change in some way. Such changes can pose problems for relationship partners, because they are forced to choose between assimilating the new identity to an existing one, renegotiating a new identity, or leaving the relationship. Often, such transitions are finessed through cognitive gymnastics that are designed to maximize the apparent overlap between the old and new identities (at least from the perspective of the one undergoing the change). One such strategy

is discussed by McAdams (1999), who suggests that people may organize multiple identities around overarching cognitive or affective themes. For example, people may imbue their various identities with a common affective tone such as humor or pessimism, thereby providing psychological unity to the multiple roles that they enact. Using such higher-level schemas, people may perceive continuity between two or more identities that outside observers might construe as conflicting. We elaborate on this idea in the next section.

Cognitive gymnastics notwithstanding, problems may emerge when sudden identity changes occur that cannot be finessed, or when interaction partners disagree about the degree to which a given identity is continuous. For example, when one partner suddenly loses an interpersonal asset such as a job or status, that partner may become financially dependent on the other partner. Such reversals may turn the power dynamic in the relationship on its head, and this shift may have important reverberations for the respective identities of each partner. If such identity discontinuity cannot be repaired fairly quickly, then partners are forced to renegotiate the relevant identities.

Compatibility

Often, people know one another in different contexts that call for distinct identities. For example, married people may know one another not only as spouses but also as parents, colleagues, and salsa dancing partners. When negotiating distinct identities with a given partner, targets should ensure that these identities are compatible with one another and with previously negotiated identities. Given the premium that people place on predictability and consistency in their relationship partners, someone who elicits appraisals of "bookworm" in one context and "party animal" in another context may be perceived as unreliable and therefore undesirable as a partner. If targets seek to negotiate different identities with the same perceivers, they can do so successfully only insofar as the appraisals associated with the different identities are not inconsistent either logically (e.g., Democrat vs. Republican) or emotionally (e.g., friend vs. foe).

Intrapsychic Mechanisms That Help Sustain Identities

Accompanying identity negotiation processes are a host of intrapsychic processes that shape how individuals interpret and react to the outputs of their identity negotiations. For the most part, these intrapsychic mechanisms enable people to maintain a sense of personal continuity even in the face of identity-discrepant feedback from others. Thus, both within a given negotiation and across different negotiations, people tend to perceive stability and regularity in their own identities and those of others. In this section, we identify seven intrapsychic mechanisms that foster identity continuity and regularity in the process of identity negotiation.

Selective Attention

In general, people pay more attention to interpersonal feedback when they expect it to confirm as opposed to disconfirm their identity (Swann & Read, 1981). As such, targets may fail to notice feedback that is inconsistent with their identity and relationship goals. Moreover, when targets are confronted with identity-threatening feedback that cannot be ignored, they may respond by focusing more attention on their firmly held self-views (e.g., Dodgson & Wood, 1998). This tendency may serve to reinforce identities that have been challenged during identity negotiations, thus reducing the likelihood of identity change.

Discounting and Augmenting

When confronted with feedback that is inconsistent with their self-views, people tend to discount both the validity of the feedback (Korman, 1968; Markus, 1977) and the credibility of the evaluators who offer it to them (Shrauger & Lund, 1975; Swann, Griffin, Predmore, & Gaines, 1987). In some cases, such discounting might allow targets to remain untroubled by inconsistent feedback. In other cases, discounting may motivate targets to break off relations with the source of the identity-discrepant feedback, as when a perceiver who repeatedly misperceives the target ultimately loses all credibility as a relationship partner. On the flip

side, people tend to augment the credibility of perceivers who agree with them about their identities (Chun, Ames, Uribe, & Higgins, 2017). Evaluators who view targets in an identity-consistent manner are seen as especially good judges of character.

Biased Interpretation

Targets' need for coherence and regularity may compel them to "see" more identity-consistent feedback than they actually receive during identity negotiations. Indeed, humans possess a powerful ability to interpret incoming information in a manner that is consistent with their prior knowledge. Interestingly, some propose that a particular region of the brain is responsible for such activity. Gazzaniga (1998), for example, suggests that a "left-hemisphere interpreter" compels people to impose coherence and continuity on their conscious experiences.

Anxiety as Information

For interpersonal evaluations to be internalized, they must fall within the individual's latitude of acceptance (Jones, Rhodewalt, Berglas, & Skelton, 1981). Information that falls outside the latitude of acceptance garners extra scrutiny. If identity-discrepant information pertains to a highly certain and central self-view or comes from a highly credible source, it may produce anxious arousal (Ayduk, Gyurak, Akinola, & Mendes, 2013; Vandellos, Bosson, Cohen, Burnaford, & Weaver, 2008; Wood, Heimpel, Newby-Clark, & Ross, 2005), which motivates behaviors designed to neutralize the threat (Burke, 1991; Swann, 2012). Anxiety can thus alert targets that particular perceivers pose a threat to their enduring beliefs about themselves, which may motivate amplified efforts to receive identity-confirming feedback (Vázquez, Gómez, & Swann, 2018) or, conversely, disengagement from the relationship.

Biased Recall

In general, targets show better recall for identity-consistent feedback than they do for inconsistent feedback (Crary, 1966; Swann & Read, 1981), and they tend to recall past

feedback as being more consistent with their self-views than it really was (Story, 1998). Thus, even if targets receive identity-inconsistent feedback that they cannot ignore, discount, or reinterpret, they may still sustain their self-views—and thus meet their need for coherence—by forgetting the threatening feedback or misremembering its content.

Thematic Coherence

When targets negotiate multiple identities in the context of a single relationship or across multiple different relationships, they may increase the underlying coherence and logic of the various identities through a process that McAdams (1999) refers to as “selfing.” As noted earlier, people can increase compatibility by structuring their multiple identities around underlying themes and narrative tones. For example, themes of agency and communion are prevalent in many people’s identities, providing cognitive unity to the multiple roles that they enact. In a similar manner, distinct identities often share a common affective tone, such as optimism, humor, pessimism, or sorrow. Thus, the target who behaves differently and pursues different relationship goals across his or her various negotiations with a given perceiver may still maintain intrapsychic coherence by linking all of his or her identities to underlying concerns about agency and connectedness, or by imbuing the different identities with a similar affective tone.

Compartmentalization

Cognitive compartmentalization may be another mechanism through which some targets achieve continuity among the different identities that they negotiate. People tend to organize their self-views into different cognitive compartments or *self-aspects* (Linville, 1985; Showers, 1992). Whereas some people’s self-concepts contain a few broad self-aspects that encompass most of their specific self-views, other people organize the contents of their self-concept into numerous, nonredundant self-aspects (e.g., “student self,” “religious self,” “self at home”). Importantly, experiences that activate a given self-aspect should prime associ-

ated self-views. Therefore, targets higher in self-complexity—those who organize their self-views into numerous nonredundant self-aspects—may find it easier to negotiate multiple distinct identities without experiencing threats to their sense of continuity. For instance, if a professor’s “self at work” self-aspect contains the qualities “introverted” and “submissive,” whereas her “self at home” contains the qualities “outgoing” and “exuberant,” she may find it relatively easy to negotiate each of these disparate identities in its own context. For this target, even though her work and home identities differ, interactions in each separate context will activate primarily those self-views that are relevant to the current setting. In theory, then, when targets negotiate very different identities with their different relationship partners, those with more complex self-structures should be less troubled by feelings of incompatibility.

A Process Model of Identity Negotiation

We highlight in this section some of the key links in the chain of events that make up the identity negotiation process. The process model of identity negotiation depicted in Figure 27.1 guides our excursion. This model explicates the dynamically interrelated roles of targets’ and perceivers’ identities and relationship goals in guiding identity negotiations and their outcomes. Along the way, we also illustrate how targets apply the interpersonal principles and intrapsychic mechanisms described earlier. Note that the processes described here presumably operate both in new relationships and in long-term, enduring relationships.

The Target’s Initial Identity and Relationship Goals

The model begins with the initial identity and relationship goals of targets (see Figure 27.1, small, top box at far left). As noted earlier, *identity* refers to personal, social, and collective self-views, along with the narratives that people superimpose on their self-knowledge to foster a consistent and coherent sense of self. *Relationship goals* are

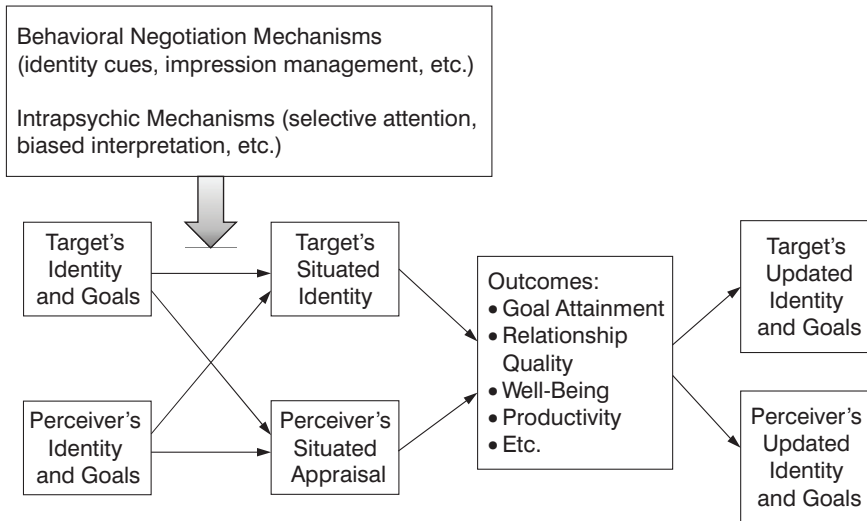


FIGURE 27.1. A process model of identity negotiation.

the desired end states toward which people strive when they enter social interactions. At the broadest level, people strive to meet their needs for agency, communion, and psychological coherence. Depending on the nature of the relationship (e.g., Kelley & Thibaut, 1978), these broadly defined goals may also give rise to various midlevel goals, such as self-verification, ingratiation, and self-promotion (Jones & Pittman, 1982), as well as specific goals, such as garnering the affections of a particular person.

Targets' initial identities and relationship goals should guide them toward certain environments and situations. Indeed, all organisms gravitate toward environments—or “opportunity structures” (e.g., Hawley, 1950; McCall & Simmons, 1966)—that routinely satisfy their needs (e.g., Clarke, 1954; Odum, 1963). For example, people's identities may guide them toward certain vocations, living environments, hobbies, and leisure activities, thereby ensuring that the experiences they routinely encounter are ones that support and buttress their chronic identities (cf. Caspi & Roberts, 1999). Moreover, people may choose interaction partners who seem similar to them (Byrne, 1971), who share their reactions to the world (Bosson, Johnson, Niederhoffer, & Swann,

2006; Pinel, Long, Landau, Alexander, & Pyszczynski, 2006) or who like them (Lowe & Goldstein, 1970; Sprecher, 1998).

Interestingly, the evidence that targets prefer partners who like them may reflect a desire for appraisals that verify people's identities. Because the majority of people in unselected samples have positive self-views, for most people, positive evaluations (e.g., appraisals that indicate that one is viewed favorably) are more self-verifying than negative evaluations. When researchers *do* measure targets' self-views, evidence of self-verification strivings emerges even among people with negative self-views. For example, a meta-analysis of self-verification in marriage relationships revealed that people enjoyed superior relationship quality if their spouses perceived them in a self-verifying manner (Kwang & Swann, 2010), and this was true whether people's self-views were positive or negative. Furthermore, people display self-verification strivings cross-culturally (e.g., Seih, Buhrmester, Lin, Huang, & Swann, 2013) and at the level of personal self-views (Swann, Pelham, & Krull, 1989), social self-views, and collective self-views (Chen, Chen, & Shaw, 2004; Gómez, Seyle, Huici, & Swann, 2009; Lemay & Ashmore, 2004).

The Perceiver's Initial Identity and Relationship Goals

All identity negotiations are shaped by the joint contributions of at least two parties. Thus, the perceiver's initial identity and relationship goals play integral roles in determining the outcomes of identity negotiations. For instance, perceivers' identities and goals compel them to enter certain environments and opportunity structures, and to avoid others. Once both parties have entered the relationship, the identity negotiation process can begin in earnest. To this end, targets and perceivers systematically deploy a host of interpersonal identity negotiation strategies.

Negotiations between the Target and the Perceiver

Targets may communicate their identities before they even open their mouths by displaying identity cues. For example, flashy sports cars that communicate wealth and confidence or ripped jeans that convey a laid-back approach to life project a particular identity to one's partner. Moreover, consciously or not, targets tend to arrange and design their dorm rooms, offices (Gosling et al., 2002), homes (Sadalla, Vershure, & Burroughs, 1987), and personal websites (Back et al., 2010) in ways that elicit identity-consistent evaluations from others. Of course, targets also convey their identities to others through direct verbal communications. For example, the shy, unadventurous bookworm who wants her new college roommate to see her as such may quietly state, "I'll probably spend most nights studying in the library."

Upon communicating his or her identity, a target must wait for the perceiver's counteroffer and then respond accordingly. If a perceiver responds to his roommate's displays of introversion with "Don't be shy! Come out with me and I'll introduce you to people," the target must then decide whether to utilize a more forceful impression management strategy or acquiesce to the perceiver's counteroffer. One possibility is to reassert his introversion by behaving in an even more introverted fashion (Stets & Burke, 2003). Consistent with this notion, self-proclaimed

submissive individuals exaggerated their submissiveness when interacting with a confederate who ostensibly perceived them as dominant (Swann & Hill, 1982). More recently, when college-age men received feedback that they scored in a feminine manner on a test of gender knowledge, they subsequently asserted their masculinity by punching a pad with greater force (Bosson, Vandellos, Burnaford, Weaver, & Wasti, 2009). And when adolescents were sensitized to the manipulative and unfair practices of the food industry (e.g., marketing addictive junk food to young children), they recognized healthy eating as more autonomy-assertive and preferred healthy alternatives to sugary snacks and drinks (Bryan et al., 2016). In such instances, identity negotiation can be a powerful mechanism through which people display agency (Swann & Jetten, 2017).

According to the clarity principle discussed earlier, targets should use as many channels of communication as possible to convey their desired identities to perceivers. The use of multiple channels may be especially helpful when people encounter resistance in bringing others to see them congruently. Returning to the earlier example, the introverted target may increase the likelihood that her roommate will come to see her as shy if she supplements her verbalizations with nonverbal cues such as speaking in hushed tones, allowing her hair to fall into her face, and adopting an anxious expression each time her roommate invites her to a party. Moreover, the shy target may communicate his intention to "power study" by stacking piles of books on his desk, sprinkling study guides and daily organizers throughout the apartment, and highlighting exam dates and paper deadlines on his calendar.

In response to the target's exaggerated efforts to elicit an identity-consistent appraisal, the perceiver must now make another counteroffer. In keeping with the cooperation principle, social harmony will be maximized if the perceiver acquiesces to the target's wishes and offers behaviors that validate her preferred (i.e., introverted) identity. For example, the roommate may back down and stop insisting that they attend social events together. Furthermore, both parties may cooperate by following each concession

on the other's part with a concession of her own. To illustrate, if her roommate comes to view her as an introvert, the target may reciprocate by redoubling her efforts to honor the roommate's extroverted identity.

As their relationship unfolds across time, both parties should uphold the continuity principle by remaining faithful to their negotiated identities. Thus, the target should continue to play the role of the introvert in her dealings with her roommate. Were she to host a wild, drunken party one night, the roommate could justifiably view this behavior as a breach of their interpersonal contract and might "retaliate" by refusing to accept the target's claim to an introvert identity.

The fourth principle of identity negotiation states that targets should strive to maintain compatibility among the various identities that they negotiate with a given perceiver. In our ongoing example, this means that the identity the shy target negotiates with her roommate in their apartment should be compatible with the identities that she negotiates with her roommate elsewhere. Insofar as the target wishes to negotiate a more outgoing identity with her roommate in other contexts, she may maintain compatibility by seeking appraisals of herself that are only slightly more outgoing than the appraisals she seeks from her roommate when they are at home.

Intrapsychic Mechanisms

As noted earlier, the identity negotiation processes described earlier are facilitated by a parallel set of intrapsychic mechanisms. These cognitive and affective mechanisms both accompany and sustain people's identity negotiations. Consider the scenario in which a shy woman tells her roommate that she dislikes parties, and her roommate nonetheless encourages her to attend the evening's soiree ("Come out with me and I'll introduce you to people"). In this case, the target may interpret her roommate's offer to introduce her to people as an acknowledgment of her social awkwardness rather than as a refusal to verify her introversion. Because interpersonal feedback is often ambiguous and open to interpretation, most people have little difficulty maintaining co-

herent and stable identities, even when faced with interaction partners who view them in identity-inconsistent ways. If the inconsistency is too great to ignore, however, it will threaten the target's need for coherence, which will produce unsettling feelings of anxiety. Such feelings should prompt identity negotiation strategies that are designed to correct the perceiver's inaccurate appraisals and reduce feelings of defensiveness (e.g., Critcher & Dunning, 2015).

Intrapsychic processes facilitate continuity between not only a target's self-views and the appraisals he or she receives from others but also the different identities that a target negotiates with the same perceiver. Consider a target who negotiates a highly introverted identity with her roommate in their home environment, and a mildly introverted identity with her roommate in the context of their larger social group. Despite this discrepancy, she may nonetheless maintain intrapsychic coherence by linking both of these identities to her underlying concerns about belongingness. Such cognitive gymnastics can even harmonize strikingly distinct identities. If a target is outgoing and exuberant around her mother but shy and retiring around her roommate, she may increase the compatibility of these divergent identities by imbuing both of them with a tone of ironic humor. Furthermore, the target may cognitively compartmentalize her different identities such that each becomes salient primarily during interactions with the relevant partner.

The Target's Situated Identity

As shown in Figure 27.1, the identity negotiation processes and intrapsychic mechanisms described earlier jointly produce targets' situated identities. A *situated identity* is a person's identity within a specific, circumscribed situation (Alexander & Knight, 1971). This idea is related to the notion of the working self-concept (Markus & Kunda, 1986), in that it is the currently active portion of a person's identity.

Note that targets' situated identities reflect both their own behavioral, cognitive, and affective contributions to the identity negotiation process and the contributions (e.g., feedback, verbal and nonverbal reac-

tions) made by their partner, as well as the constraints imposed by the situation. Therefore, a target's situated identity will sometimes overlap minimally with his or her initial identity. The discrepancy between a target's initial and situated identities may be greater to the extent that the target (1) is uncertain or unclear about the identity being negotiated (J. Campbell et al., 1996; Maracek & Mettee, 1972; Pelham & Swann, 1994; Swann & Ely, 1984; Swann, Pelham, & Chidester, 1988); (2) places relatively little importance on the negotiated identity (Markus, 1977; Pelham, 1991; Swann & Pelham, 2002); (3) is low in self-awareness or self-consciousness (Major, Cozzarelli, Testa, & McFarlin, 1988); or (4) has an especially labile and fragile self-concept (e.g., Valentiner, Hiraoka, & Skowronski, 2014). Similarly, identity-discrepant feedback from a perceiver who is high in certainty or credibility should be particularly powerful in shaping a target's situated identity (e.g., Josephs, Bosson, & Jacobs, 2003; Swann & Ely, 1984). Finally, situational influences that are exceptionally strong (e.g., emergencies, powerful authority figures or interaction goals, novel environments) or that provide unambiguous self-relevant information (e.g., obvious failure at a task, repeated doses of credible feedback) can also foster significant discrepancies between a target's initial and situated identities. In part, situations can influence the overlap between initial and situated identities by activating people's communion needs. For instance, those who experience a powerful need to belong may be willing to negotiate situated identities that differ substantially from their initial identities. We return to this idea shortly.

The Perceiver's Situated Appraisal

Situated appraisals are the impressions that perceivers develop of targets within a given situation. In general, identity negotiation processes unfold more smoothly to the extent that perceivers' situated appraisals match targets' situated identities, as such matches enable them to predict one another's reactions and behaviors (Swann, 1984). When neither party is willing (or able) to broker an agreement regarding the identity that the target is to assume (Major et al., 1988), both

parties are likely to feel dissatisfied with the outcome of the interaction.

Although situated appraisals should generally match the *actual* qualities of target persons, there are some exceptions to this. People involved in short-term, relatively tenuous dating relationships represent a case in point. The very survival of such provisional relationships hinges on the interest of both parties. For this reason, people in dating relationships may negotiate whatever identity they feel is necessary to keep the relationship alive, even if it requires seeking feedback that is more favorable than their self-views merit; that is, identity negotiations in dating relationships may be driven by people's communal needs at the expense of their desire for self-verification.

Consistent with this reasoning, Swann, Bosson, and Pelham (2002) found that when people held the goal of winning the love of a romantic partner, targets sought appraisals of their physical attractiveness that were more positive than their chronic self-perceived attractiveness warranted. More interestingly, targets who negotiated highly attractive situated identities tended to elicit matching (i.e., highly attractive) situated appraisals from perceivers. They appear to have done so, in part, by presenting themselves to perceivers in a highly physically attractive manner. Thus, when targets' relationship goals demand that they seek highly favorable feedback, they accordingly arrange it so that perceivers develop—and they thus deserve—such positive evaluations.

In the short run, such harmony between the target's situated identity and the perceiver's situated appraisal ensures that the identity negotiation process unfolds smoothly. In the long run—for example, in marriage relationships—a situated identity that receives reinforcement may become part of the target's permanent identity. Alternatively, targets in long-term relationships may renegotiate identities that better reflect their stable self-views, bringing partners to appraise them congruently regarding both their positive and their negative self-views. To the extent that targets succeed in eliciting situated appraisals from long-term partners that match their situated identities, feelings of intimacy are maximized (L. Campbell, Lackenbauer, & Muise, 2006; Swann, De La Ronde, & Hixon, 1994).

Negotiation Outcomes

By negotiating situated identities and appraisals, targets and perceivers achieve a “working consensus” (Goffman, 1959). At this point, the stage is set for them to work toward the goals that initially brought them into the interaction, such as collaborating on a work project, forging a romantic relationship, cohabitating peacefully, or negotiating assets. To the extent that targets’ situated identities are consistent with their initial relationship goals and with perceivers’ situated appraisal of them, they should be well positioned to achieve the outcomes they desire. These outcomes include relationship quality, psychological well-being, and work productivity.

Relationship Quality

As we noted earlier, targets’ satisfaction with their long-term relationships increases to the extent that perceivers view them in an identity-confirming manner (i.e., their situated identity corresponds closely to both their initial identity and their partner’s situated appraisal of them). For example, when married people’s spouses see them as they see themselves, they are more intimate and satisfied with their spouses and are less likely to get divorced (Swann et al., 1994). Similarly, unmarried couples in long-term relationships feel more close and intimate with partners who view them congruently (L. Campbell et al., 2006). Presumably, congruent appraisals foster predictability and manageability in the relationship, which may not only increase the likelihood of achieving relationship goals (e.g., raising children), but also offer psychological comfort. Such psychological comfort may, in turn, reduce anxiety. From this vantage point, self-verification has an emotion regulatory function that the identity negotiation process facilitates.

Well-Being

There is some indication that a lack of correspondence between targets’ situated identities and perceivers’ situated appraisals increases negative emotions and promotes maladaptive psychological and physiologi-

cal outcomes. For example, Burke (2004) reported that identity-disconfirming events in the context of marital relationships increased people’s distress for up to 2 days following the events. Similarly, Wood and colleagues (2005) found that participants with low self-esteem felt anxious and concerned when confronted with success, apparently because success feedback was inconsistent with their identity. More recently, Howarth and Forbes (2015) found that socially anxious people reacted to positive feedback with heightened fears of evaluation, and to negative feedback with increased feelings of comfort. Finally, Ayduk et al. (2013) observed people’s cardiovascular responses to evaluations that either confirmed or disconfirmed their self-views. When people received positive feedback, those with negative self-views became physiologically “threatened” (distressed and avoidant). In contrast, when they received negative feedback, people with negative self-views became physiologically “challenged” or galvanized (i.e., aroused, but in a manner associated with approach motivation). People with positive self-views displayed the opposite pattern.

If positive but nonverifying experiences are stressful for people with negative self-views, then over an extended period such experiences might prove to be physically debilitating. Sure enough, several independent investigations support this proposition. An initial pair of prospective studies (Brown & McGill, 1989) examined the impact of positive life events on the health outcomes of people with low and high self-esteem. For high-self-esteem participants, positive life events (e.g., improvement in living conditions, getting very good grades) predicted increases in health; among people low in self-esteem, positive life events predicted *decreases* in health. This finding was replicated and extended by Shimizu and Pelham (2004). These researchers discovered that positive life events predicted increased illness among people low in self-esteem, even when controlling for negative affectivity, thereby undercutting the rival hypothesis that negative affect influenced both self-esteem and symptom reports. Apparently, for people with negative self-views, the disjunction between positive life events and their chronically negative identity may be so psychologi-

cally threatening that it undermines physical health (cf. Iyer, Jetten, & Tsivrikos, 2008; Stinson & Swann, 2017).

Workplace Outcomes

Accruing evidence indicates that identity negotiation processes can influence outcomes in the workplace. For example, studies of small work groups suggest that to the extent that individual group members bring their compatriots' appraisals of them in line with their identities, both individuals and groups benefit. Specifically, individuals who elicited identity-congruent appraisals were more committed to the group and performed better than those who did not (Swann, Kwan, Polzer, & Milton, 2003; Swann, Milton, & Polzer, 2000; see also London, 2003). Similarly, among people in service occupations, those with more negative self-evaluations were more strongly identified with their work, found their work more meaningful, and engaged in fewer counterproductive workplace behaviors (e.g., coming in late, daydreaming instead of working) to the extent that they perceived their occupation as more widely stigmatized by others (Shantz & Booth, 2014). People's identities may also influence their reactions to justice in the workplace. Whereas people with high self-esteem responded to high levels of procedural justice with high commitment and low rates of absenteeism, people with low self-esteem showed no such preferences (Wiesenfeld, Swann, Brockner, & Bartel, 2007). Even before people enter the workplace, identity negotiation processes may shape career-relevant outcomes. For instance, high-self-esteem students in computer science classes demonstrated greater science/technology/engineering/mathematics (STEM) persistence to the extent that their parents verified their positive STEM identity (Amarnani, Garcia, Restubog, Bordia, & Bordia, 2018).

In short, the outcome of the identity negotiation process, in general, and the fit between a target's situated identity and a perceiver's situated appraisal, in particular, has important implications. When people are seen as they see themselves, they enjoy superior relationship quality and duration, exhibit heightened psychological and physical well-being, and are even more productive

and satisfied in the workplace (for a further discussion, see Swann, Johnson, & Bosson, 2009).

Resulting Identity and Relationship Goals

The final step in the model depicted in Figure 27.1 consists of both parties' identities and relationship goals at the conclusion of a given iteration of the identity negotiation process. Although both the target's and the perceiver's resulting identities usually resemble their initial identities to a large degree, it is also possible for an identity to shift during the identity negotiation process. In this sense, the identity negotiation model allows for and explains both identity stability and identity change.

The foregoing discussion points to at least five conditions that increase the probability of permanent (or at least long-term) identity change: (1) the aspect of identity being negotiated is relatively unimportant or uncertain to the target; (2) interpersonal feedback or experiences fall outside the target's or perceiver's latitude of acceptance (and thus cannot easily be assimilated into a preexisting identity); (3) feedback or experiences are difficult or impossible to dismiss (e.g., feedback comes from a highly credible source or is patently obvious); (4) feedback or experiences that are inconsistent with the target's initial identity nonetheless produce outcomes that are perceived as highly desirable; and (5) the social environment lacks opportunity structures (e.g., social networks, physical and psychological resources) that are necessary to sustain a given identity. In the next section, we discuss several factors that precipitate these conditions.

Identity Negotiation and Identity Change

Up to this point in the chapter, we have emphasized the importance of congruence in the perceptions of targets and perceivers, especially when these perceptions match the target's chronic (initial) identity. By implication, changes in identity appear to be unwelcome phenomena that can confuse or even derail the process of identity negotiation. Yet as disruptive and painful as identity changes may sometimes be, they are a natural, un-

avoidable, and critically important part of life (Marcia, 1980; Robins, Nofle, Trzesniewski, & Roberts, 2005). In fact, although some changes in identity are triggered by events over which the target has no control, other changes are triggered by changes in the target him- or herself, some of which are intentional. Here, we consider several different cases of volitional and nonvolitional identity change that reflect, to varying degrees, the five conditions of change listed earlier.

Sociocultural and Idiosyncratic Contextual Changes

Changes in widespread normative expectations may have a profound impact on how people construe their identity. For example, the Civil Rights and Women's movements of the mid-20th century in the United States altered cultural expectations and behavioral norms for Black people and women, respectively. More recently, increasing awareness of lesbian, gay, bisexual, and transgender (LGBT) identities, combined with sweeping legal changes, such as the 2015 U.S. Supreme Court ruling that granted same-sex couples the right to marry, led to shifts in cultural attitudes and beliefs about members of the LGBT community. These changed expectations, norms, and beliefs subsequently impact the identities of members of these groups, as happened when the Women's movement led men and women alike to relinquish stereotyped conceptions of women as weak and dependent (e.g., Spence, Deaux, & Helmreich, 1985). Widespread changes in gender stereotypes produced corresponding changes in girls' and women's identity-relevant feedback, experiences, opportunity structures, and outcomes. To illustrate, young women showed steady increases in agentic self-views (e.g., assertive, effective) between 1973 and 1994 (Twenge, 1997) that corresponded with women's increasing entrance into previously male-dominated workplace, educational, and political domains. Similarly, as cultural stigmatization of sexual and gender minorities has declined over the past couple of decades in the United States, more and more people are publicly identifying as LGBT (Gates, 2013). These changes in self-views and identity are then negotiated and renegotiated via the processes detailed here.

People may also encounter changed expectations and behavioral norms when their immediate culture changes rapidly. A particularly dramatic example of such idiosyncratic culture change occurs when people enter "total institutions" (Goffman, 1961), or institutions such as prisons, mental hospitals, and military bases, in which all aspects of personal life are controlled and regulated by authorities. In total institutions, those in power theoretically isolate people from their families and friends, and systematically program their environments so as to encourage adoption of a new identity (Berger & Luckman, 1966). In general, such institutions are rarely successful in transforming the core identities of those who are disinclined to change (Schein, 1961). Rather, the success of this approach is limited to relatively modest, short-term alterations of behaviors and identities that are of a more peripheral nature.

Environmental Changes

Dramatic identity changes can occur when people shift their social networks by, for example, entering college or moving to a new town or country (e.g., Iyer et al., 2008). Such shifts produce identity change for a variety of reasons (see Hormuth, 1990). First, as with the contextual changes described earlier, new environments inevitably provide people with new expectations and norms that can produce corresponding changes in identity. Furthermore, novel environments tend to increase people's self-focused attention, which over time can bring about identity change as new self-knowledge is acquired and new self-standards are applied.

Finally, new environments may not afford the opportunity structures that once nurtured and sustained an identity. In such cases, people who (for whatever reasons) fail to *remoor* their identity to a new social structure that resembles the old one most likely experience identity change (Ethier & Deaux, 1994). For example, some (e.g., Sageman, 2004) have speculated that identity negotiation processes initiated the chain of events that led to the terrorist attacks on the World Trade Center in 2001. The process was set in motion when a group of foreign students visited Europe and failed to receive the warm reception that their past

successes had led them to expect. So, rebuffed, they sought refuge with a group of fellow visitors with whom they felt a sense of shared essence (Swann et al., 2014). These visitors happened to have radical leanings. Over time, the eventual terrorists gradually became more and more aligned with a jihadist group, culminating in the fusion of their personal identities with the social identities associated with this new group (e.g., Swann & Buhrmester, 2015; Swann, Jetten, Gómez, Whitehouse, & Bastian, 2012). The consequences of this identity fusion process were catastrophic.

Developmental Growth and Role Changes

One common source of identity change is set in motion when the larger community recognizes a significant change in the individual. Such changes, for example, may entail the person's age (e.g., when adolescents become adults), status (e.g., when graduate students become professors), or social role (e.g., when single people get married). When such transformations occur, the community may abruptly alter the way that it treats the person. Usually, targets of such differential treatment eventually become less invested in maintaining their initial identities and bring their identities into harmony with the treatment they currently receive. Support for such scenarios comes from theories and research suggesting that late adolescence marks a developmental period during which changing treatment and expectations prompt significant identity change (Arnett, 2000; Erikson, 1959).

Acquisition and Loss of Abilities

At various times in life, people acquire new competencies or lose established ones. Although both gains and losses can occur at any point, gains tend to be concentrated during the early years (e.g., acquiring the ability to play sports, drive a car) and losses tend to be concentrated during the later years (e.g., losing the ability to play sports, drive a car). Whether people gain or lose an ability, the experience can have important implications for their identity. One especially powerful influence on people's abilities and related capacities is their physical health. Because

serious illnesses have ramifications for so many aspects of people's lives, the shift from "healthy person" to "patient" may be one of the most psychologically wrenching identity transformations that people undergo. In a related vein, the physical changes that inevitably accompany aging can produce profound identity change even in healthy persons (Whitbourne, 1996).

Strategic Self-Verification

When people realize, either explicitly or implicitly, that a chronic identity could prevent them from achieving a valued goal, they may negotiate a situated identity that promotes the attainment of that goal. Over an extended period of time, such negotiations may produce permanent identity change. Consider, for example, a woman who decides that her lack of social confidence will prevent her from retaining the admiration of her lover. Recognizing the problem, she may strive to convey a more sociable and confident persona in the context of her relationship with her lover. If her lover recognizes her heightened sociability, she may internalize his positive reactions and come to see herself as more confident than she did originally (Swann et al., 2002). As another example, U.S. college-age men routinely respond to threats to their gender status with heightened attempts to demonstrate masculinity, even when they do not view themselves as especially masculine (Bosson & Michniewicz, 2013; Vandellos & Bosson, 2013). Such strategic self-verification meets important social goals for men, for whom manhood status is typically conceptualized as precarious and "easy to lose." Notably, research shows that positive feedback from an interaction partner can encourage a person to internalize a new self-view (Jones, Gergen, & Davis, 1962), thus increasing the likelihood that the target's situated identity will become relatively permanent. Of course, as noted earlier, the likelihood of this will be reduced insofar as a chronic negative self-view is held with great certainty.

Self-Initiated Changes

On a related note, people may initiate an identity change to address or repair an un-

satisfying life situation or because they aspire to self-improvement. People may, for example, decide that they are dissatisfied with their standard of living and take systematic steps to adopt an identity that will accommodate a more lucrative profession. Some research suggests that such intentional identity change requires a self-focused state of mental preparedness or *subjective readiness to change* (Anthis & LaVoie, 2006). Even those who feel prepared for change, however, will likely find it difficult to alter deeply entrenched aspects of their identity simply because they want to (e.g., Swann, 1996). Indeed, for self-initiated identity change to take root successfully, people should change not only their own self-views and/or narratives but also other aspects of the identity negotiation process that sustained their former identity, such as specific relationship partners and social contexts.

Gateway Identities

At times, people may engage in behavior but resist internalizing an identity that befits the behavior. For example, earlier this century, smoking rates stabilized at around 21% of U.S. adults (Centers for Disease Control and Prevention, 2005), but the stigma associated with smoking has increased steadily (Kim & Shanahan, 2003). An outgrowth of these dual trends is that many people take their smoking behavior underground or identify merely as “social smokers,” even though they may smoke as often as self-acknowledged smokers. This “pseudo-non-smoker” identity may be a *gateway identity*, a relatively safe and nonthreatening transitional identity that can lull people into behaviors that eventually precipitate full-blown addiction. Once addiction takes hold, it promotes behaviors that are emblematic of the undesired identity. Although the behaviors justified by the gateway identity might be quite different, they all share the common effect of allowing people to cling to their established identities while engaging in behaviors that conflict with that identity. If the behaviors persist, it becomes increasingly likely that the individual will be forced to recognize the behavior for what it is and update the identity in question.

In short, although identities tend to remain fairly stable, there are several mecha-

nisms that can contribute to identity change. If there is a single quality that all of these mechanisms share, it is that they are either triggered by or lead to changes in the social environment. In this respect, identity negotiation theory shares the assumption of both self-categorization theory (e.g., Turner, Oakes, Haslam, & McGarty, 1994) and self-perception theory (Bem, 1972) that stability in people’s interpersonal relations fosters stability in identity. Despite this similarity, however, identity negotiation theory does not assume that people’s sense of identity is computed on an ad hoc basis from current inputs from the social environment. Identity negotiation theory rejects this “empty self” assumption, arguing instead that people derive a sense of self not only from currently available social inputs but also from chronically activated beliefs about the self that influence, as well as reflect, social inputs. This feature of identity negotiation theory bolsters its ability to explain the stability, as well as the flexibility, of self-knowledge.

Summary and Conclusions

Identity negotiation processes refer to those intrapsychic and interpersonal activities through which people establish, maintain, and change their identities. This chapter has offered a rudimentary theory of identity negotiation. We assume that the identity negotiation process begins when people enter social interactions and strive to establish the identities they are to assume. To this end, people follow (largely without awareness or intention) a host of principles. Generally, these principles encourage people to negotiate identities that are compatible with their chronic self-views. Under some conditions, however, people may reorganize or transform their identity to accommodate new social realities. As a result, although identity negotiation processes and their accompanying intrapsychic mechanisms usually stabilize identities, they can lead to identity change under specifiable conditions.

In constructing our model of identity negotiation, we have elaborated the interpersonal principles and intrapsychic mechanisms that guide identity negotiation processes, and have explained how these processes unfold

during each of several successive stages of social interaction. Although our emphasis has been on the ways in which the identity negotiation process can foster stable identities, we have pointed to some specific conditions under which identity negotiation processes can lead to identity change.

Identity negotiation processes play a critically important role in peoples' relationships by making them predictable and manageable, which in turn allows people to meet their needs and accomplish their goals. Simply put, just as identities define people and make them viable as human beings, the identity negotiation process defines relationships and makes them viable as a foundation for organized social activity.

As a model that emphasizes the interactive influence of personal and social situational antecedents of behavior, identity negotiation theory joins a relatively recent spate of theories of personality (e.g., Carver & Scheier, 2003; Cervone, 2004; Dweck & Leggett, 1988; Higgins, 1990; Mischel & Shoda, 1999; Secord & Backman, 1965; Swann & Seyle, 2005). Nevertheless, the theory is unique in its focus on the role of the self, which represents a key component of personality (Robins, Chapter 26, this volume). In addition, by merging two approaches (self-verification theory and symbolic interactionism) that have heretofore received little attention from personality theorists, identity negotiation theory may open up new domains of inquiry regarding the social nature of personality.

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CHAPTER 28

Self-Regulation and Personality

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Self-regulation is the primary means by which people direct their behavior in service of their goals. Goals, by their nature, are states of being that people desire but have not attained. These may include achievements such as graduating from college, changes to personal characteristics such as weight loss, or meeting standards of behavior such as routinely following rules of etiquette. Goal pursuit typically takes the form of activity aimed at reducing the gap between the current state and a desired state with respect to some achievement, personal characteristic, or behavioral standard, though it occasionally involves increasing the gap between the current state and some undesired state (e.g., financial dependence on parents) or maintaining the current state (e.g., optimal body weight). Goal pursuit can take as many forms as there are goals, people pursuing those goals, and conditions under which pursuit is enacted. For that reason, self-regulation encompasses a broad array of cognitive, emotional, motivational, and behavioral processes and strategies.

The array of psychological structures and processes encompassed by models of personality is similarly broad. Although traditional structural models of personality such as the Big Five (John, Chapter 2, this volume) offer nearly complete cover-

age of the broad array of personality traits, they do not readily connect to models of self-regulation. Process-oriented extensions of those models (e.g., DeYoung, 2015; McCrae & Costa, 1996) and models such as the cognitive–affective personality system (Mischel & Shoda, 1995) reveal the ways in which accounting for self-regulatory processes can enrich models of personality. Likewise, acknowledging the role of personality in cognition, emotion, motivation, and behavior can inform and extend models of self-regulation.

In this chapter, we explore the interconnection of self-regulation and personality. We begin with a sketch of the self-regulation domain space, which encompasses the array of psychological structures and processes implicated in self-regulation. Rather than commit to a single model of self-regulation, we offer a broad and integrative sketch, thereby ensuring that we do not miss a point of contact between self-regulation and personality. Next, we review connections between personality and self-regulation. We begin by considering links between prominent personality perspectives and self-regulation. We then review a set of traits that capture individual differences in preferences and styles related to self-regulation. We conclude with a discussion of the conceptual benefits

of integrating models of self-regulation and personality.

Self-Regulation Domain Space

The term *self-regulation* refers to a broad and heterogeneous set of psychological constructs implicated in autonomous goal pursuit, which involves conscious and non-conscious processes that influence goal pursuit in the moment (e.g., impulse control, delay of gratification) and over time (e.g., habit formation, strategic selection of situations; Duckworth, Milkman, & Laibson, 2018). A subset of these constructs includes structures and processes that support many essential neurobiological and cognitive functions but are of critical importance to self-regulation. We refer to these as collectively as the *foundation*, from which self-regulation emerges during childhood and on which it draws from adolescence into adulthood. These basic capacities are implicated in a set of *processes* that, together, constitute self-regulation proper. These processes make possible a set of *goal-related activities* that serve the needs and desires of people in a position to direct their own behavior. In broad terms, self-regulation is “voluntary action management” (Karoly, 1993, p. 24) made possible by a system of interdependent psychological structures and mechanisms (Bandura, 1991; Karoly, 1993), which we outline in the remainder of this section.

Foundation

Executive function, temperament, and selected dimensions of personality form the psychological foundation on which self-regulation rests. *Executive functions* are basic cognitive processes that support the mental activity involved in self-regulation (e.g., adoption of goals, anticipation of goal-relevant affordances and obstacles, monitoring progress toward goal attainment). Specifically, they allow for planning, decision making, error correction, and the inhibition of prepotent responses (Norman & Shallice, 1986), skills that are critical in goal pursuit. Individual differences in executive skills are first evident in temperament and later in personality, the more specialized and proximal

foundations of self-regulation. Conceptual and empirical integration of executive skills across the many tasks by which they are assessed points to a single overarching skill, inhibition, and two more specific skills, updating of working memory and shifting between tasks or mental states (Miyake et al., 2000).

Temperament is the bridge between executive function and fundamental features of personality that underpin self-regulation (Rothbart, 2007). The link between temperament and self-regulation is explicit in some definitions of temperament (e.g., “constitutionally based individual differences in reactivity and self-regulation, in the domains of affect, activity, and attention” (Rothbart & Bates, 2006, p. 100), but it is at least implied in nearly all (Shiner et al., 2012). A useful distinction can be drawn between automatic or involuntary aspects of temperament and aspects that are subject to conscious behavioral control (Derryberry & Rothbart, 1997; Eisenberg & Morris, 2002). *Automatic processes* (also called *reactive processes*) include impulsivity or reactivity to positive or negative stimuli. Individual differences in these processes are associated with differences in neural systems (e.g., the behavioral activation and inhibition systems; Gray, 1981). Conscious processes include effortful control, the ability to inhibit a prepotent response, and to plan and carry out goal-directed behavior (Kochanska, Murray, & Harlan, 2000). Several more fundamental executive control processes underlie effortful control, including attentional focusing, inhibition of distraction, and monitoring of goal pursuit (see Nigg, 2017, for a review).

These temperamental processes foreshadow aspects of *personality* that in adolescence and beyond, support or undermine self-regulation (Shiner, Masten, & Roberts, 2003). The aspect of personality that most clearly supports self-regulation is conscientiousness. Its relevance is most clear in the five-factor model conceptualization, which specifies self-discipline, deliberation, and competence as facets and “plans before travel” and “gives up on self-improvements” (reversed) as nuances (Mõttus, Kandler, Bleidorn, Riemann, & McCrae, 2016). Conversely, particular facets of neuroticism—

anxiety, impulsiveness, and vulnerability (panics easily)—pose challenges for effective self-regulation. The relevance of these and other features of personality for multiple processes involved in self-regulation points to personality as foundational for self-regulation. Indeed, some processes involved in self-regulation, when considered over time or across situations, can be viewed *as* personality traits (e.g., deliberation; McCrae & Löckenhoff, 2010). And processes evident in the expression of some personality traits can be viewed *as* self-regulation (e.g., narcissism; Morf & Rhodewalt, 2001). In multiple ways, then, personality is a component of the foundation on which self-regulatory processes draw.

Processes

Regardless of the goal or goal type in question, the psychological processes involved in self-regulation of goal pursuit are the same. Although goal-supportive behavior may be spontaneous or automatic (e.g., Fitzsimons & Bargh, 2004), self-regulated goal pursuit as characterized in the primary models of the process is deliberate and conscious (though it may require overriding impulses, habits, and norms that are automatic and involuntary). Moreover, most conceptual models of the process posit a small number of interdependent processes that operate sequentially and cyclically (e.g., Carver & Scheier, 1981; Kanfer, 1970; Zimmerman & Campillo, 2003).

Given the cyclical nature of self-regulatory processing, an account of the overall process could commence with any of the contributing subprocesses. At some point, however, most instances of goal pursuit begin with cognitive processes focused on expectations, anticipation, and planning. Collectively, we refer to these processes as *forethought*, which is mental activity focused on the means by which the goal will be pursued and the affordances and obstacles likely to be present during goal pursuit. The result of forethought is a plan, which may be vague and abstract or highly specific and concrete. Critically, the evaluation of the likely effectiveness of the available means and confidence in the plan given the anticipated circumstances contributes to beliefs about

whether the goal can be achieved (i.e., self-efficacy regarding goal-relevant behaviors).

Forethought informs *performance*, which is cognitive or behavioral activity aimed at reducing (or, on occasion, enlarging) the gap between the current and desired states. Performance involves enacting goal-relevant behaviors while avoiding behaviors, including cognitions and emotions, irrelevant to or in conflict with the goal. A critical aspect of performance is *self-monitoring*, the metacognitive activity of assessing the effects of the enacted behavior with reference to the motivating goal. Effective goal pursuit results in a discernible move from the person's prior state to a state consistent with the goal or standard in play.

Most episodes of goal-directed performance are followed by a period of *self-reflection*, during which people evaluate the effects of their behavior on the gap between the prior and desired states. An adaptive response to the outcome of self-reflection is *self-reinforcement*, by which people positively reinforce those behaviors that result in progress toward the goal and negatively reinforce those behaviors that yield little or no convergence between the prior state and the state implied by the operative goal or standard.

These subprocesses are linked in a cyclical process by which people iteratively move from forethought to performance to self-reflection, realizing progress toward the goal with each successive cycle.

Goal-Related Activities

The foundational elements and psychological processes we have presented serve the primary goal-related activities: goal setting, goal pursuit, and disengagement from goal pursuit. Goal setting establishes the mental representation of an end state toward which self-regulation is focused. The term *goal setting* implies a thoughtful, volitional process; however, goals are sometimes, perhaps often, adopted through conformity or some other unintentional process, or prescribed by others. Whether adopted autonomously or passively, goals define the current–future state discrepancy to be reduced through self-regulation (Locke & Latham, 2006). Although goals may be set with reference

to a wide range of outcomes (e.g., academic performance, social life, health and wellness), many focus on task performance. For such goals, a mental representation that is specific and imagines a future state that will be difficult to attain typically produces the highest level of motivation and, ultimately, superior performance.

The adoption of a goal typically is followed by pursuit of that goal. *Goal pursuit* involves the enactment of means aimed at reducing the discrepancy between the current state and the state reflected in the adopted goal. Among the many considerations relevant for goal pursuit are sources of motivation, persistence, maintenance of interest and commitment, and monitoring of progress. As will be evident later in the chapter, these considerations are primary points of overlap between self-regulation and personality.

Goal pursuit may terminate for two general reasons: (1) the goal has been attained (i.e., the gap between the desired state and the current state is zero) or (2) pursuit of the goal has been discontinued. The latter reason is of particular interest, because it ensures that the goal will not be attained. Such *goal disengagement* could result from self-regulatory failure—the goal remains relevant and important but pursuit has ceased—or self-regulatory success—the goal is no longer relevant or is unlikely to be attained and therefore should be abandoned (Wrosch, Miller, Scheier, & Brun de Pontet, 2007) or put on hold (Davydenko, Werner, & Milyavskaya, 2019). Goal disengagement and its opposite, persistent goal pursuit, are influenced both by performance during goal pursuit and stable characteristics of the person engaged in goal pursuit.

Connecting Self-Regulation and Personality

Drawing on this broad sketch of self-regulation, in the remainder of the chapter we review conceptual models and empirical findings that illustrate and explain the interconnection of self-regulation and personality. We organize the review in two parts. The first focuses on selected major models of personality that offer insight into one or more aspect of self-regulation.

In some cases, principles and processes in self-regulation are explicitly addressed by the model. In other cases, the connection with self-regulation is not explicit; rather, it is evident either from empirical evidence or conceptual overlap. The second part focuses on traits that reflect individual differences in preferences and approaches to self-regulation. A subset of these traits offers insight into stable tendencies that distinguish between people who are generally effective at self-regulation and people who are not. Others focus more on different preferences or styles of self-regulating, suggesting that there are multiple routes to effective self-regulation.

When considering connections primarily evident in empirical relations, we sometimes focus on behaviors that imply effective or ineffective self-regulation. Most consequential behaviors are multiply determined; thus, our assumption is that such behaviors are “noisy” indicators of self-regulation. Nonetheless, when correlated with personality, they offer useful, if imperfect, clues as to how and when personality influences self-regulation and, in turn, adaptive behavior. This form of evidence is particularly useful in research connecting foundational features of temperament in infancy and childhood with behavior in adolescence and young adulthood, a body of research to which we turn first.

Accounts of Self-Regulation in Models of Personality

The connections between self-regulation and personality highlighted in this section have not always been evident. The earliest accounts of self-regulation focused primarily on cognitive, affective, and motivational processes presumed to operate similarly for all people (e.g., Carver & Scheier, 1981; Duval & Wicklund, 1972; Kanfer, 1970). Newer models and elaborations on early accounts have highlighted stable individual differences in how people self-regulate and how (in)effective they are when they do (e.g., Higgins, 1997; Kruglanski et al., 2000; Lynam & Miller, 2004). Early comprehensive models of personality focused primarily on the latent structure of personality

descriptors, offering useful descriptive accounts of the basic content and structure of personality space, with little attention to the mechanisms that characterize personality and are influenced by it (e.g., Costa & McCrae, 1992; John, 1990). With near consensus on the structure of personality, these descriptive models have been embellished and expanded to propose mechanisms that suggest a direct role of self-regulation in basic personality processes, as well as ways in which personality influences self-regulatory processes (e.g., Denissen & Penke, 2008; DeYoung, 2015; McCrae & Costa, 1996; Van Egeren, 2009). The convergence of theoretical models of self-regulation and personality have revealed many connections, which we review in this section.

Models of Temperament

Temperament, evident in infancy, is the earliest expression of individual differences relevant for self-regulation. Early models focused on consistency in expressed behavior, expressly excluding issues of motivation and control (e.g., Thomas & Chess, 1977). Later models added components that hint of a connection with rudimentary forms of self-regulation. For example, synthesizing definitions from multiple perspectives, McCall (in Goldsmith et al., 1987) defined *temperament* as “basic dispositions inherent in the person that underlie and modulate the expression of activity, reactivity, emotionality, and sociability” (p. 524); the modulation of behavioral and emotional expression suggests some capacity for controlling, perhaps strategically, behavior. Newer models, reflecting increased understanding of the brain regions relevant for mental activity essential for self-regulation (e.g., Banfield, Wyland, Macrae, Münte, & Heather-ton, 2004) and their activity during infancy (e.g., Posner, Rothbart, Sheese, & Voelker, 2012) fully incorporate self-regulation in models of temperament. Rothbart and Bates (2006) offer a clear expression of this view, defining *temperament* as “individual differences in reactivity and self-regulation, in the domains of affect, activity, and attention” (p. 100).

A specific facet of temperament reflective of this model is *effortful control*, the

ability to inhibit a prepotent response, and to plan and carry out goal-directed behavior (Kochanska et al., 2000). Many of the processes underlying effortful control are also studied as executive control processes, such as attentional focusing, inhibition of distraction, and monitoring of goal pursuit. Effortful control abilities measured early in life have robust associations with outcomes many years later. As assessed with parent reports, teacher reports, and behavioral measures, effortful control abilities predict social competence and social acceptance, negative and positive emotion, and externalizing behaviors such as aggression in cross-sectional studies and in longitudinal studies spanning several years (e.g., Atherton, Lawson, Ferrer, & Robins, 2020; Sethi, Mischel, Aber, Shoda, & Rodriguez, 2000; for summaries, see Eisenberg, Eggum, Sallquist, & Edwards, 2010; Tobin & Graziano, 2006). Such associations imply that effortful control in childhood is foundational for self-regulation in adolescence and young adulthood. Alternatively, and consistent with definitions of similar constructs (e.g., Rothbart & Bates, 2006), effortful control may be viewed *as* self-regulation, though less sophisticated and effective than self-regulation when neuromaturation is complete.

Further evidence that highlights connections between temperament and self-regulation comes from longitudinal studies that follow research participants from early childhood into adulthood. The most comprehensive study of this type that includes measures of temperament and later measures of behaviors reflective of self-regulation is the Dunedin Multidisciplinary Health and Development Study, in which a complete birth cohort in Dunedin, New Zealand, was assessed every 2–3 years from birth to age 21 (Silva, 1990). At age 3, observational assessments of temperament provided data for a classification analysis that revealed five types of children, distinguishable on characteristics from which individual differences in self-regulation emerge. About 10% of the sample (of which almost two-thirds was male) was classified as *undercontrolled*, characterized by impulsivity, irritability, hyperactivity, emotional lability, and lacking in persistence. At the age 21 assessment, information was obtained on a variety of

health risk behaviors, including unsafe sex, dangerous driving, violence, and alcohol dependence. Young adults who were classified as undercontrolled at age 3 were more than twice as likely as other individuals in the cohort to be involved in one or more health risk behaviors (Caspi et al., 1997). Moreover, when personality assessed at age 18 was controlled, the effect became nonsignificant, suggesting a developmental path that runs from childhood temperament to adolescent personality to adult behavior. Children for whom the temperamental foundation of self-regulation is weak are more likely to become dispositionally poor at self-regulation and engage in problem behaviors that ordinarily are managed through self-regulation. This pattern is evident in the findings of other prominent studies of self-regulation-relevant characteristics of temperament (e.g., Robins, John, Caspi, Moffitt, & Stouthamer-Loeber, 1996) and their relevance for a range of consequential outcomes during adolescence and young adulthood (e.g., Allemand, Job, & Mroczek, 2019; Moffitt et al., 2011).

Complementing and corroborating findings from longitudinal research such as the Dunedin Study are the results of intervention studies that target deficits rooted in temperament. Two such interventions that have produced findings that underscore the relevance of temperament for later self-regulation are Head Start and the Perry Preschool Program. Based on economic analyses, Heckman (2006) has argued persuasively that the benefits of such programs are important but missed by evaluations that focus on cognitive abilities as reflected in measures of intelligence and academic achievement. Rather, the effects of these programs are evident in skills governed by temperament in early childhood but increasingly shaped by experience with aging. These “soft skills,” which allow for personal and social productivity, include attentiveness, persistence, and impulse control. Evaluations comparing treated and control groups more than three decades after intervention indicate impressive long-term effects on important life outcomes: higher rates of high school graduation, higher salaries, higher rates of home ownership, lower rates of receipt of welfare assistance as adults, fewer out-of-wedlock births, and fewer arrests (Schweinhart et al.,

2005). Consistent with our argument that these skills rooted in temperament serve as the foundation from which self-regulatory skills develop, the return on investment is maximized when the intervention is provided in preschool or earlier.

Although not a canonical facet of temperament, the critical ability to *delay gratification* emerges during early childhood. The ability to forego an immediate goal or reward in favor of a later, larger goal or reward requires executive control abilities, such as inhibition of impulsive or prepotent behavior, so delay of gratification can be seen as one aspect of effortful control (Tobin & Graziano, 2010). Variability in early delay ability as indexed by the “marshmallow test” (Mischel, Ebbsen, & Zeiss, 1972) is associated with an array of outcomes indicative of good self-regulation later in life, including better social competence in adolescence (Mischel, Shoda, & Peake, 1988), higher standardized achievement test (SAT) scores (Shoda, Mischel, & Peake, 1990), fewer instances of substance use (Romer, Duckworth, Sznitman, & Park, 2010), and lower rates of obesity in both adolescence (Seeyave et al., 2009) and adulthood (Schlam, Wilson, Shoda, Mischel, & Ayduk, 2013).

The interconnection of self-regulation and personality is evident in contemporary models of temperament that encompass elemental features of self-regulation while foreshadowing core aspects of personality. In the next section, we shift the focus to adolescence and later, reviewing models of personality that highlight the connections to self-regulation that originate with temperament.

The Big Five

The dominant comprehensive models of personality are the Big Five trait taxonomy (John, Chapter 2, this volume) and the conceptually similar five-factor model (Costa & McCrae, 1992). The focal domains are fundamental, higher-order dimensions that encompass in an organized manner the broad array of specific personality descriptors (John, Chapter 2, this volume). The domains are *agreeableness*, *conscientiousness*, *emotional stability/neuroticism*, *surgency/*

extraversion, and *intellect/openness to experience*. Although additional domains have been proposed (e.g., Thielmann, Hilbig, Zettler, & Moshagen, 2017), the consensus among personality researchers is that the Big Five domains are sufficiently comprehensive and cross-culturally replicable to guide analyses focused on the full personality domain space, as is our purpose here.

In order to fully capture the connections between self-regulation and personality as reflected in the Big Five, we note that some connections are most clearly evident when moving up or down the conceptual hierarchy of personality structure. First, moving up the hierarchy, one higher-order model proposes two independent metatraits that account for the covariation between the Big Five domains (DeYoung, 2006, 2010). Specifically, the covariation between (low) neuroticism, agreeableness, and conscientiousness is attributed to a higher-order factor labeled *stability*, and the covariation between extraversion and openness is attributed to a second higher-order factor labeled *plasticity*. Moving down the personality hierarchy, the domain-level factors encompass multiple facets (Costa & McCrae, 1992; Soto & John, 2017). Although facets across domains are implicated in self-regulation, those of principal interest for our review are the facets of conscientiousness: *organization*, *productiveness*, and *responsibility* (Soto & John, 2017). Though not relevant for our review, in the interest of thoroughness, we note that analyses also have pointed to potentially useful levels of abstraction between domains and facets, referred to as *aspects* (DeYoung, Quilty, & Peterson, 2007) and at the bottom of the conceptual hierarchy, *personality nuance*, as reflected in individual personality descriptors (Möttus et al., 2016).

The focus of classic domain-level models of personality on structure rather than process makes them less valuable for analyzing connections with self-regulation, which typically is cast in process terms. The five-factor model has been used as the starting point for process-oriented theorizing about the role of personality in cognition, motivation, affect, and behavior. Five-factor theory embeds the five personality domains in a model that specifies both the origins of vari-

ability in the domains and the consequences of that variability for motivation, emotions, behavior, and, ultimately, identity (McCrae & Costa, 1996, 2008). Self-regulation and associated processes are positioned in the model as *characteristic adaptations*, which are stable individual differences that reflect the ways in which people navigate their social world given their personality, life experiences, and cultural influences. According to the theory, self-regulation emerges and operates as a function of two influences. One is the person's standing on the five basic personality dimensions, which is causal and sets the dispositional boundaries within which self-regulation operates. The second, more proximal influence, is a set of processes that follows from the person's standing on the personality dimensions, as well as cultural norms and important life events. These processes may enable or constrain goal pursuit.

In a similar effort, Denissen and Penke (2008) proposed a conceptualization of the personality domains not as decontextualized general tendencies but as individual differences in motivation and self-regulated behavior in different domains. For example, extraversion reflects individual differences in the functioning of reward systems in social situations, and conscientiousness reflects individual differences in goal pursuit skills and motivation. In effect, this approach organizes individual differences in motivation and self-regulation according to the five personality domains, so each individual difference in this model is an individual difference in either self-regulatory behavior (e.g., tenacity of goal pursuit) or motivation (e.g., motivation to cooperate).

Although five-factor theory offers a plausible set of mechanisms by which personality influences self-regulation, current assessment strategies do not capture those mechanisms. For that reason, our review of relevant empirical research is limited to associations involving scores on structure-focused measures, principally the NEO Personality Inventory—Revised (NEO-PI-R; Costa & McCrae, 1992). Many of these associations involve facet-level scores, which, given their specificity compared to domain-level scores, provide a stronger basis for theorizing about the role of personality in

self-regulation as prescribed by five-factor theory (e.g., McCrae & Löckenhoff, 2010).

Personality as characterized by these domain-level models is associated with goal setting, self-evaluation, and choice of self-regulatory strategy. With regard to goal setting, surgency/extraversion and emotional stability/neuroticism reflect approach and avoidance, respectively, and these basic tendencies influence whether goals are oriented toward producing desirable outcomes or avoiding undesirable outcomes (Carver & White, 1994; Depue & Collins, 1999). People who are high on surgency/extraversion, high on selected facets of conscientiousness, and low on the impulsiveness facet of emotional stability/neuroticism are likely to set more challenging goals (Judge & Ilies, 2002). Agreeableness is associated with less ambitious personal goals and a preference for goals that require cooperation (Judge & Ilies, 2002). Intellect/openness does not predict goal type or degree of challenge but is associated with the simultaneous pursuit of multiple goals (Little, Lecci, & Watkinson, 1992).

Turning now to processes involved in goal pursuit, with a specific focus on self-evaluation, we find that standing on several of the personality domains is associated with the amount and quality of self-evaluation as it relates to progress in goal pursuit. Most prominent in this regard is neuroticism. The negative emotional states characteristic of individuals low in emotional stability (i.e., high in neuroticism) bias self-evaluation in the direction of underestimating progress in goal pursuit (Little et al., 1992). Moreover, low emotional stability is associated with a style of self-reflection that is ruminative and ego-involved (Trapnell & Campbell, 1999). Thus, individuals low in emotional stability are inclined toward worry and overly negative self-evaluation, a bias that, ironically, can improve goal-relevant performance (Norem & Chang, 2002; Tamir, 2005). Surgency/extraversion is associated with positive emotional states that bias self-evaluation in a positive direction, perhaps resulting in the overestimation of progress in goal pursuit. Individuals high in intellect/openness, because of their interest in accurate self-knowledge, are likely to evaluate with relative accuracy their progress in

goal pursuit (Schaefer, Williams, Goodie, & Campbell, 2004). Finally, low conscientiousness is associated with a tendency to engage in goal-inconsistent behavior in the service of self-serving performance attributions (Ross, Canada, & Rausch, 2002). The result is favorable self-evaluation despite unsatisfactory goal pursuit.

The strategies by which goal pursuit is routinely managed also are associated with the five personality domains and their facets. Most obvious among these is conscientiousness. The facets of conscientiousness identify characteristic patterns of behavior that support (McCrae & Löckenhoff, 2010) and, at least partially, define (Eisenberg, Duckworth, Spinrad, & Valiente, 2014) self-regulation. Empirically, conscientiousness is associated with effort expenditure, persistence, and efficiency of time use (Chamorro-Premuzic & Furnham, 2003; Kelly & Johnson, 2005). The remaining domains are less explicitly associated with goal pursuit but are nonetheless correlated with certain preferences for how goals are pursued. People high in openness prefer spontaneity over scheduling (Courneya & Hellsten, 1998). High agreeableness is associated with a preference for working in cooperative group settings in which expectations are clear. People high in surgency/extraversion, driven primarily by approach motivation, rely on input from others (Courneya & Hellsten, 1998) and respond well to positive goal-relevant imagery. Conversely, people low in emotional stability/high neuroticism, driven primarily by avoidance motivation, experience improvements in goal pursuit on exposure to negative goal-related imagery (Knutson & Bhanji, 2006). In terms of preferences that undermine goal pursuit, low conscientiousness and low emotional stability are associated with a tendency to procrastinate (Steel, 2007).

The empirical literature on the Big Five and two related aspects of self-regulation—impulse regulation and self-control—is extensive (for a review, see McCrae & Löckenhoff, 2010). Most relevant for these aspects of self-regulation are emotional stability/neuroticism and conscientiousness. The associations involving emotional stability are complex. Individuals low in emotional stability (i.e., high in neuroticism), which en-

compasses impulsivity, are simultaneously low in self-control and impulse regulation, and high in avoidance. As such, their failures at self-regulation may stem from either under- or overcontrol and involve deficits in the regulation of both emotion (e.g., fearfulness) and behavior. Conscientiousness, with its roots in temperamental effortful control, is associated with good control of impulses and behavior, with little relevance for the regulation of emotion. Individuals high in conscientiousness are prone to planning, persistence, and perseverance, all tendencies that generally support effective self-regulation (though the tendency to persevere may forestall goal disengagement when it is warranted; Wrosch et al., 2007). Considered together, emotional stability/neuroticism and conscientiousness define distinct styles of self-control (Costa & Piedmont, 2003). The combination of high emotional stability and high conscientiousness is optimal, supporting a style that favors successful self-regulation. Conversely, low emotional stability and low conscientiousness mark an undercontrolled style of managing emotions and behavior that works against the regulation of impulses and control of behavior (Favini, Gerbino, Eisenberg, Lunetti, & Thartori, 2018). Finally, people low in emotional stability and high in conscientiousness are prone to overcontrol in the form of perfectionism and compulsive behavior.

Before summarizing connections between self-regulation and other models of personality, we briefly move up, then down, the personality hierarchy to highlight additional connections with basic models of personality structure. Moving up the hierarchy, we return to a model described at the beginning of this section, in which two independent metatraits account for the variance in the basic five domains (DeYoung, 2006). Conscientiousness, agreeableness, and emotional stability reflect the metatrait of stability, which is a general tendency toward resisting temptations that would disrupt progress toward currently active goals. Extraversion and openness reflect plasticity, which is a general tendency toward the pursuit of new goals and a willingness to entertain new perspectives on currently active goals and strategies for pursuing (DeYoung, 2010). Now moving down the hierarchy, we note

the outcome of a project linking specific everyday behaviors to conscientiousness (Jackson et al., 2010). Students generated lists of behaviors associated with conscientiousness, resulting in a pool of 185 behaviors constituting the Behavioral Indicators of Conscientiousness. Many of these behaviors are indicative of (in)effective self-regulation (e.g., “Spend more money than I have”; “Oversleep for class or work”; “Get to appointments on time”), providing concrete evidence of the connections between conscientiousness and self-regulation as manifest in behavior.

As a whole, the literature linking self-regulation and personality as outlined in comprehensive, domain-level models reveals many connections between general cognitive, affective, and behavioral tendencies as reflected in personality and self-regulatory processes and outcomes. In the next section, we summarize models that integrate the Big Five personality dimensions and self-regulatory processes.

Cybernetics and the Big Five

Two features characterize most process-oriented models of self-regulation: (1) activity aimed at reducing the discrepancy between the current state and some preferred state prescribed by a goal or standard, and (2) an iterative process whereby attempts at discrepancy reduction are assessed and repeated until the current state is sufficiently close to the preferred state to signify acceptable progress in goal pursuit or adherence to a behavioral standard (e.g., Carver & Scheier, 1981; Duval & Wicklund, 1972). Such models characterize self-regulation as a cybernetic system, not unlike the dynamic systems that regulate physiological activity in the human body (e.g., blood pressure, body temperature; Weiner, 1948).

An initial attempt to characterize the Big Five in cybernetic terms and, in so doing, connect them with self-regulation, integrates basic features of temperamental systems (e.g., approach–avoidance) with basic features of agentic and autonomous goal pursuit (Van Egeren, 2009). A core assumption is that people control their behavior with reference to goals, which lead to forethought (with particular reference to situ-

ational affordances and barriers), on which plans are based. Those plans account for the likely effect of personality traits on the intended behavior. As such, behavior is not an expression of personality. Rather, it is a product of the particular personality traits that are relevant for the pursuit of a particular goal for which the behavior is relevant. Specific combinations of temperamental dispositions, forms of agency, and stages in cybernetic processing are evident in the Big Five factors. For example, the combination of a tendency to respond to rewards (temperament) and actively pursue goals (agency) through behavior (cybernetic) underlies Big Five extraversion (see also, Depue & Collins, 1999). The combination of a tendency to respond to threat and respond emotionally to failure, with a focus on failure to meet standards, underlies neuroticism. The remainder of the Big Five can be understood in similar terms, resulting in a comprehensive integration of cybernetic processes involved in self-regulation and basic dimensions of personality.

A related model combines features of cybernetic systems with the notion of characteristic adaptations as outlined in five-factor theory. Cybernetic Big Five Theory (CB5T) is built on the assumption that any adequate model of personality process must draw on principles of cybernetic systems (DeYoung, 2015). A distinctive feature of the theory is its characterization of personality traits not as fixed but rather as probabilistic descriptions of people. Thus, although people might, on average, behave in ways consistent with their standing on a particular trait, their behavior is responsive to situated stimuli and therefore likely to vary around some typical value (Fleeson, 2001). The assumption that trait-reflective behavior is sensitive to situated stimuli is critical for characterizing personality as a dynamic, self-regulating system. CB5T situates traits in a causal system in which genes, environments, and their interaction lead to relatively stable parameters of cybernetic mechanisms that lead to personality traits, which influence outcomes and characteristic adaptations (e.g., goals and strategies that characterize the person's general pattern of responding to particular situations). Critically, characteristic adaptations feed back to potentially alter the pa-

rameters of the cybernetic mechanisms and environmental factors that influence them. CB5T offers a process-oriented explanation for individual differences in personality at the domain level, as well as a level above and below it, in the personality hierarchy. For each personality dimension, the theory specifies connections between features of the dimension and stages of the cybernetic cycle, thereby integrating self-regulation and personality.

Cognitive–Affective Personality System

The integration of self-regulation and personality is complete in the cognitive–affective personality system (CAPS) perspective on personality (Mischel & Shoda, 1995). The CAPS perspective offers an account of personality that accommodates the seemingly contradictory observations that dispositions and traits are invariant, yet behavior varies across situations. This apparent contradiction is resolved through the mechanism of if–then situation–behavior relations, the pattern linking specific features of situations to the enactment of specific behaviors for a given person. The array of thoughts, feelings, and behaviors associated with specific if–then relations characterizes people and, when evident across people, personality types (Mischel, 2004). At the individual level, they constitute self-signatures (Mischel & Morf, 2003). To the extent particular self-signatures are evident across people, as signatures of personality, they offer insight into the self-regulatory processes associated with specific dimensions of personality.

With its focus on process, self-construction, and consistency in contextualized behavior, CAPS theory offers the ultimate integration of self-regulation and personality. The theory draws attention to trigger situations that activate internalized cognitive–affective units that link thoughts, feelings, goals, and behaviors. Self-regulation is evident in the dynamic interplay of triggers and if–then relations encoded in cognitive–affective units (Morf & Horvath, 2010). With experience, particular goals become chronically active, nonconsciously motivating goal pursuit. Others, though part of the self-system, are active only in the presence

of relevant triggers. These may be consistent with, or incompatible with, chronically accessible goals. Active goals are monitored through active processing of goal-relevant aspects of the immediate environment and the outcomes of goal-relevant behaviors. Monitoring associated with active goals results in biased attention to and processing of information in the environment, favoring interpretations of situational affordances and characteristics of people present in situations in goal-related terms. Monitoring also is concerned with evaluating potential gains and losses associated with specific approaches to goal pursuit, reflecting biases described in our summary of regulatory focus theory in the next section. These core features of online, contextualized goal pursuit allowed for detailed and process-oriented description of characteristic patterns of self-regulation that manifest as personality (e.g., Cain, Meehan, Roche, Clarkin, & De Panfilis, 2019; Mendoza-Denton & Goldman-Flythe, 2009; Morf & Rhodewalt, 2001).

Specific Traits Associated with Self-Regulation

A basic set of psychological structures and processes is assumed to characterize self-regulation for most people most of the time. Yet how and when these structures are activated and how relevant processes are deployed may vary systematically across situations and between people. In this section we review several prominent traits from a potentially large number of traits that contribute to that variability. Although these traits may account for variability in episodes of self-regulation as a function of situational affordances and constraints, we focus on their relevance for between-person differences in self-regulation.

Approach–Avoidance

At a fundamental level, self-regulation is influenced by the tendency toward behavior that is motivated by approach or avoidance. Although the tendency toward one or the other source of motivation influences behavioral choices relevant for self-regulation, those tendencies are not themselves features

of self-regulation. Rather, they account for differences in the strength of influence exerted by stimuli relevant for goal pursuit (e.g., temptations). To some degree, whether the operating motivation system is approach or avoidance depends on the stimulus eliciting the behavior and the behavior supported or discouraged by the immediate environment (Corr, 2013). If the stimulus is perceived as potentially rewarding, the approach system is typically activated. If the stimulus is perceived as potentially punishing, the avoidance system is typically activated. Individual differences related to approach–avoidance are relevant in two ways. First, the degree to which a particular stimulus is likely to produce reward or punishment is not always clear. In such cases, individual differences may dictate whether the perceiver is motivated to approach or avoid the stimulus. Second, people vary in the sensitivity of these motivational systems. Some people are more likely than most to perceive potentially rewarding stimuli and approach them, whereas other people are more likely than others to perceive stimuli as signaling possible punishment and avoid them (Carver & White, 1994). As noted in the previous section, individual differences in sensitivity of the approach and avoidance system account for a portion of the variability in the Big Five domains surgency/extraversion and emotional stability/neuroticism, respectively. Measures designed specifically to capture individual differences in sensitivity of the behavioral activation and behavioral inhibition systems have shown the relevance of approach–avoidance differences for self-regulation (Carver & White, 1994). The more sensitive the *behavioral inhibition system*, the more prone the individual is to anxiety and avoidance. Of relevance for the self-reinforcement phase of self-regulation, individuals high on behavioral inhibition are more sensitive to punishment. In contrast, the more sensitive the *behavioral approach system*, the more prone the individual is to impulsivity and novelty seeking, and the more responsive he or she is to reward. The sensitivity of these systems has profound effects on the sources of motivation that fuel people's pursuit of goals, as well as their preferences for specific goal-pursuit strategies.

Impulsivity

Impulsivity as a trait has been defined in a number of different—often inconsistent—ways (DeYoung, 2011). At its core, the construct refers to the frequency and strength of impulses, and the ability to override them when acting on them would be problematic. Despite its relevance for self-regulation, the general tendency to experience frequent and strong impulses has received little attention (cf. Tidwell & Eastwick, 2013). Nearly all accounts focus on the general tendency to act impulsively, that is, without forethought or planning (e.g., Whiteside & Lynam, 2001). Given the centrality of forethought and planning to self-regulation, it is not surprising that higher trait impulsivity is associated with a variety of behaviors that threaten adaptive goal pursuit, including substance use, sexual risk taking, and aggressive behavior. Despite the seemingly obvious detrimental effects of impulsivity on self-regulation, it bears noting that, on occasion, acting without thinking can improve rather than undermine self-regulation. For example, one path by which self-control leads to positive goal-consistent outcomes is through its effect on beneficial habits, which are enacted without forethought or planning (Galla & Duckworth, 2015). Thus, acting without thinking can be functional when it involves habitual behaviors that serve important goals. Individual differences in *functional impulsivity* reflect the ability to act quickly, with little or no thought, when quick decision-making is required in order to stay on track in goal pursuit (Dickman, 1990). On balance then, impulsivity, with respect to both the frequency and strength of impulses and the ability to override them when they are contrary to an active goal, generally undermines efforts at self-regulation (Duckworth & Steinberg, 2015), though occasionally it promotes efficient and effective self-regulation by limiting deliberation and choice.

Causality Orientation

Self-determination theory offers a general account of human motivation and personality, with a focus on the implications of different types of motivation for performance

and well-being (Ryan & Deci, 2000). The theory identifies three general tendencies toward the regulation of behavior. People who are *autonomy*-oriented self-regulate by considering their own interests and the behaviors and choices that would serve them. People who are *control*-oriented self-regulate by considering the social and material consequences of their behaviors and choices. Finally, people who are *impersonal* in their orientation generally do not feel as if they control their behaviors and choices. Although individual differences in causality orientation reflect the people's typical means of self-regulation, circumstances may push any person in the direction of more autonomous or controlled self-regulation. As such, even people who tend toward controlled self-regulation may self-regulate autonomously in autonomy-supportive environments. People who operate from an autonomous orientation are generally more effective at self-regulation, because their goal-relevant behaviors are more easily initiated, better maintained, and more thoroughly performed (Converse, Juarez, & Hennecke, 2019; Ryan & Deci, 2000). Thus, to the extent that the goals people pursue are adaptive, we would expect people who typically self-regulate from an autonomous orientation to be healthier and happier. Indeed, autonomous self-regulation predicts physical and mental health, as well as more satisfying and stable relationships (for a review, see Ryan & Deci, 2006).

Action Control

Action control theory proposes a set of volitional processes that contribute to effective goal pursuit (Kuhl, 1985). For an intention to act in a goal-consistent manner to be translated into action, it must be protected from alternative action tendencies within the person and in the immediate environment. Action control processes such as selective attention, motivation control, and control of the environment provide the protection needed to ensure that goal-consistent intentions produce goal-consistent actions. Action control theory posits two motivational orientations that manifest as states and, relevant to our review, characterize general tendencies that influence self-regulation.

People who are *action-oriented* have a high capacity to self-regulate their thoughts, feelings, and behaviors in such a way that their goal-relevant intentions lead to actions that promote progress in goal pursuit. People who are *state-oriented* tend to focus either on their current states or on future states but do not routinely engage in the assessment of gaps between the two and strategies for narrowing those gaps. As a result, their goal-relevant intentions do not routinely translate into actions that move them toward their goals. In general, action-oriented people are more likely to shield themselves from intentions inconsistent with active goals, and therefore tend to be more focused and decisive with respect to their goals than their state-oriented counterparts.

Concluding Remarks

In this chapter we have explored the interconnection of self-regulation and personality, which is increasingly apparent as models of personality become more process oriented and research on self-regulation increasingly attends to individual differences that characterize variability between people and across situations in self-regulatory processes. As concepts from each of these major literatures have infiltrated the other, the potential for models that fully integrate the two, with each benefiting from the strengths of the other, has become apparent. Indeed, what might be termed “second-generation” personality models such as the CAPS and CB5T are impressive attempts at characterizing personality processes in self-regulatory terms.

Whether the seeming convergence of models of self-regulation and personality continues until neither is explained without ample reference to the other remains to be seen. Yet even without a full convergence and integration, the benefits to researchers working either on self-regulation or personality of exploring links between the two is clear (McCabe & Fleeson, 2016). Comprehensive models of personality structure such as the Big Five provide terminology and assessment strategies for characterizing general similarities and differences between people. Beyond simple description, however, they do not ad-

dress fundamental questions, such as how personality is expressed and maintained, and, critically, *how* personality influences consequential behaviors, such as those to which models of self-regulation frequently are applied. Additional research exploring links between personality at different levels of the structural hierarchy and specific stages of self-regulation would provide an empirical basis for moving those models from descriptive to explanatory. Comprehensive models of self-regulation detail the cognitive, affective, and motivational processes at play in autonomous goal pursuit. Yet those models do not account for dispositional tendencies that surely facilitate or complicate goal pursuit. Moreover, they typically assume that the processes involved in self-regulation and the order in which they unfold in episodes of goal pursuit are invariant across people. Although that assumption may prove correct when put to empirical scrutiny, it seems possible, even likely, that people who are equally poor or adept at self-regulation vary in the processes, stages, or order of stages that characterize their management of goal pursuit. Personality traits below the domain level in structural models, as well as traits that cut across domains and facets in those models, are rich sources of information for embellishing basic models of self-regulation to account for adaptive and maladaptive deviations from the basic processes they propose. There is much to be gained from research by scholars of self-regulation or personality exploring the empirical connections between self-regulation and personality in the context of meaningful goal pursuit.

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CHAPTER 29

Narcissism in Contemporary Personality Psychology

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Narcissism is a popular topic that draws attention from researchers affiliated with clinical, developmental, personality, and social psychology, as well as psychiatry (e.g., Ackerman, Hands, Donnellan, Hopwood, & Witt, 2017; Back et al., 2013; Brown, Budzek, & Tamborski, 2009; Cain, Pincus, & Ansell, 2008; Krizan & Herlache, 2018; Miller, Lynam, Hyatt, & Campbell, 2017; Pincus & Lukowitsky, 2010; Wetzel & Robins, 2016). Research on narcissism is also controversial, as ongoing debates about the best ways to characterize the phenotypic expressions of narcissism (e.g., is narcissism best characterized by unshakeable grandiosity or ego brittleness?) and how to measure those attributes (e.g., is one narcissism inventory superior to another on conceptual and psychometric grounds?) characterize the literature. Our goal in this chapter is to provide readers with an understanding of these debates by placing them within a historical context. This chapter also aims to provide a summary of current research about the correlates and developmental antecedents of narcissistic attributes as they are studied in personality psychology. We spend more time summarizing recent psychometric and

developmental work given existing reviews of the correlates of narcissism (e.g., Ackerman et al., 2011; Krizan & Herlache, 2018; Miller et al., 2017; Rosenthal & Hooley, 2010; Rosenthal, Montoya, Ridings, Rieck, & Hooley, 2011). We begin with a brief review of the history of the construct and how it has been traditionally measured in personality psychology.

A Brief History of Narcissism

The term *narcissism* comes from mythology. In Ovid's *Metamorphoses*, the beautiful and arrogant hunter Narcissus coldly rejected the romantic overtures of the nymph, Echo. The pain of unrequited love caused Echo to wither away from despair. One of the gods, Nemesis, punished Narcissus for his indifference by making him suffer the same fate as Echo. However, this punishment came with a twist. Nemesis lured Narcissus to a pool of water where he fell in love with *his own* reflection. Whenever Narcissus reached out to touch his beloved visage, the image was disturbed by his own hand. Distressed that he could never attain the object of his

affection, Narcissus took his own life. The myth of Narcissus illustrates the dangers of vanity, self-absorption, and indifference to others. Not surprisingly, these attributes are featured in many contemporary phenotypic descriptions of narcissism.

Narcissism was first given serious attention in academic settings by researchers focused on sexuality and psychological disorders. Ellis (1898) used the term “Narcissus-like tendency” (p. 280), to describe an extreme form of autoeroticism. Psychoanalytic theorists (e.g., Freud, 1914/1955; Rank, 1911) later used the term *narcissism* to describe normal and pathological personality processes (for a more detailed review, see Millon, 2011), as well as various outcomes of these processes, such as sexual perversion, vanity, and self-absorption. In the field of psychology, narcissism has become most closely associated with a specific type of personality disorder.

Narcissistic personality disorder (NPD) was defined when it first appeared in the third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III; American Psychiatric Association, 1980). The description of NPD was ecumenical in that it drew from the phenotypic descriptions of narcissism from leading theorists of the time (namely, Kohut, Kernberg, and Millon) while being agnostic about etiology. In his writings on narcissism, Kohut (e.g., 1966, 1972) described both grandiose (e.g., exhibitionism, superiority) and vulnerable (e.g., feelings of inferiority, narcissistic rage) features. Similarly, Kernberg (1998) suggested that the fundamental features of narcissistic personality included superiority (which fluctuates with feeling inferior), grandiosity, exhibitionism, self-absorption, envy, exploitativeness, lability in mood that is brought on by frustrations of narcissistic ambitions, and possession of childish values. Finally, Millon (e.g., 1969) argued that narcissists’ most obvious problems lie within the realms of self-image (e.g., self-absorption, entitlement) and interpersonal relations (e.g., exploitativeness). These characteristics directly influenced the list of features in the DSM-III. One concern, however, with conceptualizations of narcissism in the subsequent revisions of the DSM was that themes related to grandiosity were emphasized at

the expense of themes and content related to vulnerability (Pincus & Lukowitsky, 2010).

The description of NPD in the DSM-III influenced the development of the most widely used inventory of narcissism in social and personality psychology (see Cain et al., 2008), the Narcissistic Personality Inventory (NPI; Raskin & Terry, 1988; Raskin & Hall, 1979). Raskin and Hall developed an initial pool of 223 pairs of self-relevant statements, with one statement of each pair reflecting narcissistic tendencies following the description of NPD. The 223 pairs were eventually winnowed to 40 (Raskin & Terry, 1988). Based on their initial structural analyses of the NPI, Raskin and Terry concluded that narcissism is “best construed as a higher order construct that describes diverse yet interdependent mental and behavioral phenomena” (p. 892). Indeed, the NPI has a complicated factor structure, with different groups advocating anywhere from two to seven factors (e.g., Ackerman et al., 2011; Corry, Merritt, Mrug, & Pamp, 2008; Emmons, 1984; Raskin & Terry, 1988) and the various dimensions seem to have somewhat distinct nomological networks (e.g., Ackerman et al., 2011; Barry, Frick, & Killian, 2003; Bradlee & Emmons, 1992; Emmons, 1984, 1987; Hickman, Watson, & Morris, 1996; Ruiz, Smith, & Rhodewalt, 2001; Trzesniewski, Donnellan, & Robins, 2008; Stanton et al., 2017; Watson & Morris, 1991).

Debates are ongoing as to which narcissistic attributes are most central to the construct. Measurement issues are relevant to these debates, as a number of groups have suggested that the NPI may have an overrepresentation of content related to leadership and authority compared to other arguably more central elements such as entitlement (Ackerman et al., 2011; Brown et al., 2009; but see Miller & Campbell, 2011). In addition, there is a concern that the NPI emphasizes grandiosity over other attributes that have traditionally been central to narcissism within clinical psychology (see Pincus & Lukowitsky, 2010). In short, tensions exist over the importance of grandiosity and vulnerability when conceptualizing and measuring narcissism.

Fortunately, there are indications that a consensus model of narcissistic attributes is

forming that includes both vulnerability and grandiosity. The kind of consensus model helps to organize the different dimensions of personality that have been historically associated with the construct. This model also captures the insights that grandiosity and vulnerability can co-exist within the same individual (e.g., Robins, Tracy, & Shaver, 2001; Pincus et al., 2009). For example, Robins et al. (2001) suggest that narcissistic personality expressions such as excessive grandiosity result from psychological processes implicated in the regulation of shame (i.e., vulnerability).

The Narcissism Spectrum Model: An Emerging Consensus about the Conceptualization of Narcissism

The recently proposed narcissism spectrum model (NSM; Krizan & Herlache, 2018) considers the domains of entitlement, grandiosity, and vulnerability critical to the structure and expression of narcissism (for a similar taxonomy, see Miller et al., 2017). According to the NSM, self-absorption and an entitled self-image lie at the core of narcissism. Moreover, the particular behavioral manifestations of this entitled self-image may be grandiose or vulnerable. Krizan and Herlache (2018) posit that approach-related motivational tendencies underlie grandiose expressions (e.g., excessive self-confidence, exhibitionism), whereas avoidance-related motivational tendencies underlie vulnerable expressions (e.g., emotional dysregulation and ego brittleness that lead to rage and aggression in its more extreme forms). Grandiosity reflects self-regulatory processes associated with acquisition, attainment, and self-promotion, which can fuel a sense of entitlement (grandiosity is also similar to the construct of Boldness from Patrick, Fowles, & Krueger's [2009] model of psychopathic personality traits). Likewise, vulnerability entails self-preservation tendencies and emotional brittleness that can spur entitlement as a defensive response to consistent feelings of threat and insult. The self may be elevated above others as a way of seeking retaliation against insults and to compensate for deep-seated feelings of inadequacy and insecurity (see Robins, Tracy, & Shaver [2001] for a

theoretical account of this process). Thus, the NSM offers a dual-process model of expressions of narcissistic entitlement.

We believe the NSM offers a way to integrate research on narcissism with existing work on psychobiological systems underlying motivation and temperament. It also maintains an important theoretical distinction between grandiosity and vulnerability (e.g., Dickinson & Pincus, 2003; Pincus et al., 2009; Wink, 1991) and can be used to organize DSM-5 criteria for NPD (American Psychiatric Association, 2013) as shown in Table 29.1. The NSM also aligns well with approaches that characterize narcissistic attributes in terms of the Big Five domains and facets (e.g., Glover, Miller, Lynam, Crego, & Widiger, 2012; Paulhus, 2001; see also the trifurcated model of narcissism by Crowe, Lynam, Campbell, & Miller, 2019).

Krizan and Herlache (2018) contains a summary of how well currently used measures provide coverage of the NSM (see their Figure 2). While acknowledging that the NPI has been generative in launching the booming narcissism literature in social/personality psychology, Krizan and Herlache (2018) noted concerns with the NPI and argued that future research should use targeted measures of the core constructs of the NSM rather than the NPI total score. In light of these considerations, we recommend that researchers administer multiple measures to ensure adequate coverage of the NSM constructs (see, e.g., Crowe et al., 2019). Potential scales are listed in Table 29.1 and the relatively recently developed Five-Factor Narcissism Inventory is another possibility (Glover et al., 2012).

Correlates of Entitlement, Grandiosity, and Vulnerability

Table 29.2 provides a summary of the correlates of entitlement, grandiosity, and vulnerability, drawing on multiple studies (a complete list of sources is available from the authors). We combined effect size estimates using a random-effects model following the logic of mini meta-analysis (e.g., Goh, Hall, & Rosenthal, 2016). The point of Table 29.2 is to provide a weighted-average estimate from a selection studies rather than a com-

TABLE 29.1. Attributes Associated with Narcissism in Current Research

Construct	Krizan & Herlache (2018)	Brown et al. (2009)	Narcissistic rivalry concept (NARC; Back et al., 2013)	Pincus & Lukowitsky (2010)	DSM-5 criteria	Five-factor model dimension/facet (e.g., Glover et al., 2012; Lynam & Widiger, 2001; Miller et al., 2017; Samuel & Widiger, 2008)	Relevant scales
Entitlement: Willingness to put oneself before others and to exploit others for personal gain. ("I am better than everyone else and thus I deserve more")	Entitlement: Self-importance that manifests as entitlement. This is the core feature that unites grandiosity and vulnerability.	Entitlement: Primarily interpersonal elements concerned with a socially objectifying sense of self in relation to others	Rivalry: Devaluation and aggressiveness that motivates interpersonal conflict. Antagonistic self-protection		#4 requires excessive admiration; #5, sense of entitlement; #6, exploitative; #7, lack of empathy; #8, envious; #9, arrogant and haughty	Agreeableness versus antagonism and all facets but also includes angry hostility (i.e., NEO facet N2)	Psychological Entitlement Scale (PES; Campbell et al., 2004). Entitlement–Rage subscale of the Pathological Narcissism Inventory (PNI; Pincus et al., 2009). Narcissistic Exploitative Entitlement Scale (Lessard, Greenberger, Chen, & Faruggia, 2011)
Grandiosity: Belief in personal greatness and sense of importance ("I am great")	Grandiosity: Boldness and approach orientation. Manifests as hubris and exhibitionism	Grandiosity: Primary intrapersonal elements concerned with self-importance	Admiration: Grandiosity and self-assuredness that motivates social potency. Assertive self-enhancement	Pathological Grandiosity: Overvalued and entitled self-image that motivates exploitative and exhibitionistic behaviors and feelings	#1 Self-importance; #2 Fantasies of success, power, brilliance; #3 Believes self is special	Extraversion especially assertiveness, excitement seeking, and gregariousness (if extremely high levels are seen as exhibitionistic) but not warmth. Also includes low self-consciousness (NEO facet N4), low modesty (NEO facet A5), and high achievement striving (NEO facet C4)	Narcissistic Grandiosity Scale (Rosenthal et al., 2020). Scales from the PNI associated with the PNI grandiosity (Self-Sacrificing Self-Enhancement and Grandiose Fantasy; Wright et al., 2010)
Vulnerability: Brittle self-image that produces negative affect and interpersonal animosity ("I am insecure about myself and I will lash out when threatened")	Vulnerability: Defensiveness or a preoccupation with detecting and counteracting threats to the self-image. Reactivity or stress-prone dispositions that motivate avoidance behaviors.	N/A	N/A	Pathological Vulnerability: Depleted and enfeebled self-image that motivates angry, shameful, hypersensitive, and depressed feelings and actions	N/A	Neuroticism/Emotional Instability, especially Self-Consciousness (NEO facet N4) and Vulnerability (NEO facet N6)	Hypersensitive Narcissism Scale (Cheek, Hendin, & Wink, 2007; Hendin & Cheek, 1997). Scales from the PNI associated with vulnerability (the Continuent Self-Esteem, Hiding the Self, and Devaluing scales; Wright et al., 2010)

prehensive meta-analysis of a large literature. Thus, the effect size estimates in Table 29.2 are more suggestive than definitive. Krizan and Herlache (2018) also provide tables with correlates of grandiosity and vulnerability; likewise, Ackerman et al. (2011; see their Figure 1) discussed the correlates of narcissistic entitlement and grandiosity (see also Brown et al., 2009). Ackerman and colleagues (2011) suggested that narcissistic entitlement might prove socially toxic, whereas narcissistic grandiosity might prove socially noxious. Their idea is based on the observation that the correlates of entitlement are often more problematic and severe than the correlates of grandiosity. Individuals high in grandiosity might prove to be obnoxious and annoying, whereas those high in entitlement might prove to be harmful to others. The pattern in Table 29.2 seems consistent with these generalizations.

Entitlement

Measures of entitlement are negatively correlated with Big Five measures of agreeableness (see Ackerman & Donnellan, 2013) and measures of warmth. This is consistent with the idea that antagonism is a key element of narcissistic entitlement. Entitlement is negatively correlated with self-control, a finding that dovetails with theorizing by Vazire and Funder (2006), who suggested that elements of narcissism related to impulsivity account for the observed associations between narcissism and self-defeating behaviors (see also Witt & Donnellan, 2008). Entitlement is positively associated with anger and negative affect, as well as measures of envy. Ackerman et al. (2011) noted that entitlement is positively associated with antisocial tendencies and negatively associated with relationship quality. Moreover, entitlement is more or less unrelated to approach- and avoidance-related motivation (see also Krizan & Herlache, 2018).

Grandiosity

Consistent with Paulhus's (2001) description of narcissists as "disagreeable extraverts," measures of grandiosity are linked to lower levels of agreeableness and warmth, and higher levels of extraversion and dominance (al-

beit the correlations with low agreeableness seem lower than measures of entitlement). Individuals with higher levels of grandiosity also possess increased approach-related motivational tendencies and high self-esteem (see also Krizan & Herlache, 2018; Tables 5 and 6). Ackerman et al. (2011) reported that grandiosity is associated with social potency and drive. Grandiosity is also positively associated with most measures of risk taking, as reported in Krizan and Herlache (2018).

Vulnerability

Compared to grandiosity, the pattern of correlates for vulnerability reflect high levels of neuroticism, negative affect, and avoidance-related motivational tendencies (see also Krizan & Herlache, 2018). Vulnerability is also related to low agreeableness and low self-esteem. Persons with higher levels of vulnerability appear to report problematic interpersonal relationships given that the dimension is linked to greater relationship dissatisfaction and mistrust, along with increased conflict and envy. Interestingly, Krizan and Herlache (2018) also found that vulnerability was related to risk taking. This could again be consistent with the idea that a lack of adequate self-regulatory capabilities associated with some aspects of narcissism account for many of the negative correlates associated with the construct.

The Development of Narcissism

Thomaes, Brummelman, Reijntjes, and Bushman (2013) suggested that narcissism may result when the processes involving the typically developing self-system are corrupted. According to Harter (1999), the desire to feel valuable and valued by others emerges during late childhood. Thomaes et al. argue that narcissism first emerges during this period of the lifespan if a child develops an excessive need to feel valuable and valued by others. Typically developing children want to feel esteemed, but children with elevated narcissistic traits take this desire to an excessive level. A key developmental question then centers on the source of this excessive or pathological need for esteem. Parenting practices are commonly invoked.

TABLE 29.2. Correlates of the Traits of the Narcissism Spectrum Model

Variables	Entitlement		Grandiosity		Vulnerability	
	Average <i>r</i> [95% CI]	<i>k</i>	Average <i>r</i> [95% CI]	<i>k</i>	Average <i>r</i> [95% CI]	<i>k</i>
Basic personality traits/motives						
<i>Big Five traits</i>						
Extraversion	-.02 [-.07, .04]	12	.35 [.29, .42]	11	-.28 [-.38, -.19]	2
Neuroticism	.17 [.12, .21]	12	-.14 [-.20, -.09]	11	.48 [.33, .60]	5
Agreeableness	-.41 [-.47, -.35]	12	-.19 [-.30, -.07]	10	-.30 [-.47, -.12]	4
Conscientiousness	-.12 [-.16, -.07]	12	.09 [.03, .15]	10	-.19 [-.34, -.04]	4
Openness	-.07 [-.10, -.04]	12	.07 [-.05, .18]	10	.00 [-.06, .06]	4
<i>Agency and communion</i>						
Dominance	.03 [-.02, .08]	8	.39 [.29, .47]	8	-.21 [-.42, .02]	2
Warmth	-.23 [-.36, -.09]	4	-.16 [-.29, -.02]	4	-.28 [-.46, -.08]	2
<i>Approach and avoidance motivation</i>						
Approach motivation	-.05 [-.31, .23]	2	.23 [.14, .31]	5	-.02 [-.17, .13]	3
Avoidance motivation	.09 [-.34, .49]	2	-.10 [-.20, .01]	5	.43 [.23, .60]	3
Self-regulatory strategies/outcomes						
<i>Intrapersonal</i>						
Self-esteem	-.07 [-.13, -.01]	11	.28 [.24, .33]	15	-.40 [-.44, -.36]	4
Subjective well-being	-.05 [-.18, .07]	2	.15 [.05, .25]	4	-.10	1
Social comparison	.27	1	.23 [.04, .39]	2	.24	1
Positive affect	.05 [-.07, .16]	3	.20 [.10, .29]	3	-.21	1
Negative affect	.20 [.07, .32]	2	.08	1	.48	1
Anger	.32 [.19, .44]	6	.09 [.00, .17]	7	.44 [.30, .56]	6
Depression	.02 [-.11, .14]	2	-.18 [-.23, -.14]	5	.53 [.46, .59]	2
Self-control	-.21 [-.29, -.12]	4	-.00 [-.10, .09]	4	—	
<i>Interpersonal</i>						
Attractiveness	-.01 [-.07, .05]	9	.32 [.25, .38]	9	—	
Relationship satisfaction	-.11 [-.19, -.03]	3	-.03 [-.17, .11]	3	-.20 [-.29, -.10]	2
Tendency to forgive	-.25 [-.45, -.07]	3	-.03 [-.12, .06]	3	—	
Conflict/aggression	.21 [.06, .35]	7	.11 [.03, .18]	8	.34 [.26, .42]	5
Trust	-.23 [-.45, .03]	4	.02 [-.08, .13]	3	-.34 [-.51, -.13]	2
Closeness	-.05 [-.18, .08]	2	-.02 [-.14, .10]	2	-.12 [-.24, .00]	2
Envy	.46 [.28, .60]	7	.06 [-.02, .13]	9	.46 [.34, .57]	3
Empathy	-.26 [-.43, -.08]	4	-.03 [-.14, .09]	3	-.14	1

Note. *k*, number of studies.

The classic literature on NPD provides divergent perspectives on the exact parenting practices implicated in the development of narcissistic tendencies (see Horton, Bleau, & Drwecki, 2006, for a succinct overview of different clinical theories). Theorists such as Kernberg (1998) suggest that a lack of parental warmth and a high level of control lead children to develop an excessive need for esteem. According to this view, narcissism is a response to unmet needs for acceptance and support from caregivers early in development. A related psychodynamic perspective from Kohut (1966) suggests that parent-child enmeshment causes narcissism. According to this view, narcissism results from parental overindulgence, because the developing child never acquires a realistic sense of his or her own limitations and genuine status in the world. Alternatively, narcissism can result from too much parental control, so that the child never experiences the frustrations associated with trying and failing to act upon the world in an independent fashion. The basic idea is that the child's development of an independent sense of self was somehow thwarted by parenting that was either too lenient or too controlling. Millon (1969) proposed a social learning account positing that narcissism stems from parental indulgence, coddling, and excessive praise, such that the child believes that he or she is exceptional (see also Imbesi, 1999).

At the risk of oversimplification, many existing developmental perspectives predict that narcissism emerges from too much parental control, rejection/hostility, or indulgence. These ideas have been tested in some cross-sectional studies that primarily use recollections of parenting to operationalize early childhood experiences. For example, Horton et al. (2006) found a positive association between recalled parental warmth and overall NPI scores in college students (see also Otway & Vignoles, 2006). They also created a variable called unhealthy narcissism by partialing out the effects of trait self-esteem from total NPI scores. Unhealthy narcissism was associated with recollections of increased parental warmth and psychological control (i.e., parental intrusiveness), a finding consistent with enmeshment predictions. Horton et al. (2006) conducted a similar study with high school students.

Overall NPI scores were predicted by increased reports of warmth and decreased reports of monitoring (i.e., whether parents are aware of the child's friends and actions outside the home). Unhealthy narcissism was associated with low parental monitoring. In a more recent study, Horton and Tritch (2014) found that the NPI Entitlement scale was positively associated with recollections of higher levels of psychological control and lower levels of monitoring in a sample of 145 college students.

Cater, Zeigler-Hill, and Vonk (2011) considered how recollections of early life experiences were associated with entitlement, grandiosity, and vulnerability. Thus, their study can be integrated with the NSM in a fairly straightforward manner. They found that entitlement was positively associated with recollections of harsh punishment, negatively associated with recollections of secure attachments to caregiver, and positively associated with threats of separation. The findings for grandiosity were more ambiguous given that one measure showed largely null effects (grandiosity elements of the NPI) and another measure (based on the Pathological Narcissism Inventory; Pincus et al., 2009) showed a positive correlation with recollections of harsh punishments and separation. Vulnerability was positively correlated with harsh discipline and threats of separation. Multivariate analyses focused on unique associations were generally consistent with these zero-order correlations.

The existing cross-sectional work seems to suggest that entitlement is associated with parental control and intrusiveness, whereas grandiosity is associated with parental warmth. However, there are numerous limitations associated with cross-sectional studies of parenting and narcissism. First, there are very few constraints on the direction of causal influence (see Stattin & Kerr, 2000), as it is well known that children can evoke certain kinds of parenting practices (e.g., Bell, 1968). Likewise, retrospective biases factor into the interpretation of these studies. For example, the more adaptive aspects of narcissism, which overlap with self-esteem (see Wetzel & Robins, 2016), may contribute to overly rosy recollections of parenting, whereas the more maladaptive aspects of narcissism may contribute to overly harsh

recollections of parenting. Thus, we tend to favor prospective longitudinal designs for shedding light on the parenting correlates of narcissistic attributes. We are aware of only three such studies.

Cramer (2011) provided one of the first longitudinal investigations of the developmental correlates of narcissism using data from the Block and Block (1980) sample. Cramer (2011) drew a distinction between adaptive narcissism (autonomy) and maladaptive narcissism (willfulness and hypersensitivity). Willfulness in this study is likely a blend of grandiosity and entitlement from the NSM, and hypersensitivity is akin to vulnerability from the NSM. Adaptive narcissism seems to share attributes with the leadership/authority elements of the Narcissistic Personality Inventory (Raskin & Terry, 1988). Early parenting responsive to the needs of the child was associated with adaptive narcissism at age 23. There were no parenting main effects on maladaptive narcissism at age 23; however, Cramer (2011) found an interaction between age 3 precursors to narcissism and parenting when predicting maladaptive narcissism at age 23. Specifically, developmentally inappropriate parenting (e.g., lacking in responsiveness early in development or being too indulgent in adolescence) interacted with temperamental attributes to predict maladaptive narcissism, particularly mother-child parenting variables. These findings, although based on a small sample (the maximum sample size was less than 100), suggest that transactions between early emerging individual differences and parenting play a role in the etiology of narcissistic attributes.

Brummelman et al. (2015) conducted a four-wave longitudinal study ($N = 565$) of parental overvaluation and narcissism (assessed as a unidimensional construct) with a 6-month time interval between waves. Parents reported on their level of overvaluation and children (age range = 7–11 years at Wave 1) reported on their levels of narcissism using the Child Narcissism Scale (Thomaes, Stegge, Bushman, Olthof, & Denissen, 2008). Although both constructs were highly stable over time, parental overvaluation prospectively predicted child narcissism, even after researchers controlled for prior levels of narcissism (standardized co-

efficients around .06–.07). Brummelman et al. (2015) concluded that “collective efforts to reduce parental overvaluation . . . hold promise in curbing the societal rise in narcissism” (p. 3661).

Wetzel and Robins (2016) have reported the largest longitudinal study of the development of narcissistic attributes using a sample of 674 Mexican-origin youth followed from ages 12–16. They measured parental hostility and monitoring, along with two aspects of narcissism—superiority (essentially adaptive aspects of narcissism) and exploitativeness (akin to entitlement in the NSM). Parenting variables were measured using child reports, spouse reports, and observational coding. The most consistent results were that increased parental hostility and decreased monitoring were associated with exploitativeness, even after researchers controlled for its shared variance with self-esteem.

One issue that many existing developmental theories about the origins of narcissism will eventually need to address is the reality of genetic influences (see Holtzman & Donnellan, 2015). Regardless of the measure used to assess narcissism, heritability estimates have been substantial in the behavior genetics literature. Vernon, Villani, Vickers, and Harris (2008) reported that the heritability for NPI scores was 59%, with the remaining 41% of the variance attributable to nonshared environmental factors (and error) using a sample of 139 adult twin pairs from the United States and Canada. Similar results were reported by Luo, Cai, Sedikides, and Song (2014), who found a heritability estimate of .47 for the NPI using a sample of 304 Chinese twins. Torgersen et al. (2012) reported heritability of .71 using a latent variable model of NPD with interview and self-reports as indicators based on data from 2,794 adult Norwegian twin pairs (see also Jang, Livesley, Vernon, & Jackson, 1996). As with research on most personality attributes in adult samples (see, e.g., Turkheimer, 2000; Polderman et al., 2015; Vukasović, & Bratko, 2015), there was no evidence for the effect of the shared environment in these studies of adults.

Researchers have only recently focused on specific elements of personality associated with NSM, and there are hints that the genetic architecture might be different

for the different elements. Luo, Cai, and Song (2014) administered measures of both grandiosity and entitlement to 304 Chinese twin pairs. Grandiosity had a heritability of .23, with a nonshared environmental effect of .60. Interestingly, there was also a detectable shared environmental effect (.17). Entitlement had a heritability of .35 and a nonshared environmental effect of .66. Consistent with the idea that grandiosity and entitlement are separable dimensions, the vast majority of genetic and environmental influences on these attributes appeared to be independent. If replicable, this would mean that the different narcissistic attributes are distinct in terms of both their genetic and environmental influences.

Most of the genetically informed research about narcissism has been conducted with adults; however, a pattern of detectable genetic influence seems to extend to childhood samples. Most notably Coolidge, Thede, and Jang (2001) reported a heritability of .66 for NPD in a sample of 112 twins with an average age of 8 years recruited by a university in the United States. Coolidge et al. used parent report to assess NPD. The effect of the shared environment was not detectable in this small sample. If replicable, such a finding may mean that many classic approaches to the development of narcissism that place the etiology squarely on parenting will need to be updated to account for both genetic factors and nonshared environmental factors (i.e., environmental factors that make children raised in the same household different as opposed to similar). This likely means considering temperament-by-parenting interactions following Cramer (2011) and the dual-pathway model in the NSM.

In summary, there is increasing interest in the developmental processes that produce narcissistic attributes. Parenting is often implicated in developmental studies (although the effect sizes are modest), whereas behavioral genetics research consistently points to substantial heritability and nonshared environmental influences. Given this reality, we think it would be premature to conclude that parental overvaluation, hostility, or monitoring are promising targets for intervention (see e.g., the discussion in Brummelman et al., 2015). For example, if parents misinterpret a message to tone down their over-

valuation and inadvertently increase their harshness, then simplistic parenting advice would backfire for reducing narcissism. More research is needed before recommendations are offered to the public. Moreover, we believe that a focus on temperament-by-parenting interactions is especially promising. The underlying theorizing of the NSM suggests that narcissistic entitlement might be an example of the concept of equifinality from developmental psychopathology (see, e.g., Masten, 2006). The idea is that entitlement is a common outcome produced by multiple pathways involving transactions between the developing individual and various social contexts. These different pathways to entitlement might differ depending on whether individuals have high approach-related tendencies or avoidance-related tendencies.

In addition to studying how parenting and temperamental attributes are implicated in the development of narcissism, research is needed to chart the developmental course of narcissism in adulthood. In line with this need, Wetzel, Grijalva, Robins, and Roberts (2020) recently evaluated the development of narcissism from ages of 18 to 41 using data from a longitudinal study based in California ($N = 486$ at age 18; $N = 237$ at age 41). They administered the NPI at both time points and found a latent correlation of .69 for overall narcissism (i.e., this association was corrected for attenuation due to measurement unreliability). They also looked at stability correlations for facets of narcissism and reported estimates of .67 for leadership, .61 for vanity, and .85 for entitlement. Rank-order stability was therefore impressive given the 23-year time interval. Mean-level declines were observed with substantial overall declines in the NPI ($d = -0.79$) and moderate to large declines in the facets (vanity: $d = -0.46$; leadership: $d = -0.67$; and entitlement: $d = -0.82$). These general findings are consistent with existing literature on adult personality trait development with respect to rank-order consistency and mean-level changes in the direction of greater maturity (see Roberts & Nickel, Chapter 11, this volume).

In addition, Wetzel et al. (2019) evaluated evidence for selection and socialization effects when considering associations

between narcissism and life events. In terms of selection effects, individuals high in entitlement at age 18 tended to report more negative life events and lower well-being in adulthood. Individuals higher in leadership tended to have more supervisory jobs. Vanity had a mixed profile of positive and negative selection effects: Vanity at age 18 was associated with shorter and more unstable close relationships with romantic partners in adulthood but better self-reported health. In terms of socialization effects, supervisory positions were associated with comparatively smaller declines in leadership, whereas instability in relationships and self-reported health were associated with smaller declines in vanity. Altogether, these results suggest that experiences in work and interpersonal relationships are associated with the development of some facets of narcissism such as vanity and leadership in adulthood. This was one of the first studies of its kind, and more work is needed on this topic. We now turn to a discussion of some important other future directions.

Future Directions: Resolving Controversies over Pathological versus Normal Narcissism and Shifting to Within-Person Dynamics

As we have highlighted in various places in this chapter, the study of narcissism is a somewhat controversial area of personality psychology. Below, we review two current controversies. We believe that resolving these controversies will help to integrate personality research on narcissism with NPD research in psychiatry and clinical psychology.

1. *Are there normal versus pathological expressions of narcissism?* Pincus and Lukowitsky (2010) noted that narcissism often involves both pathological and normal expressions in classical theoretical writings. For example, Freud (1914/1955) used the idea of primary narcissism to refer to libidinal drives toward self-preservation and secondary narcissism to refer to the process of withdrawing from objects outside of the self toward internal objects. Both primary and secondary narcissism reflect processes evi-

dent in normal individuals. Disruptions in processes related to secondary narcissism, however, were believed to result in megalomania. Thus, in foundational writings about narcissism, there are ambiguities related to narcissism being implicated as part of typical developmental processes (e.g., the channeling of libidinal drives), as well as a condition related to pathological character traits (e.g., megalomania).

An especially controversial passage in Pincus and Lukowitsky (2010) raises the possibility that normal and pathological aspects of narcissism might be distinct constructs (see Miller et al., 2017, pp. 299–2300). Pincus and Lukowitsky (2010) noted that such distinctions “remain unclear” (p. 426) but seemed to favor the idea that normal and pathological narcissism are “distinct individual differences” (p. 425). Rather than using the terms *normal* and *pathological* to refer to different individual differences, we prefer to focus on the dimensions highlighted in the NSM. We suspect that both extremely high and low levels of entitlement, grandiosity, and vulnerability can be pathological in the sense of creating significant intra- and interpersonal distress. Moreover, we worry that researchers fail to consider whether there are downsides to especially low levels of these traits when discussing the social ills associated with narcissism. For example, a person who lacks any sense of entitlement at all might be easily exploited by others and become especially dependent on others. Similarly, a person who is extremely low in the personality elements related to grandiosity might not have enough agency to effectively engage with the social world. In short, we think it makes sense to use the term *pathological* to refer to outcomes associated with particular levels of the traits associated with the NSM rather than as a blanket term for distinct individual differences. Likewise, in the spirit of making distinctions, we believe that there is value in clearly differentiating constructs associated with narcissism from those related to self-esteem (e.g., Donnellan, Trzesniewski, & Robins, 2011; Tracy, Cheng, Robins, & Trzesniewski, 2009).

2. *How strongly does theorizing about between-person individual differences capture the day-to-day within-person dynamics*

associated with vulnerability and grandiosity? As we noted in our opening paragraph, there is ongoing debate about the primary phenotypic expression of narcissism. The NSM helps to address this issue by carving out a role for the conceptually (and often psychometrically) distinct attributes of entitlement, grandiosity, and vulnerability. We emphasize that these distinctions are largely based on between-person studies of individual differences. They are not rooted in within-person studies that track the moment-by-moment or day-by-day fluctuations in narcissistic attributes and psychological processes. It is possible that grandiosity and vulnerability might be integrated in interesting ways at a within-person level. Such an *intraindividual* perspective might help reconcile the divergent conceptualizations of narcissism adopted by clinical psychologists and social/personality psychologists. Indeed, many of the more interesting theoretical accounts about narcissism in personality psychology emphasizing within-person dynamics draw from classic clinical accounts (e.g., Robins et al., 2001; Morf & Rhodewalt, 2001).

The rich clinical descriptions of narcissism have traditionally emphasized contextualized dynamic processes that serve to moderate the expression of narcissistic behaviors across time and circumstance. The within-person perspective of these accounts is sometimes lost in recent discussions about the between-person structure of narcissistic attributes. Long-standing theoretical concepts (e.g., conscious grandiosity serves to mask nonconscious vulnerability) have led to the development of different scales to operationalize the diverse states that have been associated with narcissistic individuals. When administered as dispositional scales, these naturally asynchronous states of grandiosity and vulnerability form differentiable dimensions of individual differences. However, this work does not clarify how these attributes are associated within individuals. For instance, a complementary way to integrate the seemingly divergent constructs of grandiosity and vulnerability is to focus on their dynamic interplay within individuals and across context (e.g., Edershire et al., 2019; Sadikaj, Moskowitz, Russell, Zuroff, & Paris, 2013). Put simply, it is possible some individuals vacillate between states of

grandiosity and vulnerability in ways that are clinically relevant. Beyond the theoretical integration achieved by this perspective, this approach offers an avenue for testing the proposition that grandiosity serves as a defense against perceptions of threat or feelings of shame (see, e.g., Tracy, Cheng, Martens, & Robins, 2011).

It is now well established that manifestations of personality (i.e., thoughts, feelings, and behaviors) fluctuate within persons over short time periods (e.g., moments to days; Fleeson, 2001; Wright & Simms, 2016) when they are assessed with appropriate ambulatory assessment techniques (Wright & Hopwood, 2016; Wright & Zimmermann, 2019). Furthermore, individuals appear to reliably differ in the degree to which they vary in relevant domains (e.g., affect, self-esteem, exhibitionism; Eid & Diener, 1999; Fleeson & Gallagher, 2009; Moskowitz & Zuroff, 2004; Wright & Simms, 2016), making behavioral variability an individual-difference variable in its own right. Although it is tempting to take these findings and translate them into straightforward research questions (e.g., do individuals high in narcissism have unstable momentary self-esteem?), it is likely that the actual intrapsychic dynamics are complicated and need to involve a careful consideration of individuals and their contexts rather than just pure within-person variability itself. For example, there have been long-standing debates about whether narcissists have high or low self-esteem, and several investigators have pursued these questions, with mixed results (e.g., Bosson et al., 2008; Geukes et al., 2016; Rhodewalt, Madrain, & Cheney, 1998). One of the earliest studies was conducted by Rhodewalt, Madrian, and Cheney, who found that NPI scores were predictive of daily variability in self-esteem. However, a small meta-analytic integration of findings from several datasets failed to find this effect. More recently, the point was made that different aspects of narcissism may be predictive of self-esteem stability and instability (Geukes et al., 2016). Similarly, it is likely important to tie fluctuations in self-esteem with life events (e.g., achieving or failing a desired outcome) and interpersonal processes (e.g., getting ahead or coming into conflict with others).

One solution to this problem is to learn more about how the attributes associated with narcissism actually fluctuate on an experiential basis. For example, do individuals who are high on measures of entitlement cycle between grandiose and vulnerable states, or do fluctuations in these states operate independently? In an effort to begin addressing these questions, Gore and Widiğer (2016) asked individuals to identify and then rate individuals they knew who were similar to either a grandiose or vulnerable prototype. They then asked participants if the identified individuals had ever exhibited the converse state (i.e., if the grandiose narcissist ever experienced feelings of vulnerability). Interestingly, those individuals who were identified as grandiose were seen as experiencing periods of vulnerability, whereas those identified as vulnerable were not seen as exhibiting grandiose states. This suggests the possibility that narcissistic grandiosity might be dynamically linked to vulnerability, but that individuals who are chronically vulnerable may not necessarily exhibit signs of grandiosity. However, despite being highly innovative, this study was ultimately a between-person design, and these are important questions that require a within-person perspective. For instance, Houben et al. (2016) used innovative statistical modeling approaches to study shifts between positive and negative affect states in borderline personality disorder. A similar approach might be profitably employed in narcissism research.

Dynamic and efficient scales for the assessment of grandiose and vulnerable states have only recently been developed (e.g., Edershile et al., 2019; see also Crowe et al., 2018). Edershile and Wright (in press) have since shown in three samples that individuals vary considerably in both grandiose and vulnerable momentary narcissistic states, and that individuals who were more variable in grandiose states were also more variable in vulnerable states. They also found that dispositional grandiosity predicted greater variability in momentary grandiose states and the same was true of dispositional vulnerability and momentary vulnerable states. However, they found no evidence for “switching” between narcissistic states (i.e., grandiosity at one moment predicting vulnerability at the

next, or vice versa). Although these analyses represent the first systematic efforts to study variability in grandiose and vulnerable states, many questions remain. To list a few of the most pressing ones: What are the time scales under which shifts occur, and what is their general duration (e.g., hours, days, weeks)? A major roadblock to this research is that existing theory does not provide clear guidance about the time scale for such fluctuations.

In general, we believe studies are needed over diverse time scales using sensitive measures of context with relevant behaviors to fully integrate grandiosity and vulnerability, and to provide a better match to clinical theories of narcissism. Overall variability is a relatively coarse outcome, providing evidence that there is a dynamic process at work. Additional analyses are needed to best reveal the nature of the psychological mechanisms driving the dynamic processes. Individuals do not just vary stochastically in their behavior; they respond to and elicit internal and external cues. Accordingly, an important research issue is to understand the circumstances when certain individuals shift between a grandiose and vulnerable state, and vice versa. For instance, in a recent study, Wright and colleagues (2017) showed that psychiatric outpatients who were higher in NPD features were more likely to respond to perceptions of others’ dominance with antagonistic behavior, and this was accounted for by negative affect. Thus, dysregulation of behavior and affect tended to occur when narcissistic individuals perceived a challenge to their status. This study has several limitations, but it provides a starting point for future research. With the development of momentary scales suitable for dynamic modeling, this work has been extended to show that perceiving others as more dominant and colder/hostile in interpersonal situations is associated with momentary vulnerability and one’s own cold/hostile behavior in the same situation (Edershile & Wright, 2019). Perceiving others as warmer and more submissive was associated with modestly higher grandiosity, which in turn was associated with one’s own dominant and warm behavior. These promising findings bear replication and extension, especially with designs that have more tem-

porally textured and nuanced information (e.g., within situation assessments).

Summary: Narcissism in Contemporary Personality Psychology

Our goal in this chapter has been to review the status of narcissism in contemporary personality psychology and to offer some commentary and perspective on the issues to guide future studies. The key themes of this chapter can be summarized by five points.

1. The term *narcissism* is associated with multiple dimensions of personality, and researchers debate as to which phenotypic expressions are most central to the construct. The constructs typically fall under the domains of grandiosity, entitlement, and vulnerability as specified by the NSM (Krizan & Herlache, 2018).

2. The three constructs associated with the NSM seem to have relatively distinct nomological networks. There are also hints that entitlement and grandiosity are genetically distinct. The conventional term *narcissist* might reflect individuals with particular constellations of traits (e.g., high grandiosity and high entitlement) rather than refer to a true natural kind of personality type. Researchers should continue to study the separate components of narcissism, potential interactions between the components, and the possibility of specific trait constellations giving rise to psychologically interesting patterns of behavior.

3. Existing inventories and stand-alone measures widely used to study narcissism in the current literature seem to focus on one or more dimensions associated with the NSM but not all three simultaneously. Some provide a narrower content focus than the NSM. Thus, researchers may need to use multiple measures until a psychometrically sound omnibus inventory is widely adopted by the field.

4. Narcissistic personality attributes are heritable, suggesting that genetic factors play a role in the development of narcissism. On the other hand, classic theories suggest that parenting practices are a primary

driver in the development of narcissism. Although the existing developmental literature is sparse, there is converging evidence from cross-sectional and longitudinal studies that parental hostility and low monitoring are associated with entitlement. Future developmental theorizing should consider how early emerging temperamental differences transact with parenting and other social relationships and experiences to produce narcissistic attributes.

5. There are ongoing controversies about whether normal and pathological elements of narcissism are distinct constructs and how to integrate expressions of vulnerability and grandiosity at a within-person level. We think that grandiosity, vulnerability, and entitlement are normal dimensions in the sense that all people have different levels on these latent entities. Extreme levels (high or low) can be pathological in the sense of causing interpersonal and intrapersonal distress. We also believe that greater attention to the within-person processes underlying grandiosity and vulnerability are a promising path forward.

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CHAPTER 30

Attachment Theory and Its Place in Contemporary Personality Theory and Research

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While working in a home for maladjusted and delinquent boys in the 1930s, John Bowlby was struck by the boys' difficulty in forming close emotional bonds with others. Some of the boys came across as cold, aloof, and compulsively self-reliant; others seemed clingy and unsure of themselves. After studying the family histories of the children, Bowlby learned that a disproportionate number of the boys had experienced severe disruptions in their early home lives. His observations led him to conclude that early parent–child relationships serve an important organizing role in human development, and that disruptions in these relationships can have profound consequences for behavior, not only in the short term, but in the long term as well (Bowlby, 1944).

To better understand the significance of early relationships and how they shape human development, Bowlby turned to a variety of literatures, including those pertaining to psychodynamic theory (Freud, 1933/1965, 1940), the emerging ethological models of the 1950s and 1960s (e.g., Hinde, 1966), cognitive-developmental psychology (e.g., Piaget, 1953), and the principles of

control systems (e.g., Craik, 1943; Young, 1964). Over the next few decades he integrated ideas from each of these domains to forge a theoretical perspective now known as “attachment theory” (Bowlby, 1969/1982, 1973, 1980).

Bowlby's attachment theory has had an enormous impact on psychological science, in large part because it speaks to many of the enduring subjects that psychologists wish to understand: personality, emotions, relationships, love and loss, nature and nurture, and development. Moreover, it does so in a way that has multidisciplinary appeal, bringing together ideas and observations from social psychology, developmental psychology, behavioral neuroscience and psychobiology, animal behavior, and clinical psychology. Indeed, by many standards, attachment theory is a strong candidate for being considered a “Grand Theory” in contemporary psychology (Gillath, Karantzas, & Fraley, 2016).

Despite the theory's influence on psychological science more generally, it was slow to be embraced by personality psychologists. But over the last decade, this has begun to

change. Attachment research is now routinely featured in traditional outlets in personality psychology, including the *Journal of Personality and Social Psychology: Personality Processes and Individual Differences*, the *Journal of Personality*, the *European Journal of Personality*, and the *Journal of Research in Personality*. Moreover, the previous edition of this volume included the first chapter on attachment to be featured in a major handbook of personality science. Our objective in this chapter is to stimulate additional research at the interface of personality and attachment by outlining some of the contemporary debates in attachment theory and explaining how those debates are relevant to modern personality psychology. We begin with a brief overview of attachment theory, highlighting the origins of the theory and how attachment dynamics have been studied in infants and children. Next, we review modern extensions of attachment theory, focusing primarily on the study of attachment in adulthood as it was popularized by social/personality psychologists. Finally, we discuss some of the new and enduring challenges faced by attachment theory and explain how they can be informed by, and also inform, contemporary methods and debates in personality psychology.

A Brief Overview of Attachment Theory

The Attachment System

Bowlby developed attachment theory to explain the intense distress expressed by infants when separated from their parents. He observed that separated infants go to extraordinary lengths (e.g., crying, clinging, and frantically searching) either to prevent separation from, or reestablish proximity to, a missing parent. At the time of Bowlby's first writings, psychoanalytic theorists held that such emotional outbursts were manifestations of immature dependency, and many behaviorists thought that they were signs of dysfunctional parental reinforcements of dependency. Bowlby observed, however, that such expressions were common among otherwise well-functioning children who had been separated from their primary caregivers. Moreover, he noted that such expressions are common to a wide variety of mam-

malian species, suggesting that they serve an evolutionary function.

Drawing on ethological theory, Bowlby postulated that *attachment behaviors*, such as crying and searching, are adaptive responses to separation from a primary attachment figure—someone who has a history of providing support, protection, and care to the child. Because human infants, like other mammalian infants, cannot feed or protect themselves, they are highly dependent on the care and protection of “older and wiser” adults. Bowlby argued that over the course of evolutionary history, infants who were able to attract the attention of, and maintain proximity to, an attachment figure (i.e., by looking cute or by engaging in attachment behaviors) would be more likely to survive to a reproductive age. According to Bowlby, a motivational control system, which he called the *attachment behavioral system*, was gradually “designed” by natural selection to do just that.

The attachment behavioral system is an important concept in attachment theory, because it provides a conceptual bridge between ethological models of human development (e.g., Hinde, 1966) and modern theories of emotion regulation and personality (e.g., English, Eldesouky, & Gross, Chapter 24, this volume; see also Gillath et al., 2016; Mikulincer & Shaver, 2016). According to Bowlby, the attachment system essentially “asks” the following question: Is the attachment figure nearby, accessible, and attentive? If the child perceives the answer to be “yes,” he or she feels loved, secure, and confident, and, behaviorally, is likely to explore his or her environment, play with others, and be sociable. If, however, the child perceives the answer to be “no,” he or she experiences anxiety and, behaviorally, is likely to exhibit attachment behaviors ranging from simple visual searching to active following and vocal signaling (see Figure 30.1). These behaviors continue until either the child is able to reestablish a desirable level of physical or psychological proximity to the attachment figure, or the child wears down, as often happens in the context of a prolonged separation or loss. Bowlby believed that such experiences lead to despair and depression, and have the potential to shape the beliefs and expectations a child develops regarding

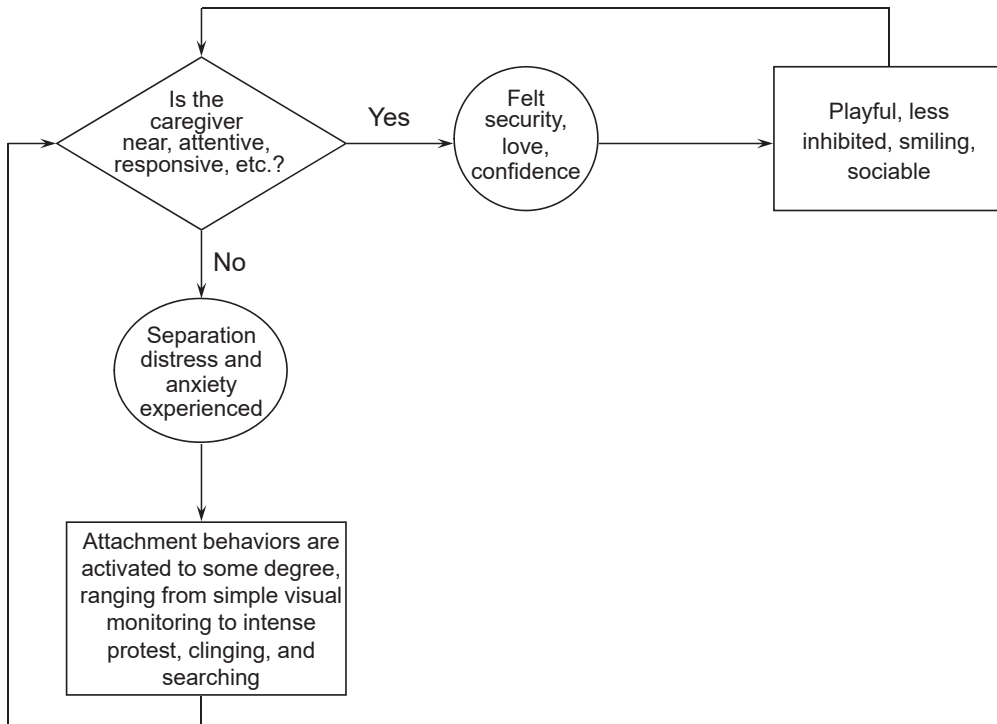


FIGURE 30.1. An illustration of the basic control mechanisms underlying Bowlby's conceptualization of the attachment behavioral system.

self-worth and the availability and accessibility of significant others.

Individual Differences in Infant Attachment Patterns

Although Bowlby believed that the basic processes illustrated in Figure 30.1 characterize the normative dynamics of the attachment behavioral system, he recognized that there are individual differences in the way children appraise the accessibility of their attachment figures and regulate their attachment behavior in response to a threat. However, it was not until his colleague, Mary Ainsworth, began to study infant–parent separations systematically that a more complete and empirically informed understanding of these individual differences was established. Ainsworth and her students (Ainsworth, Blehar, Waters, & Wall, 1978) developed a technique called the “Strange Situation” to study infant–parent attachment. In the Strange Situation, 12-month-

old infants and their parents are brought to the laboratory and systematically separated and reunited in a series of 3-minute scripted episodes. Most children (i.e., about 60% in middle-class samples) behave in the way implied by Bowlby's normative theory; that is, they become upset when their parent leaves the room, but when he or she returns, they actively seek the parent and are easily comforted. Children who exhibit this pattern of behavior are often called *secure*.

Other children (about 20% or less) are ill at ease initially, and upon separation, become extremely distressed. When reunited with their parents, they have difficulty being soothed and often exhibit conflicting behaviors that suggest that they want to be comforted but also want to “punish” their parent for leaving. These children are often called *anxious–resistant*. The third pattern of attachment (shown by around 20% of children) is called *avoidant*. Avoidant children do not appear to be overly distressed by the separation and, upon reunion, actively avoid

seeking contact with their parent, sometimes turning their attention, somewhat rigidly, to toys on the laboratory floor.

Ainsworth's research is important for at least three reasons. First, she provided an early empirical demonstration of the ways in which attachment behavior is activated and terminated in threatening and safe contexts. As such, this work was critical for establishing that attachment behaviors not only reflect individual differences between children but are also natural responses to evolutionarily significant contextual triggers. Second, she provided the first empirical taxonomy of individual differences in infant attachment patterns. According to her research, at least three types of children exist: those who are secure in their relationship with their parents, those who are anxious-resistant, and those who are anxious-avoidant. These individual differences have become the focus of most empirical research conducted on attachment. We discuss the strengths and weakness of this particular taxonomy later, but for now we wish to highlight the fact that it was an important first step in studying individual differences in attachment.

Finally, and most importantly, Ainsworth demonstrated that these individual differences were predicted by infant-parent interactions in the home during the first year of life (i.e., before the Strange Situation assessments were made). Children classified as secure in the Strange Situation, for example, tended to have parents who were responsive to their needs. Children classified as insecure (i.e., as anxious-resistant or avoidant) often had parents who were insensitive to their needs, inconsistent, or rejecting and negligent in their care. These data provided early support for Bowlby's and Ainsworth's hypotheses about why some children develop secure relations and others develop insecure relations with their caregivers.

Working Models and Early Development

A central assumption of attachment theory is that individual differences in children's attachment patterns are partly a result of the many interactions they have had with their primary caregivers. Specifically, it is assumed that children develop mental representations or *working models* of them-

selves and others on the basis of how sensitive and responsive their caregivers are to their needs (see Bretherton & Munholland, 2016, for a review). When children reliably find that their caregivers are responsive to their signals of distress and are able to feel soothed by the caregiver's presence, they learn that other people can be counted on for support or protection. This facilitates the development of secure working models (i.e., conscious and unconscious mental representations) of attachment. In contrast, when children consistently find that their caregivers are unresponsive to their needs (e.g., when caregivers are inattentive or downplay their needs and vulnerabilities), they learn that others cannot be counted on. As a result, such a child develops insecure working models of attachment and may begin to organize his or her attachment behavior in a way that minimizes attachment-related needs or exaggerates them.

A great deal of research since Ainsworth's original studies has empirically tested some of attachment theory's claims about the origins of security and insecurity. Several longitudinal studies have documented associations between early maternal sensitivity and a child's attachment classification in the Strange Situation. For example, K. Grossmann and colleagues (K. Grossmann, Grossmann, Spangler, Suess, & Unzer, 1985) studied interactions between infants and their parents at home, and then later, when the infants were approximately a year old, brought them and their parents into the laboratory to participate in the Strange Situation. Children whose parents were rated as sensitive and responsive to their needs were more likely than other children to be classified as secure in the Strange Situation (see also Bates, Maslin, & Frankel, 1985; Isabella, 1993; Kiser, Bates, Maslin, & Bayles, 1986; see DeWolff & Van IJzendoorn, 1997, for a review).

The association between infant-parent interactions and security has also been established experimentally. In one particularly interesting study, Anisfeld, Casper, Nozyce, and Cunningham (1990) randomly assigned parents who were participating in a parenting class to receive either a cozy, strap-on baby carrier or a plastic infant seat with a safety belt (which had the consequence of

keeping the baby at a distance from the parents' bodies). Children whose parents had been assigned to the close-contact carrier condition were later more likely to be classified as secure in the Strange Situation than children whose parents received a plastic infant seat. Many experimental studies of nonhuman primates also demonstrate associations between maternal sensitivity and infant security and adaptation (Suomi, 2016), further suggesting that the infant–mother relationship can have effects on the way the child organizes his or her attachment behavior and regulates emotions.

Over the years, there have been debates regarding the extent to which the attachment classifications are “merely” reflections of child temperament instead of capturing something about the way in which children organize their emotions and behavior based on the history of interactions with that figure. We discuss this issue in more detail in a subsequent section, because this is relevant to understanding individual differences in adult attachment as well. For now, however, we note that some scholars have observed only modest overlap between attachment classifications when children are tested separately with their mothers and with their fathers (Fox, Kimmerly, & Schafer, 1991). This suggests that attachment classifications tend to be relationship-specific and, therefore, reflect the quality of the relationship between the infant and the parent. Moreover, most studies that have examined measures of temperament and attachment classifications have found weak or inconsistent associations between them (see Vaughn & Bost, 2016, for a review). This is not to say that temperament and parental relationships do not interact to affect a child's attachment classification (see, e.g., Mangelsdorf, Gunnar, Kestenbaum, Lang, & Andreas, 1990), but such findings indicate that attachment classifications are not simply an alternative way of measuring temperament.

Developmental Sequelae and the Canalization of Attachment

Over the past few decades there has been a great deal of developmental research on the implications of early attachment experiences for interpersonal functioning (e.g., K. E.

Grossmann, Grossmann, & Waters, 2005; Weinfield, Sroufe, Egeland, & Carlson, 2008). Most of this research has focused on the longitudinal associations between parenting behavior or attachment classifications at 1 year of age and various later outcomes of developmental significance, such as ego resiliency, the ability to get along well and cooperate with peers, the ability to solve problems effectively, and psychopathology in adolescence (see Sroufe, Egeland, Carlson, & Collins, 2009, for a review). Although there are exceptions, the majority of published studies demonstrate that early attachment status is related to many outcomes of interest to psychologists, not only in early childhood but also in later adolescence and young adulthood (e.g., Roisman, Madsen, Hennighausen, Sroufe, & Collins, 2001). For example, Fraley, Roisman, and Haltigan (2013) found that sensitive caregiving in early childhood is consistently associated with behavioral and observational measures of social competence and academic achievement from kindergarten through age 15. Madigan, Brumariu, Villani, Atkinson, and Lyons-Ruth (2016) found, in a meta-analysis, that early attachment security predicts internalizing behavior and externalizing behavior in later childhood and adolescence (see also Groh, Roisman, Van IJzendoorn, Bakermans-Kranenburg, & Fearon, 2012).

Taken together, this and related research suggests that early attachment experiences have diverse implications for social and emotional development. Of course, there are varying perspectives on what those associations mean. The most common interpretation is captured by the *organizational* perspective (Sroufe, 1979) inspired by Bowlby's discussion of developmental pathways. The organizational perspective holds that early attachment experiences serve as a *foundation* on which subsequent experiences are built (e.g., Fraley & Roisman, 2015; Sroufe & Waters, 1977; Simpson, Collins, Farrell, & Raby, 2015). This foundation helps to organize or lend coherence to a variety of diverse social and emotional outcomes. For example, a child who develops the expectation that others are trustworthy and responsive, based on his or her early caregiving experiences, might enter into new social relationships (e.g., with family, teachers, or

playmates) with the expectation that others will behave in a benevolent manner. This, in turn, biases those interactions to be cooperative and rewarding, allowing relationships skills to develop and reinforcing existing attachment representations.

The organizational perspective on attachment has its origins in C. H. Waddington's (1957) discussion of the cybernetics of cell development. Waddington was a developmental embryologist who was attempting to understand how a cell maintains a particular developmental trajectory in the face of external disturbances. He and others had observed that once a cell begins to assume specific functions (e.g., becomes integrated into a structure that is destined to become the visual system), weak experimental interventions are unlikely to alter the cell's developmental trajectory. Although early in development a cell has the potential to assume many different fates, once a developmental trajectory becomes established, its pathway becomes "canalized" or buffered, to some degree, making it less and less likely that the cell will deviate from that developmental course.

The concept of canalization was central to Bowlby's ideas about stability and change in attachment patterns. In the context of personality development, Bowlby believed that once an individual started developing along a specific trajectory, there were a number of processes that would tend to canalize that pathway, making it increasingly unlikely that the person would change. Bowlby separated these processes into two broad categories. The first concerns the *caregiving environment*. To the extent that an individual's caregiving environment is stable, he or she is unlikely to experience interactions that challenge his or her representations of the world. Bowlby (1973) noted that many children have relatively stable caregiving environments which are reinforced at different levels of analysis: a parent provides a context for education, educational settings provide a context for the development of peer relations, and so on. Each of these can provide a "force" that helps to guide the developing child along a specific pathway.

Bowlby (1973) also discussed *intraindividual* or *psychodynamic* processes that can promote canalization. He noted that people

often select their environments in ways that maximize the overlap between the psychological qualities of the situations and their experience-based expectations and preferences. Moreover, Bowlby argued, the mind generally assimilates new information into existing schemas rather than accommodating to it (an idea Bowlby borrowed from Piaget, whom he knew personally; see Collins & Read, 1994, for a discussion of this issue as it arises in the study of adult attachment and social cognition). Consistent with these ideas, empirical research has shown that people's working models influence the kinds of reactions they elicit from others (Arend, Gove, & Sroufe, 1979; Troy & Sroufe, 1987; Waters, Wippman, & Sroufe, 1979) and the kinds of inferences they make about people's intentions in experimental contexts (Brumbaugh & Fraley, 2006; Collins, 1996; Pierce, Sarason, & Sarason, 1992; Pietromonaco & Carnelley, 1994). Such dynamics allow working models to shape the kinds of interactions a person experiences, and in concert, help to maintain the individual's already partially canalized pathway through development. To the extent that an individual diverges from such a pathway, the changed route seems likely to be fairly close to its predecessor.

Attachment in Adults

Although Bowlby was primarily concerned with understanding the infant-caregiver relationship, he believed that attachment is relevant to understanding human experience from "the cradle to the grave." It was not until the mid-1980s, however, that researchers began to take seriously the possibility that attachment processes operate in adulthood in ways that go beyond what had been observed in infancy or childhood. Ideas about adult attachment were explored and developed in slightly different ways within different research traditions. Among developmental psychologists, researchers began to refine methods, such as the Adult Attachment Interview (AAI; Main, Kaplan, & Cassidy, 1985; see review by Hesse, 2016), for understanding how young adults represent their early attachment experiences with parents. By studying transcripts based on hour-

long interviews, Main and her colleagues (1985) developed a means of predicting which parents would have secure children and which would have insecure children, as assessed in the Strange Situation.

Developmental research revealed that parents who are able to recall and describe their early experiences in a coherent fashion are more likely to have infants classified as “secure” in the Strange Situation. Such parents, called “secure and autonomous with respect to attachment,” or just “secure,” are able to collaborate effectively with the interviewer and provide accounts that are internally consistent. In contrast, other parents provide less coherent narratives and inconsistent information (e.g., describing their early relationships with parents as being “warm,” yet narrating specific episodes in which they felt neglected or unappreciated by their parents). Some adults tend to minimize the relevance of their parents, whereas others appear to be overly enmeshed in relationships with parents. The theme of developmental research on adult attachment is that experiences taking place in childhood have downstream implications for understanding a broad array of psychological outcomes, including social competence (e.g., Groh et al., 2014), peer relations (e.g., Pallini, Baiocco, Schneider, Madigan, & Atkinson, 2014), and psychopathology (e.g., DeKlyen & Greenberg, 2016). (See Hesse, 2016, and Crowell, Fraley, & Roisman, 2016, for in-depth reviews of developmental research using the AAI.)

Among social and personality psychologists, attachment theory was adopted as both a normative and an individual-differences approach to understanding the nature of close relationships, often of the romantic-sexual variety. Hazan and Shaver (1987) were among the first researchers to explore Bowlby’s ideas in this context. They argued that the emotional bond that develops between adult romantic partners is partly a function of the same motivational system—the attachment behavioral system—that gives rise to the emotional bond between infants and their caregivers. Moreover, they observed that infant–parent and adult pair-bonds were similar in the following ways: (1) Both infants and adults feel safer when their

attachment figure is nearby and responsive; (2) both engage in close, intimate, bodily contact; (3) both feel insecure when their attachment figure is separated from them and inaccessible; (4) both share discoveries with each other; (5) both engage in mutual eye contact, touch each other’s faces gently or playfully, snuggle and embrace, and seem fascinated and preoccupied with each other; and (6) both tend to use a special kind of communication, called “motherese” in the infant–parent relationship and “baby talk” in romantic relationships (Shaver, Hazan, & Bradshaw, 1988). On the basis of these parallels, it was argued that many adult romantic relationships, like infant–caregiver relationships, are *attachments*, and that romantic love is a property of the attachment behavioral system, as well as the somewhat distinct motivational systems that give rise to caregiving and sexuality (Hazan & Shaver, 1987; Shaver et al., 1988). In short, one of the key themes of research in the social–personality tradition is that as people reach adolescence and adulthood, they begin to form attachment relationships with people other than their parents (e.g., peers, romantic partners). These relationships function in ways similar to infant–parent attachments and, as such, can be understood using the same concepts and theoretical principles.

The Structure of Individual Differences in Adult Attachment

Although modern research on adult attachment is rooted in the notion that the attachment behavioral system is just as relevant for understanding behavior, thought, and affect in adults as it is in children, the majority of research on adult attachment has emphasized individual differences in the way the attachment system is organized. The earliest research on adult attachment examined associations between individual differences in adult attachment and the way people think about their romantic relationships. Hazan and Shaver (1987) developed a simple questionnaire to measure these individual differences by asking participants to indicate which of the following paragraphs best characterize how they think, feel, and behave in close relationships:

- A. I am somewhat uncomfortable being close to others; I find it difficult to trust them completely, difficult to allow myself to depend on them. I am nervous when anyone gets too close, and often, others want me to be more intimate than I feel comfortable being.
- B. I find it relatively easy to get close to others and am comfortable depending on them and having them depend on me. I don't worry about being abandoned or about someone getting too close to me.
- C. I find that others are reluctant to get as close as I would like. I often worry that my partner doesn't really love me or won't want to stay with me. I want to get very close to my partner, and this sometimes scares people away.

Hazan and Shaver (1987) found that the frequencies of endorsing the three categories were similar to the frequencies observed in middle-class samples of infants in the Strange Situation: About 56% of adults classified themselves as secure (paragraph B), about 25% as avoidant (paragraph A), and

about 19% as anxious-resistant (paragraph C).

Although this measure was useful for documenting the association between what are now called “attachment styles” and relationship functioning, it did not allow a full test of the hypothesis that the same kinds of individual differences observed in infants might also be evident in adults. Researchers have explored this hypothesis in a variety of ways in subsequent research. For example, Brennan, Clark, and Shaver (1998) collected a large number of statements conceptually related to attachment (e.g., “I believe that others will be there for me when I need them”), correlated people's responses on them, and determined their underlying structure using factor analysis. Their findings indicated that there are two major dimensions: attachment-related anxiety and attachment-related avoidance (see Figure 30.2). People with high scores on attachment-related anxiety tend to worry whether their relationship partner is avail-

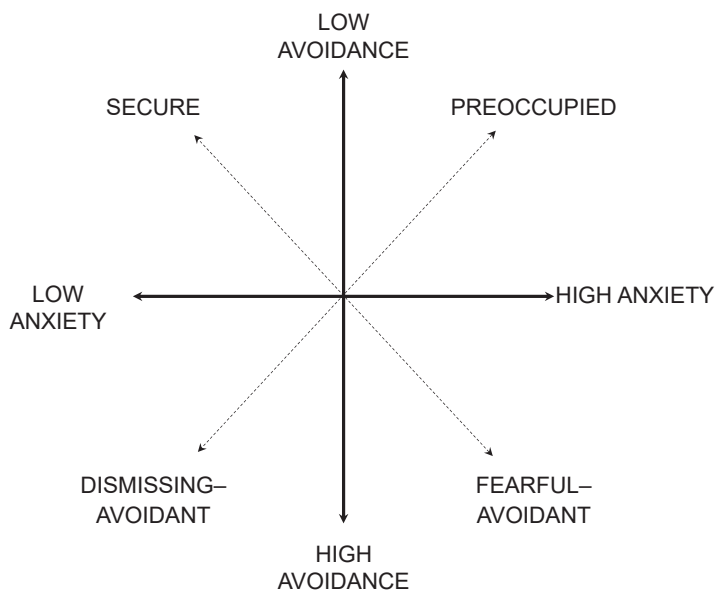


FIGURE 30.2. The two-dimensional model that is commonly used in contemporary social-personality research to conceptualize and partition individual differences in adult attachment. The cardinal lines represent the dimensions of attachment-related anxiety and avoidance, as described by Brennan et al. (1998). The diagonal lines capture the four prototypes described by Bartholomew and Horowitz (1991).

able, attentive, and responsive. People who score low on this dimension are more secure in the way they perceive their partner's responsiveness and availability. People who score high on attachment-related avoidance prefer not to rely on others or open up emotionally to them. People who score low are more comfortable being intimate with others and relying on them for comfort and support. People who score low on both dimensions are considered to have a secure attachment style. The most popular measures of adult attachment style in the social-personality tradition are Brennan and colleagues' (1998) *Experiences in Close Relationships* (ECR) and Fraley, Waller, and Brennan's (2000) *Experiences in Close Relationships—Revised* (ECR-R), a slightly revised version of the ECR, based on item response theory. Both self-report instruments provide continuous scores on attachment-related anxiety and avoidance.

Individual Differences in Attachment in Adulthood and Their Role in Thought, Feeling, and Behavior

Over the past three decades, there has been an enormous amount of empirical research on adult attachment. Much of this research is reviewed in Cassidy and Shaver (2016), Gillath et al. (2016), and Mikulincer and Shaver (2016), so we do not review it here. We do, however, want to call attention to the broad scope of this research. (Here, and in the remainder of the chapter, we focus on research conducted in the social-psychological tradition rather in the developmental/AAI tradition.) For example, research at the interface of adult attachment and developmental psychology has examined the ways in which attachment styles are related to people's attitudes about parenthood (see Jones, Cassidy, & Shaver, 2014, for a review). Insecure adults, for example, are less likely than secure adults to feel competent in their roles as parents (Caldwell, Shaver, Li, & Minzenberg, 2011), and they feel less satisfied in their relationships with their children (La Valley & Guerrero, 2010). In addition, observational research indicates that secure adults are more likely than insecure adults to provide effective support when their children are tasked with solving challenging

puzzles in the laboratory (Rholes, Simpson, & Blakely, 1995).

As can be seen in Table 30.1, attachment theory has been used in virtually every area of modern psychology, including clinical, developmental, industrial-organizational, social, cognitive, and neuroscience. When researchers initially began studying adult attachment in the middle to late 1980s, the majority of research focused on attachment styles in the context of interpersonal attraction and close relationships. The framework has now expanded considerably, and attachment theory and research are now featured in all areas of contemporary psychological science.

Attachment Theory and Contemporary Personality Research

In the following sections, we discuss contemporary issues in attachment research that we believe are likely to be of special interest to personality psychologists (e.g., the relation between personality traits and attachment styles). In the process, we hope to call attention to the many points of overlap between the rest of contemporary personality research and adult attachment theory, thereby paving the way for further integrative work. Attachment theory has the advantage of bringing a rich, coherent theoretical framework to the table, but this does not mean that it provides answers to all the important questions or that there are no ambiguities in specific strands of the theoretical network. By highlighting some of these loose ends, we hope to inspire future research that leverages the creativity and methodological talents of modern personality psychologists.

Consistency across Situations

Attachment researchers typically conceptualize attachment-related working models (cognitive-affective schemas) as generalized representations that capture broad relational themes common to diverse interpersonal experiences. This approach, which has sometimes been referred to as a "trait" approach (Kobak, 1994; Lewis, 1994), has obvious parallels to the trait concept in personality research, and it is popular for a number of

TABLE 30.1. A Brief Overview of Attachment Research Interfacing with Multiple Areas of Psychological Science

Domain	Example study or review
<u>Cognitive processes</u>	
Attachment avoidance is related to the suppression of attachment-related information, but in ways that are constrained by cognitive resources.	Mikulincer, Shaver, & Dolev (2004)
Attachment anxiety is associated with the production of false memories about interpersonal information.	Hudson & Fraley (2018)
Attachment insecurity is associated with making negative attributions about a partner's ambiguous behavior.	Collins (1996)
<u>Industrial–organizational</u>	
Attachment anxiety is associated with to job-related burnout.	Vîrgă, Schaufeli, Taris, van Beek, & Sulea (2019)
Leaders' attachment anxiety is associated with more self-serving leadership motives and poor leadership qualities in task-oriented situations.	Harms (2011); Davidovitz, Mikulincer, Shaver, Izsak, & Popper (2007)
The association between fit perceptions and job satisfaction is weaker for highly avoidant employees.	Dahling & Librizzi (2015)
People high in attachment avoidance are less likely to engage in organizational citizenship behaviors.	Harms, Bai, & Han (2016)
<u>Developmental</u>	
Attachment styles are relatively stable in adolescence, but less so among teens from families characterized by parental separation or divorce.	Jones et al. (2018)
Attachment is related to a variety of parenting behaviors and attitudes, including feelings of closeness to children, desire to have children, parental satisfaction, and parental sensitivity.	Jones, Cassidy, & Shaver (2015)
<u>Clinical and psychopathology</u>	
Attachment insecurity is associated with psychosis.	Carr, Hardy, & Fornells-Ambrojo (2018)
Secure individuals are less likely than others to experience symptoms of posttraumatic stress disorder and depression following traumatic experiences.	Fraley, Fazzari, Bonanno, & Dekel (2006)
Avoidant adults are more likely to rapidly respond to danger, whereas anxious adults are more likely to quickly and accurately detect environmental threats.	Ein-Dor (2015)
Attachment styles are related to personality disorders.	Fossati et al. (2015)
Attachment theory has informed a variety of approaches to treatment.	Mikulincer, Shaver, & Berant (2013)

(continued)

TABLE 30.1. *(continued)*

Domain	Example study or review
<u>Social and close relationships</u>	
Attachment anxiety is associated with decreases in sexual desire in early relationships.	Mizrahi, Reis, Maniaci, & Birnbaum (2019)
Secure individuals are more likely to report satisfaction, investment, and commitment in their romantic relationships	Segal & Fraley (2016)
Avoidant spouses perceive themselves as being less responsive in conflict situations and perceive their spouses as being less responsive.	Beck, Pietromonaco, DeVito, Powers, & Boyle (2014)
Attachment anxiety is associated with verbal disfluencies and interpersonal awkwardness in early dating contexts.	McClure & Lydon (2014)
Attachment insecurity is related to endorsing short-term mating strategies.	Schmitt (2005)
Attachment related to self-regulatory processes.	Orehek, Vazeou-Nieuwenhuis, Quick, & Weaverling (2017)
Attachment related to caregiving behavior and social support.	Feeney, Collins, Van Vleet, & Tomlinson (2013)
<u>Health</u>	
Attachment insecurity associated with markers of inflammation, such as interleukin (IL-6).	Ehrlich et al. (2019)
People high in attachment avoidance showed higher cortisol levels when entering the lab and during the discussion but recovered rapidly when the discussion ended.	Powers, Pietromonaco, Gunlicks, & Sayer (2006)
Couples with anxious wives and avoidant husbands showed physiological reactivity (sharp cortisol changes) in anticipation of conflict.	Beck, Pietromonaco, DeBuse, Powers, & Sayer (2013)
Anxious individuals report poorer physical health, including more bodily pain, more medical symptoms, and impaired daily functioning.	Stanton & Campbell (2014)
Insecure attachment is related to risky behavior, such as risky drinking and a decreased likelihood of using condoms.	Matson, Levy, Chung, & Ellen (2014); Strachman & Impett (2009)

reasons. For one, if early childhood experiences with caregivers result in the formation of cognitive structures that are relatively general and stable, then these structures could be the basis for the continuity and coherence people display in their many close relationships. Although there are undoubtedly variations from one relationship to another in how a person relates to significant others, a trait perspective implies that there is likely to be a common thread tying together the

individual's thoughts, feelings, and behavior across different relationships and contexts. Despite its appeal, the trait approach to attachment has been criticized on at least two grounds. First, researchers have observed that people exhibit different attachment patterns in different relationships. Baldwin, Keelan, Fehr, Ennis, and Koh-Rangarajoo (1996), for example, demonstrated that there is considerable within-person variability in the expectations and beliefs that people hold

about different significant others. A person may consider his spouse to be warm, affectionate, and responsive, while simultaneously viewing his mother as cold, rejecting, and aloof. The fact that substantial within-person variation (i.e., “inconsistency”) exists in the way people relate to others raises a number of questions about how working models should be conceptualized in attachment theory.

This problem will be familiar to most personality researchers. Over 40 years ago, Walter Mischel (1968) published a review of the field that is now best remembered for its critique of trait models of personality. According to Mischel’s interpretation of the evidence, the correlations among measures of behavior from one situation to the next were lower than expected, leading him to question the usefulness of the trait concept (see Ahadi & Diener, 1989, for alternative interpretations).

Attachment researchers have offered several potential solutions to the *inconsistency issue* in the study of attachment. One popular proposal has been that people hold different working models of different relationships, and that different models can exist at different levels of abstraction or generalization (e.g., Collins, Guichard, Ford, & Feeney, 2004; Overall, Fletcher, & Friesen, 2003; Sibley & Overall, 2008). For example, people may hold relatively global representations of their “parents,” but they also hold relationship-specific representations of their mothers and fathers. Thus, it is possible for the same person to exhibit varying degrees of security in relationships with two parents, assuming that there is a different history of security and support in the two relationships.

From this point of view, the challenge for attachment researchers is not to explain why people experience different degrees of security in their various relationships, but why there is some degree of consistency across relationships when each relationship has its own unique qualities. One possibility, reviewed by Collins and her colleagues (2004), is that in addition to forming relationship-specific representations, people develop a more abstract, global representation that captures some kind of “weighted average” of their experiences. Indeed, theoretical

work on this possibility, using connectionist simulations, suggests that mental systems easily extract the “gist” or themes that are common to many different experiences, and that these more abstract representations can be used to guide the model’s response to new and ambiguous targets (Fraley, 2007). As a result, behavior in any one context can be driven both by global or abstract representations, and by ones that are more specific to the relationship in question. The global representation is part of what creates similarity in a person’s thoughts and feelings across relationships (and thus acts as a latent factor, in a psychometric sense), whereas the relationship-specific representation captures knowledge and strategies for managing specific relationships (and thus explains relationship-specific variance).

Another explanation for the presence of some consistency across relationship partners is developmental in nature. If a relationship-specific representation is forged partly on the basis of those that already exist, we would expect a modest degree of association in security across different relationships. For example, if one relationship-specific representation (pertaining to one’s mother, say) was constructed before another (i.e., pertaining to one’s romantic relationship partner), and if the former played a role in shaping the latter, then the two sets of relational experiences would be similar (and, thus, correlated across targets). In this scenario, there need not be a global model or “trait” (although there is no reason why there could not be); the similarities among representations of different relationships exist because existing models played a causal (but incomplete) role in shaping the development of new models. Nonetheless, the statistical associations among security measures with respect to different relational domains will be imperfect, because the different relationships are unique and have their own interpersonal histories.

Social-cognitive research on transference suggests that these kinds of dynamics occur and can be set in motion relatively easily with simple laboratory stimuli (e.g., Andersen & Chen, 2002). For example, when asked to rate how secure people feel with potential mates described in personal ads, participants were more likely to feel secure with

the people described in the ads when those ads had been constructed, unbeknownst to the research subjects, to resemble a former attachment figure (Brumbaugh, 2017; Brumbaugh & Fraley, 2006). This finding indicates that existing working models can be used to guide the interpretation of new experiences, thereby creating a degree of consistency across working models.

These ideas bear on the consistency debate in personality psychology. In mainstream personality psychology, most of the initial responses to Mischel's arguments were "defensive" in nature—attempts to explain why Mischel was misrepresenting the facts rather than attempts to understand how it is that people can exhibit coherence in their thoughts, feelings, and behavior without necessarily behaving in identical ways across situations. Some proposals, for example, focused on the fact that the expected correlation between two "samples" of behavior should be relatively small, as expected from the psychometric principles of classical test theory, but that such correlations will increase as more and more instances are aggregated (Epstein, 1979, 1980). Other proposals focused on the idiosyncratic meaning of trait terms and how some traits might be relevant to some people while being irrelevant to others (thereby making their behavior less consistent across situations; see Bem & Allen, 1974; for a discussion, see Baumeister & Tice, 1988).

One of the more recent rapprochements has come from Mischel himself. Mischel and Shoda's (1995; Ayduk & Mendoza-Denton, Chapter 19, this volume) cognitive-affective processing system (i.e., CAPS) model assumes that an important aspect of personality is the "if-then" associations people hold. A person can behave in a way that appears inconsistent if a researcher simply aggregates measures of honesty across situations, but the person may in fact be behaving in a way that is perfectly consistent with the way his or her associations are organized. The CAPS framework is similar to ones that have been adopted in the study of attachment, although the attachment approach incorporates traditional trait-like concepts (e.g., attachment styles, general working models) with more contextually specific factors, rather than removing trait-like constructs

entirely. Indeed, theoretical simulations demonstrate that a connectionist cognitive system can construct both global representations and if-then representations in parallel, and that both kinds of representations can be used to guide behavior in new situations (Fraley, 2007). It should therefore be possible for personality researchers to consider models that enable traits and more dynamic and situation-specific aspects of personality to exist simultaneously.

Although additional solutions to the person-situation debate have been put forward (e.g., Fleeson's [2001]), the CAPS model is of special interest because it resembles ideas advanced by Bowlby (1969/1982, 1973, 1980) years before in his discussion of how working models are constructed and shape human experience. Moreover, some attachment researchers have explicitly embraced the CAPS framework as a means of understanding attachment dynamics in adult relationships (e.g., Zayas, Shoda, & Ayduk, 2002). Ultimately, the way each person thinks, feels, and behaves in the relationship can be understood as lawful, but to capture some of this nuance, researchers need to attend to not only the variance that is common across relationships, but also the variance that is specific to each relationship that a person has.

Antecedents of Adult Attachment: Why Are Some People More Secure Than Others?

One of the fundamental questions in adult attachment research is what makes people secure or insecure in the ways they relate to significant others. As reviewed previously, one of the core assumptions of attachment theory is that these individual differences reflect variations in the working models that people hold about themselves and close others—working models that have been constructed over the course of people's lives.

We have briefly reviewed some of the classic work on how early caregiving experiences shape the development of attachment patterns in early childhood. Correlational, experimental, and longitudinal studies all suggest that the quality of early caregiving experiences plays a role in shaping how secure children become. Our goal in this section is to review some of the research on how

these experiences translate into outcomes later in adulthood. There is an enormous amount of interest in these issues in contemporary psychology, because many of the infant and child participants in longitudinal studies that were inspired by Bowlby and Ainsworth's ideas decades ago have come of age in recent years (e.g., Chopik, Moors, & Edelstein, 2014; Fraley, Roisman, Booth-LaForce, Owen, & Holland, 2013; Salo, Jokela, Lehtimäki, Keltikangas-Järvinen, 2011; Zayas, Mischel, Shoda, & Aber, 2011). As a result, we have learned a great deal about the development of attachment and attachment-relevant outcomes since the previous edition of this chapter was written.

In one of the foundational papers in this new generation of longitudinal projects, Simpson, Collins, Tran, and Haydon (2007) analyzed data from 78 individuals who had been followed from infancy to adulthood (ages 20–23 years). Simpson and his colleagues found that early attachment security, assessed in the Strange Situation, was related to social competence in childhood, which in turn was related to friendship quality in adolescence, and still later, predicted positive emotional experiences in close relationships at age 23. Based on these findings, Simpson and his colleagues suggested that early attachment experiences have the potential to indirectly shape later interpersonal outcomes. Importantly, the process they described is not deterministic (e.g., some proportion of secure children enter into poorly functioning friendships). But, when stepping back and viewing development through a longitudinal lens, it is possible to see how early interpersonal processes trickle down into other domains of life, pushing people along some pathways rather than others.

In another important study, Dinero, Conger, Shaver, Widaman, and Larsen-Rife (2008) studied the quality of observed interactions between approximately 250 adolescents and their parents over a period of 10 years. They found that the quality of parent–adolescent interactions at age 15 predicted attachment security at age 25 after controlling for assessments of security at age 15. This research was important for at least two reasons. First, the work took into account the autoregressive nature of attachment security, showing that, despite the “in-

trinsic” stability of attachment, interpersonal experiences at one point in time have the potential to predict what people will be like at another point in time. Second, the work emphasized the role of adolescence rather than early childhood exclusively. We elaborate on this point in subsequent sections, but for now we wish to make clear that attachment theory emphasizes the role of attachment experiences *across* development and not merely those experiences that take place in early childhood.

In another intensive investigation, Fraley and his colleagues (2013) analyzed data from the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care and Youth Development. The children in this sample were originally assessed when they were 1 month of age. Importantly, they have been reassessed multiple times, with in-depth assessments of the quality of the caregiving environment (i.e., observed maternal sensitivity, maternal depression, father absence) and the quality of friendship relationships. At age 18, these children completed self-report measures of adult attachment style. Children who were relatively secure at age 18 were more likely to have had a developmental history characterized by increasingly high-quality caregiving and friendship relationships. For example, at age 18, those who were relatively secure were likely to have mothers who showed increases in sensitivity over time and decreases in depression, increases in social competence, and ever-improving friendship relationships.

Taken together, these studies suggest that one reason some people are more secure than others is that they have experienced a history of warm and responsive interactions with others—both parents and peers. Although such studies do not demonstrate that these experiences have a causal influence on the development of adult attachment styles (we discuss alternative explanations below), they help to fill a key gap that has been missing in the attachment literature.

Differentiation and Its Implications for Understanding Attachment Development

One of the challenges for future research is to understand why the same person can be

secure in some relational contexts but insecure in others. Attachment theory clearly assumes that if an individual has a relatively secure relationship with his or her parents and friends, then he or she is biased toward developing a secure relationship with a new romantic partner. If that partner begins to be unresponsive or unsupportive, however, it seems unlikely that the individual will persist fully in maintaining a secure representation of the partner. Gradually, or perhaps even abruptly, the representation should evolve to include doubts about the partner's responsiveness and commitment to the relationship.

One of the important questions for theory and research concerns the fate of "other" attachment representations in the face of relationship-specific changes. What happens, for example, to a person's representations of his or her parents when a nonparental relationship (e.g., a romantic one) takes a turn for the worse? It is possible that changes in one relational domain do not carry over laterally to other domains. And, if they do, it is possible that such changes are merely fleeting.

The Role of Early Experience

Simpson and his colleagues (2007, 2015) proposed that early caregiving experiences influence attachment-relevant outcomes later in life via indirect pathways. Specifically, they proposed that early attachment experiences shape the child's developing social competence, which in turn shapes the quality of the child's relationships with peers. Those experiences then contribute to the way attachment processes unfold in adulthood.

There are a few important implications of this framework. First, when taken at face value, it implies that if one is trying to understand what factors contribute the most to adult attachment processes, the factors most proximate to the outcomes of interest should be the most consequential. Specifically, adult attachment outcomes should be better explained by interpersonal experiences in adulthood or early adolescence than early childhood per se. Thus, although early experiences are believed to play a role in shaping the *foundations* for what is to come

next, their effects have the potential to be overshadowed by ongoing interpersonal experiences as people develop.

Having said this, some studies suggest that early experiences continue to play a role in shaping some attachment-relevant outcomes—above and beyond more recent experiences. We highlight these studies not because we wish to argue that early experiences can have powerful implications for understanding individual differences in adult attachment, but because they offer valuable nuance regarding how investigators might go about understanding the role of early experiences in shaping later outcomes—implications that could apply to personality research more generally. In one such study, Raby, Roisman, Fraley, and Simpson (2015) found that the quality of early caregiving experiences in children was weakly related to social competence at age 4. But, importantly, the magnitude of that association was relatively constant across time ($r = .17$), with similar effects at ages 10, 23, and 32. This raises the intriguing possibility that, even if recent experiences play a more powerful role in shaping later outcomes than early experiences, those early experiences might not be fully inert; they may continue to contribute to attachment dynamics later in life.

How might this happen? One possibility involves the canalization processes we described earlier in this chapter: As development unfolds, people's developmental trajectories become increasingly entrenched. It is possible that persistent environmental conditions early in life may leave a more enduring mark on the developing individual than similar such conditions taking place later, because the brain, for example, is more plastic early in childhood and adolescence than it is later on (Casey, Tottenham, Liston, & Durston, 2005).

This is not to say that early experiences necessarily leave an immutable mark on the developing person, or that later experiences are not influential. To reconcile these tensions, we have found it useful to conceptualize development as a balancing act between forces that push for socialization (environments shaping people) and selection (people shaping their environments). Fraley and Brumbaugh (2004), for example, suggested that socialization dynamics tend to take pre-

cedence in early childhood, then give way to selection dynamics as individuals develop. One consequence of this inequality is that recent experiences are more influential than distal experiences in shaping psychological outcomes. But distal experiences that take place in early childhood in particular (i.e., when socialization effects dominate) are more powerful than distal experiences that take place later.

We illustrate these developmental principles with an empirical example concerning parental divorce. Many scholars have studied the impact of parental divorce on children, because the context of divorce (both the events that precede it and those that follow it) often includes disruptions in the stability of the caregiving environment (Feeney & Monin, 2016). Research generally finds that children from divorced families experience more difficulties in psychological functioning. Because divorce is a reasonably discrete event, one can ask whether the timing of parental divorce matters in its relation to attachment functioning.

Fraley and Heffernan (2013) addressed this question in two large samples of adults. They found that at the time of assessment, adults were more insecure in their relationships with their parents if their parents had been recently divorced; that is, adults whose parents had divorced in the recent past were less likely to report that they had a secure relationship with their parents than those whose parents had divorced in the distant past. However, after controlling for how long ago the divorce took place, Fraley and Heffernan found that the timing of the divorce mattered, too: When parents divorced early in their children's lives (e.g., before the age of 5), those adult children were less secure in their current relationships with their parents than those whose parents divorced later in their children's lives. Stated differently, divorces that took place 20 years ago were less tied to current functioning than divorces that took place 20 months ago. But divorces that took place 20 years ago *in early childhood* were more influential than divorces that took place 20 years ago in later childhood.

These results suggest that both primacy and recency effects should be considered when studying the ways in which interper-

sonal experiences may shape the long-term development of attachment styles. People's current interpersonal context is the best candidate for understanding why people are secure or insecure in the here and now. And the further back one reaches, the less influential those distal experiences should be. But there is one potential exception: Experiences that take place in early childhood may be more powerful than similar experiences that take place later. That does not mean the effects are strong in an absolute sense, but their traces should be persistent.

Behavior Genetics and Adult Attachment

It is well-known that most individual-difference constructs are heritable. Using twin designs, researchers have found that about half of the differences between people in traits such as agreeableness or neuroticism can be accounted for by genetic differences between persons (Bleidorn, Kandler, & Caspi, 2014).

To date, a few studies have used twin designs to estimate the relative contribution of genetic, shared environmental, and non-shared environmental sources of variance to individual differences in adult attachment styles (Brussoni, Jang, Livesley, & Macbeth, 2000; Crawford et al., 2007; Donnellan, Burt, Levendosky, & Klump, 2008; Franz et al., 2011). The results vary across studies in part because they do not measure attachment in a consistent way. But the two studies (Donnellan et al., 2008; Franz et al., 2011) that used measures that most closely align with the multi-item scales commonly used in contemporary attachment research suggest that there is a sizable role (about 27–45%) for heritable variance in adult attachment. And, similar to the findings in the personality literature more broadly, there is little evidence that shared environmental factors (i.e., factors that are shared by twins growing up in the same family) contribute to individual differences in attachment style.

What are the implications of these findings? If we take them at face value, they suggest that what makes some people secure in their relationships reflects, at least in part, genetic differences among people. One source of controversy, however, is whether such estimates conflict with the assump-

tions of attachment theory (e.g., Barbaro, Boutwell, Barnes, & Shackelford, 2017). On the surface, it might seem that, if some portion of individual differences in attachment can be attributed to heritable differences between people, then either a careful examination of socialization processes (a) is not needed or (b) is irrelevant to understanding how people become who they are.

We think modern attachment theory is an interesting example of how a theory can be uncomfortably pulled by the tensions between behavior genetic and socialization models, while being misrepresented by both extremes. Our reading of Bowlby's original theory is that there is room for both heredity and socialization in personality development. Bowlby believed that there may be heritable differences between children that are related to the kinds of caregiving they receive and the experiences they have (Bowlby, 1973). But, importantly, he believed that those interpersonal interactions played a causal role in shaping and sustaining individual differences. In modern parlance, Bowlby believed that interpersonal experiences may *mediate* the relationship between genetic differences and attachment-related outcomes (see Briley et al., 2019, for a detailed discussion of how developmental and genetic models can be integrated to lead to new ways of understanding development).

We highlight this mediation hypothesis for two reasons. First, attachment theory is sometimes portrayed as disregarding the potential role of genetic factors in shaping attachment-related outcomes (e.g., Sherlock & Zietsch, 2018; Yarkoni, 2016). And although the majority of research on the etiology of individual differences in attachment does, in fact, ignore heritable factors, we believe that this neglect is not due to the belief that genetics are irrelevant; it is due to the assumption that genetic influences are more distal in the causal chain than interpersonal ones. Stated differently, the working assumption is that if heritable factors play a role in shaping relationship dynamics, those dynamics are primarily responsible for the working models people construct about their attachment relationships. Moreover, because some of the developmental research on attachment is motivated by concerns for social policy and child welfare, empirical ef-

fort has focused on identifying environmental factors that can be targeted in interventions (e.g., parental responsiveness training, creating safe environments).

Second, scholars sometimes assume that if there is evidence from twin designs of heritable variation in an outcome, then interpersonal factors (e.g., parenting, the responsiveness and availability of attachment figures) are not relevant for understanding that outcome. This conclusion implicitly assumes that genetic variation creates individual differences in people's experiences and in their attachment styles, *and* that there is no causal path between experience and attachment style.

In our view, empirical research is consistent with the idea that there are causal relations between people's interpersonal experiences and their attachment styles. When people are experimentally placed in situations in which they are made to feel vulnerable, neglected, or misunderstood by their partners, they tend to experience increases in insecurity (e.g., Carnelley, Otway, & Rowe, 2016). However, most of this research is based on short-term laboratory experiments. As a result, it is not clear whether the changes in attachment that have been observed are merely short-term deviations from people's attachment patterns or more enduring changes. Thus, an important direction for future research is to understand what kinds of factors influence attachment styles and whether those influences are transient or enduring (see Fraley et al., 2013).

In summary, although attachment researchers have generally overlooked heritable sources of variation in studying the origins of attachment styles, we believe this is a valuable area for future research. Indeed, investigating the genetic and environmental factors that underlie adult attachment patterns represents a more inclusive and promising approach than focusing on one etiological class of explanations alone. Moreover, contrary to some assumptions, we do not believe that the presence of heritable variation in twin studies implies that parenting or interpersonal factors are poor candidates for understanding attachment development. However, the fact that these sources of variance can be confounded does imply that sophisticated designs will be necessary for

studying the etiology of individual differences in attachment.

Some Further Considerations and Directions for Future Research on the Antecedents of Attachment Security

One of the themes we have emphasized in this chapter is that there is great value in conceptualizing and assessing attachment in a contextually sensitive way; that is, the way people relate to their parents does not wholly overlap with the way they relate to their romantic partners. We know that there are positive correlations across relational domains (which is why the concept of a generalized attachment style is defensible), but there is plenty of room for divergence in the ways people relate to different significant others in their lives. This within-person heterogeneity raises fascinating possibilities for understanding the behavior genetics of adult attachment. It is possible, for example, that heritable differences between people contribute to the shared variance across relational domains. If this is the case, it could be that the thread that connects relational patterns across domains has, in part, a genetic explanation, but that genetics do not explain what makes the same person different across domains.

Another issue that needs to be clarified in the future is age-related differences in genetic and environmental influences. In behavior genetics research on attachment and interpersonal relationships in childhood, researchers have consistently found relatively small estimates of genetic influence and sometimes sizable estimates of shared environmental influences (e.g., O'Connor & Croft, 2001; Roisman & Fraley, 2006). The measurement of attachment in childhood and adulthood is different, so we cannot assume that the weaker genetic estimates found for children reflects developmental processes rather than measurement differences. But these findings do raise the possibility that additive genetic factors come to play a larger role in explaining attachment differences as individuals move from childhood to adulthood (see, e.g., Barbaro et al., 2017, and Fearon, Shmueli-Goetz, Viding, Fonagy, & Plomin, 2014). This kind of pattern has also been observed for measures

of cognitive ability, which show considerable shared environmental effects in early childhood but sizable genetic effects by early adulthood (Briley & Tucker-Drob, 2013). If this pattern actually applies to attachment, then understanding the relative contribution of genetic and environmental factors may require a focus on developmental processes that have not been fully addressed up to this point.

Another issue that requires further consideration is that as individuals transition from adolescence to adulthood, they increasingly use peers, as opposed to parents, as attachment figures (Fraley & Davis, 1997; Nickserson & Nagle, 2005). This opens the door for nonfamilial factors to shape attachment differences in ways that could diminish to role of influences from the family of origin. It is not clear, however, what role heritable factors play in this process. It could be the case, as suggested by the mediational process described previously, that people select themselves into relationships that are compatible with the working models they already hold. And to the extent that there is genetic variance underlying these, that variance will be reflected in additive genetic contributions to individual difference in behavior genetics models.

Another possibility is that the role of heritable factors will fade across time because, although selection processes may be active, socialization processes are also active, and people's attachment styles are partial reflections of experiences that are independent of existing representations (Fraley, 2002). Those nonshared experiences can accumulate to diminish the role of heritable factors in explaining differences between people.

We have highlighted these issues in some depth for a number of reasons. First, we are concerned that researchers will ignore the potentially confounding role of genes when trying to understand individual differences in attachment style. We would like for researchers to appreciate that alternative explanations exist and that considering them should make it possible to advance our understanding of attachment and its development.

But more importantly, we are genuinely enthusiastic about the work that can be done at the interface of behavior genetics and at-

tachment. One way to improve research on socialization is by using genetically informed designs that provide a way to tease apart nature and nurture (e.g., Roisman & Fraley, 2006). Regardless of whether one assumes that genes influence attachment, one can use genetically informed designs to conduct powerful research on environmental influences.

Finally, we believe that the integration of these research traditions provides an exciting way to bridge research on personality and attachment. Most discussions of the etiology of personality employ behavior genetics methods under the assumption that the question of *how* people came to be who they are boils down to “born that way” versus “not born that way.” We believe that attachment theory provides a rich developmental legacy to serve as an excellent test case for understanding how genetic and environmental explanations can be integrated, tested, and used to advance knowledge of personality development. But to be successful, this enterprise requires investments from scholars with expertise in multiple areas, including behavior genetics, personality, development, and attachment.

What Is the Relation between Attachment and Trait Constructs?

One pressing issue for researchers working at the interface of attachment and personality is the association, both conceptual and empirical, between individual differences in attachment and personality traits, such as the Big Five dimensions (e.g., John, Chapter 2, this volume). Theoretically, the issue is not as clear-cut as some might wish. Bowlby (1973, p. 369) explicitly argued that a child’s preexisting dispositions play a role in his or her responses to the environment; in some respects, they are responsible for the shape of the epigenetic stage upon which attachment relationships play out. But he also argued that the history of interactions between a child and his or her attachment figures is the more proximate and crucial determinant of the thoughts, feelings, and behaviors that the child’s experiences in close relationships, regardless of the preexisting dispositions upon which they are layered.

In the lingo of contemporary personality psychology, it is unclear from Bowlby’s writings whether he considered basic personality traits to be independent predictors of interpersonal behavior, the starting point in a mediated casual chain, a potential moderator of the relations between attachment and interpersonal behavior, or some combination of the above. Regardless, it is certain that Bowlby did not conceptualize individual differences in security as being “nothing more” than preexisting personality traits. In that spirit, it is worth noting that there has been a great deal of research over the past decade examining how individual differences in security predict various outcomes, after researchers statistically control for individuals’ scores on measures of basic personality traits, such as neuroticism. For example, there is robust evidence that the relationships of secure individuals tend to be more stable than those of insecure people (either anxious or avoidant). Secure people also report higher levels of relationship satisfaction and adjustment relative to insecure people (see Mikulincer & Shaver, 2016, for a review). This pattern has been consistently obtained in studies of both dating and married couples and cannot be explained by other personality factors, such as the Big Five personality traits or self-esteem (Nofhle & Shaver, 2006). Moreover, research on seemingly basic affective responses reveals that measures of attachment predict emotional reactions even when basic personality traits are controlled (e.g., Erez, Mikulincer, Van IJzendoorn, & Kroonenberg, 2008; Mikulincer, Gillath, & Shaver, 2002).

Despite the fact that individual differences in attachment are related to a variety of outcomes when basic personality traits are controlled, it is important to note that attachment and personality traits *are* related to one another in meaningful ways. Attachment anxiety, not surprisingly, is substantially correlated with neuroticism (r ’s in the .40–.50 range), and avoidant attachment is often negatively correlated (e.g., r ’s around –.20) with agreeableness and extraversion (see Nofhle & Shaver, 2006, for a detailed review). As a result, the core individual differences in attachment can be located in the well-known five-dimensional space advocated in much contemporary personality

research. It seems unlikely, however, based on the evidence reviewed here, that these relations exist *because* the attachment dimensions are simply manifestations of the Big Five personality traits. In light of the previous discussion of the ways in which people can experience different levels of security with different significant others in their lives, it would be interesting for future research to examine the way relationship-specific measures of attachment relate to measures of basic personality traits and see whether basic personality traits are able to explain part of what is common across varying relationships.

Concluding Comments

Attachment theory arose from the psychoanalytic stream of personality theorizing, but because Bowlby was unusually open to emerging cognitive and ethological approaches to human and nonhuman primate behavior, and because he and Ainsworth were both empirically and theoretically oriented, the theory has remained open to other approaches and to subsequent theoretical and methodological developments. The theory spans several areas of psychology: personality, social, developmental, clinical, and comparative. It is as congenial to “negative psychology” (i.e., focusing on psychopathology and dysfunction) as it is to “positive psychology” (prosocial behavior, self-actualization). The theory was cognitive in certain respects from the start, but it has become more sophisticated cognitively as researchers have used methods ranging from discourse analysis (in the AAI) to social cognition constructs and research paradigms. Although we have not stressed its connections with learning or behaviorist approaches to personality development, the ways in which parental behavior influence the attachment patterns of infants could easily, and perhaps productively, be conceptualized in social learning theory terms, despite the historical antipathy between attachment and learning theorists.

Attachment theory explains how social “situations” (i.e., interactions with regular caregivers) build personality (i.e., attachment patterns), and how the resulting per-

sonality patterns then influence a person’s choices among, and behavior in, social situations (especially close relationships). Most of the classic issues, debates, and conundrums in personality psychology have played themselves out within the field of attachment research, with largely productive results. We have not had space to say much about contemporary neuroscience methods, but there is already some interesting neuroscience research within the attachment domain (see, e.g., Coan, 2016; Gillath, Bunge, Shaver, Wendelken, & Mikulincer, 2005). Attachment theory and research provide a model of integration across what once were separate and ferociously defended fiefdoms within personality psychology. We look forward with great interest to the field’s further development, diversification, and integration.

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CHAPTER 31

Persons, Situations, and Person–Situation Interactions

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Why do people do what they do? Can psychologists predict how a particular person will behave in a particular situation? Better yet, can psychologists explain *why* the person behaves that way in that situation? What people do depends on both who they are—their dispositions such as personality traits—and the situation they are in. The obviousness of this statement only highlights how odd it is that psychologists manage to find ways of disagreeing with each other over its implications. As the decades-long “person–situation debate” continues to prove (Donnellan, Lucas, & Fleeson, 2009; Fleeson & Furr, 2016; Funder, 2001; Kenrick & Funder, 1988), a surprising number of researchers appear to be both personally and professionally invested in believing that either situations or persons have stronger effects on behavior. By focusing on person–situation interaction, rather than person–situation competition, personality psychology is moving beyond such disagreements and debate, toward a more complete understanding of why people do what they do. The purpose of this chapter is to present the idea of person–situation interaction, its conceptual roots, and the ways in which it shapes contemporary personality research and theory.

These issues are important because person–situation interaction should be a key foundation for any personality theory that attempts to explain why a given person behaves in a given way in a given situation. Not all theories in personality psychology (or social psychology) are intended to be comprehensive in this way, and such theories might reasonably focus on concepts, processes, or phenomena that might not reflect person–situation interaction. However, person–situation interaction is an essential part of a broader understanding of why people do what they do.

By distilling and integrating contemporary approaches to person–situation interaction, we hope to direct readers’ attention to some of the most promising directions in personality psychology, and stimulate new ideas that advance understanding of personality and its effects on behavior

Conceptual Roots of Person–Situation Interactions

As a way of understanding “why do people do what they do?” and “how we explain *why* a person behaves in a certain way in a cer-

tain situation,” the idea of person–situation interaction grows from two conceptual roots—one focusing on people’s dispositions, and the other, on situational factors.

The Dispositional Roots

The dispositional root is the understanding that a person’s behavior is affected by stable qualities of that person. For example, whether a person is generally talkative or quiet is determined in part by some quality of that person. There is a psychological disposition that affects the person’s tendency to behave in a talkative and outgoing manner, or conversely, in a quiet and reserved manner.

In its traditional form, this view emphasizes dispositions that are cross-situationally broad, which means that they affect behavior across a wide range of situations. For example, according to John, Naumann, and Soto (2008), extraversion is a personality trait reflecting the degree to which one enacts an energetic approach to the social and material world, and conscientiousness reflects the degree to which one exhibits “socially proscribed impulse control that facilitates task- and goal-directed behavior.” (p. 120). This covers a lot of ground. Considering the number of situations that are part of the social and/or material world, and considering that many situations involve (or could involve) task-directed and goal-directed behavior, traits such as extraversion and conscientiousness are seen as affecting behavior across an extremely broad range of situations.

Dispositionally oriented research often focuses on the way individuals act differently from each other, on average, and experience different life outcomes. When focused on dispositional sources of behavior, a research project would ideally begin by measuring a person’s behavior in each of several situations and taking the average. For example, a researcher might observe an individual in several situations, measure his or her talkativeness in each, and compute his or her average talkativeness. Although how much the person talks will surely vary from situation to situation, dispositionally oriented research focuses on average tendencies, or the person’s typical or general level of talkativeness across situations.

When such averages are obtained for a sample of people across one set of situations,

they can be correlated with, among other things, the same person’s behavior averaged across a *different* set of situations, or with his or her scores on a measure of a relevant personality disposition. The first correlation is an *index of behavioral consistency*, reflecting the degree to which the behavioral differences among people are consistent across sets of situations. The second reflects *the association between the behavior and a specifically identified aspect of personality*—the degree to which the behavioral differences among people are related to differences in a given aspect of their personalities. Either way, the results reflect a dispositional influence on behavior. This is a standard method of research in personality psychology.

Dispositionally focused work has generated a venerable research tradition. The foundation of this tradition is an effort to identify the important personality dispositions—prototypically seen as personality traits—that are associated with the average behaviors of individuals, calculated across situations. Many candidates for “important” dispositions are available, ranging from the 100 items of the California Q-Sort (e.g., Block, 2008) to the 61 items of the Inventory of the Individual Differences in the Lexicon (Wood, Nye, & Saucier, 2010), to the 11 “primary trait” scales of the Multi-dimensional Personality Questionnaire (Tellegen & Waller, 2008), to the widely used Big Five (e.g., John, Chapter 2, this volume). Some of these candidates are highly specific; others are very general, and the range of available content is vast. Allport and Odbert (1936) identified 17,953 trait terms in the dictionary, and there may be almost that many instruments available in the literature for measuring personality dispositions.

After identifying relevant dispositions, researchers may go in at least two directions. One direction looks backward in time to seek origins of the dispositions. Personality psychologists have long been interested in both the environmental roots (e.g., early childhood experiences or later experiences of adversity, Rakhshani & Furr, 2020) and biological roots of personality. A particularly intriguing line of research is outlining the origins of personality dispositions in patterns of early experience as they interact with genetic predispositions

(e.g., Belsky & Pluess, 2013; Caspi, Hariri, Holmes, Uher, & Moffitt, 2010). A second direction looks forward in time to identify (and perhaps predict) life outcomes that eventually become associated with personality dispositions. Researchers have found that a number of important outcomes can be predicted from measures of personality gathered years earlier, including criminal behavior, mental health, occupational success, relationship satisfaction, and physical well-being (e.g., Ozer & Benet-Martínez, 2006; Soto, 2019).

Dispositionally oriented research has revealed many important facts, two of which are particularly relevant here. First, many personality dispositions can be distilled to a small set of fundamental traits. The Big Five framework identifies extraversion, neuroticism (or its converse, emotional stability), agreeableness, conscientiousness, and openness to experience (John, Chapter 2, this volume). The HEXACO framework (Honesty–Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, Openness to Experience) is similar, but adds Honesty–Humility as a sixth factor (Ashton & Lee, 2007). Any comprehensive theory of personality must account for such dispositional organization. A second fact is that broad personality characteristics, such as personality traits, matter. They predict behavioral trends and have consequential outcomes, again ranging from criminal behavior to success in occupations and relationships to—literally—the length of one’s life (Ozer & Benet-Martínez, 2006; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007; Soto, 2019). For many outcomes, broad personality dispositions matter as much as, or more than almost anything else, including socioeconomic status, money, or relationship quality. Any comprehensive theory of personality must find room for such dispositions.

The Situational Roots

The situational root of interactionism is the recognition that a person’s behavior is affected by attributes of the situation in which the behavior occurs. People are particularly likely to enact a given behavior in particular situations, and there is something *about those particular situations* that triggers or

elicits that behavior. For example, a situation that includes one’s friends likely elicits talkativeness and affection. A situation that includes loud music and adult beverages may elicit dancing.

Situationally oriented research often focuses on behavioral differences across situations. Prototypically, the situations are experimental settings, though some research examines behavior in naturally occurring situations. To examine a situational effect, researchers usually measure several individuals’ behavior in each of two or more situations and take the average (across people) of the behavior in each situation. For example, we might put people in a relaxed, unstructured situation in which they are free to do whatever they want, and a situation that is highly structured and includes a difficult job that must be completed, and measure how talkative people are, on average, in each situation. Although some people will be more talkative than others in each situation—they won’t all act exactly the same way—the situational approach bypasses these individual differences to focus on the average person’s behavior in each situation.

When such averages are obtained from a sample of people, they can be compared, usually with a statistic such as an independent groups *t*-test (if the two situations were experienced by different groups of people) or a dependent groups *t*-test (if the two situations were experienced by the same individuals). The difference in the averages from the two situations reflects a situational influence on behavior. For example, we might find that the average person in the relaxed, unstructured situation is more talkative than the average person in the highly structured, task-oriented situation, suggesting that “situational structure” tends to affect talkativeness. This is a standard method of research in social psychology.

Like dispositionally oriented work, situationally oriented work also has a venerable research tradition. The foundation of this tradition is an effort to discover how people tend to respond in important ways to various experimentally manipulated attributes of situations. This approach has served as the basis of research programs intended to test theories of social behavior and cognition, such as self-perception theory (Bem, 1972), cognitive dissonance theory (Cooper,

2012), the tend and befriend theory of the effect of stress on affiliative behavior (Taylor, 2012), and the “regulatory focus theory of goal pursuit (Higgins, 2012).

And like the dispositional approach, such work reveals many important facts, two of which have particular relevance for this chapter. First, situational qualities can have a significant impact on important behaviors, cognitions, and emotions (e.g., Ross & Nisbett, 1991). Second, and relatedly, the effects of some situational qualities may be surprising and/or beyond the awareness of those affected by them. That said, questions have recently arisen regarding the replicability of some (perhaps many) of the more surprising and counterintuitive apparent effects of situational qualities (e.g., Open Science Collaboration, 2015). Time—and further attempts at replication—will tell us which effects are indeed as well established as they once seemed. Nevertheless, it is undeniable that people’s behavior is responsive to situational attributes, and a comprehensive theory of behavior must include and account for this fact.

Persons versus Situations

Though it is indisputable that personality dispositions and situations both affect behavior, psychologists have dedicated enormous amounts of energy and emotion to a competitive view of persons and situations. When viewed as competing, dispositions and situations are implicitly conceptualized as forces pushing on behavior from different directions: *Dispositions*, which are properties of individual persons, push from the inside (the “meaty side” of the dermis, in Gilbert and Malone’s [1995, p. 21] memorable phrase), whereas *situations* push from the (“sunny”) outside. This view of dispositions and situations as competing forces has a strong, almost irresistible intuitive appeal, and, in this “person–situation debate,” many psychologists took one side or the other—generally personality psychologists emphasized the importance of dispositions, whereas social psychologists highlighted the power of situations.

Despite the hyperbole that has sometimes visited the person–situation debate, it seems likely that no, or perhaps only a few, researchers believed that personality

truly “doesn’t exist” or that situations truly “don’t matter.” However, researchers certainly fiercely debated which—dispositions or situations—are *more* important in driving behavior. There was particularly serious debate over whether the power of personality is sufficient to merit any scientific attention.

Research over the past several decades has produced a resolution—or at least an easing—of the person–situation debate, with several important outcomes. One outcome is a broader recognition of the power and importance of personality dispositions. Indeed, some (perhaps many) psychologists likely believe that no one currently questions the importance of personality dispositions. Unfortunately, although doubts about the relevance of personality have waned, they—and the competitive view of persons and situations—still echo within and beyond psychology.

Within psychology, one still hears arguments for the power of the situation over persons and questions about the existence of personality dispositions. Grabbing almost any “introduction to psychology” text from one’s bookshelf, one finds statements such as “The concept of personality demands at least some consistency in behavior across situations. But evidence suggests that cross-situational consistency in behavior may be low” (Narine, 2014, p. 400). Or, for example, one’s textbook might suggest that the certain studies reveal “the power of a bad situation to overwhelm the personalities and good upbringing of even the best and brightest among us” (Zimbardo, Johnson, & McCann, 2017, Section 11.10.1).

Beyond psychology, one can hear doubts about the power and existence of personality as well. For example, a recent movement in moral philosophy pointed to the empirical literature in psychology and concluded that broad moral character traits do not exist, or furthermore, that personality psychology itself is useless (e.g., Doris, 2002; Harman, 1999, 2009). For example, one influential philosopher claimed (to our great surprise!) that “Funder (2001) reports that personality psychology has collapsed as a serious academic subject” and that “to the extent that one is interested in the truth and accuracy of claims about character and personality, one needs to consult social psychology, not

personality psychology” (Harman, 2009, p. 237). Such conclusions generated serious attention in philosophy (Athanasoulis, 2000; Kamtekar, 2004; Miller, 2014) and elicited empirical responses in psychology (Helzer, Barranti, Meindl, Fleeson, & Furr, 2017; Helzer et al., 2014; Meindl, Jayawickreme, Furr, & Fleeson, 2015). Whether these responses have influenced the subsequent philosophical discussion is not yet clear.

What is clear, though, is that echoes of the person–situation debate have crucial implications. They influence personnel and curricular decisions within departments or universities, they shape student interest, and they even can affect financial support of various areas of science, thereby affecting researchers’ ability to reach new understandings about human functioning and to improve life. In summary, the competitive view of persons and situations still exists and still matters. To advance understanding of human behavior, researchers should continue demonstrating the power and nature of both personality dispositions and situations, while avoiding the implication that the two are competing forces.

Moving Beyond Persons “versus” Situations

There are indeed strong reasons to reject the competitive view of persons and situations. First, although the often-used analysis of variance (ANOVA) framework appears to imply that situational forces gain power over behavior at the cost of dispositional sources, and vice versa (e.g., Leising & Igl, 2007, but cf. Furr, in press), this “either–or” perspective is not the only—or even the best—way to frame the issue analytically. In fact, it is conceptually and empirically possible to have both robust dispositional effects *and* strong situational effects in the same data. A robust dispositional effect can be reflected in strong cross-situational consistency of behavior—in which the behavioral differences among people are similar from one situation to another. For example, imagine observing Adam and Betty in several situations, with Adam being more talkative than Betty in each. The fact that the behavioral difference between Adam and Betty is consistent across situations suggests that Adam and Betty differ in their level of a stable personality disposition (e.g., extraversion) that affects talk-

ativeness in each of those situations. At the same time, in the same situations, we might observe that both Adam and Betty are more talkative in situations that involve friends than in situations that involve strangers. To the degree that behavioral differences between situations (e.g., situations involving friends vs. situations involving strangers) are consistent across people, this is evidence of a robust situational effect. Theoretically, it is possible for both effects to occur simultaneously: The differences among people can be highly consistent across situations, while the differences among situations are strongly consistent across people.

In fact, Funder and Colvin (1991) revealed empirically that these effects are indeed independent of each other. They examined the cross-situational consistency of 62 behaviors across two situations, as well as the degree to which each behavior changed on average (across participants) between the same two situations. Across behaviors, the correlation between consistency and situational change was $r = -.01$. Only in extreme cases, therefore—when a situation is so strong that everyone acts the same, or a personality disposition (or disorder?) is so strong that someone behaves without regard to the situation he or she is in—do situations and dispositions gain power at the expense of the other. In more ordinary and common circumstances, there is plenty of behavioral variance to go around. More recently, Furr (in press) demonstrated that, perhaps contrary to common perceptions, ANOVA itself does not necessarily lead to (or require) a competitive view of persons and situations. Rather, ANOVA can reveal perfect consistency of both person effects and situation effects in a single dataset.

A second reason to reject the competitive view of persons and situations is that empirical estimates of effects have implications beyond the bounds of a research study only if the nature and range of the situational variables and of the dispositional variables are representative of each type. If only a limited range of situations is included—and what experiment is not forced to severely restrict the range of situations it includes, compared to those that exist in the world?—and if only a limited range of individuals is included—and what study manages to include a sample of people truly representative of the popula-

tion of the earth?—then the comparison of effects has little wider meaning.

Finally and most importantly, in order for either persons or situations to affect behavior, each needs the other (Johnson, 1997). Persons (and their dispositions) cannot exist outside of some sort of situation, and in a situation without people, no behavior will happen at all. This recognition leads writers such as Gilbert (1998), among others, to conclude that the traditional distinction between dispositional attributions (ascribing behavioral causality to aspects of the person) and situational attributions (ascribing it to the situation) is fundamentally incoherent.

This compelling perspective leads to some surprising conclusions. For example, the classic studies of obedience by Milgram (1974) are almost universally described as demonstrating that the power of the situation to affect behavior, relative to the influence of personal dispositions, is much greater than anyone would have expected (e.g., Ross & Nisbett, 1991). However, when the “person versus situation” distinction is put aside, Milgram’s results can reasonably be read either of two ways: (1) The situational force toward obedience (e.g., the experimenter saying “The experiment requires that you continue”) was (perhaps surprisingly) stronger than the situational forces toward disobedience (e.g., the victim’s protests), or (2) the dispositional forces toward obedience were (again, perhaps surprisingly) stronger than the dispositional forces toward empathy and disobedience.¹ On close examination, these interpretations are revealed to be equivalent. Notice, too, that neither of these equally valid (indeed, almost synonymous) interpretations pits dispositions against the situations.

Person–Situation Interactions

An important outcome of the person–situation debate and of a rejection of the competitive view of persons and situations is an increased—or perhaps renewed—appreciation of the fact that persons and situations “interact” rather than operate as competitive, separate, or even simply independent forces. A person’s behavior in a particular situation arises from a nonadditive combination of attributes of the person and

of the situation; that is, behavior arises not simply from both person attributes *and* situation attributes, but from processes through which persons and situations shape each other’s effects on behavior. Persons shape how situations impact behavior, and situations shape how a person’s attributes impact behavior.

Personality psychology has focused considerable attention on the ways in which such interconnected, interdependent processes unfold. There are at least five specific ways that research and theory have embraced the idea of person–situation interaction.

Contextualized Person Variables

Some researchers have embraced the idea of person–situation interaction by viewing “the person” in terms of contextually tuned dispositions rather than cross-situationally broad dispositions. Recall that the traditional dispositional approach tends to focus on dispositions, such as extraversion and conscientiousness, that are believed to affect behavior across a wide range of situations. In contrast, this approach to person–situation interaction focuses on dispositions that are believed to be much more strongly connected to specific, relatively narrow situational stimuli or cues. They tend to be defined in terms of the way that people think about, perceive, interpret, desire something in, or otherwise react to particular types of situations. Many contextualized dispositions are alternatively defined in terms of the way that people think or feel about themselves in ways that are highly responsive to specific situational cues.

For example, Carol Dweck and her colleagues (e.g., Dweck, Chiu, & Hong, 1995; Rattan, Savani, Chugh, & Dweck, 2015) suggest that a key facet of individuals’ personalities is their beliefs about their own (and others’) psychological attributes. People who see intelligence as set, stable, and not changeable are said to have an “fixed mindset” of intelligence. In contrast, people who see intelligence as potentially unstable and changeable have an “growth mindset” of intelligence. Research suggests that such differences have important implications. When individuals are in situations that they view as diagnostic or reflective of their intelligence (e.g., working on a class project), their

status as either a fixed or a growth theorist can affect their goals and behavior. Moreover, these effects can be shaped by individuals' beliefs about their actual levels of intelligence. Consider growth theorist students who believe that intelligence is changeable and not set. When required to do, say, a class project, they are theorized to have a “mastery goal” of increasing their intelligence. This goal produces behavior aimed at persisting and learning, regardless of whether the students view their level of intelligence as high or low. In contrast, consider fixed theorist students, who believe that intelligence is set. When working on a class project, they are theorized to have a “performance” goal of wanting to be judged in way that is positive, or at least not negative. The exact nature of this goal, and subsequent behavior, hinges on the students' views of their actual levels of intelligence. Among fixed theorists, those who believe that they have *low* intelligence will likely have the goal of avoiding negative judgments (i.e., avoid being seen as having the low intelligence they see themselves as having). This goal produces “helpless” behavior, such as failing to persist or avoiding challenges. Fixed theorists who believe they have a *high* level of intelligence will have the goal of receiving positive judgments (i.e., being seen as having the high intelligence they see themselves as having).

The concepts of fixed and growth mindsets illustrate contextualized personality variables in several ways. First, they are seen as stable attributes of a person. One's theory of intelligence (fixed or growth) is “a core assumption in [the person's] world view . . . that defines the individual's reality and imparts meaning to events (Dweck et al., 1995, p. 268). Presumably, such “core assumptions” are stable, and indeed, evidence suggests stability over at least a 2-week period (Dweck et al., 1995). Second, reflecting the idea of person–situation interactions, their function is highly connected to particular situations or situational features. Fixed or growth mindsets of intelligence are relevant only for situations seen as requiring or revealing intellectual competence. Third, fixed and growth mindsets are relatively “narrow” constructs, in that one's theory of intelligence might differ from one's theory of morality, which itself might differ from one's theory of personality. Indeed, Dweck et al. note that

“we are dealing not with a generalized cognitive style, but with domain-specific conceptual frameworks” (p. 269). Many contextualized personality variables are similarly “narrow” in one way or another

A well-known categorization of different types of contextualized personality variables is Mischel and Shoda's (1995) list of “cognitive affective units” (CAUs). Their list includes (1) encodings (having to do with how people interpret themselves, their experiences, or their environment), (2) expectancies and beliefs (e.g., fixed and growth mindsets of intelligence), (3) affect (emotional reactions in a situation), (4) goals and values (e.g., wanting to be seen in certain ways), and (5) competencies and self-regulatory plans (e.g., the ability to plan ways of achieving one's goals and stick to those plans). In general, contextualized personality variables, or social-cognitive variables, focus on cognition, affect, and motivation, again, as illustrated by fixed and growth mindsets. A host of variables reflect this approach, including rejection sensitivity (Romero-Canyas, Anderson, Reddy, & Downey, 2009), personal strivings (Emmons, 1986), perceived self-efficacy (Cervone, 1997), domain-specific social intelligence (Cantor & Khilstrom, 1989), and self-schemas (Markus & Wurf, 1987), to name but a few.

Such variables, in a sense, reconceptualize the “person” in ways that differ from traditional conceptualizations. Persons are seen as being more directly tuned in to situational stimuli than are traditional cross-situationally broad dispositions. Thus, this approach builds on the general idea of person–situation interactions by focusing on personality constructs that are, by definition and function, inherently connected to situations.

Focus on Within-Person Variability and Patterning of Behavior

A related avenue through which researchers have explored the idea of person–situation interaction is to focus on variations of behavior *within* rather than across persons (e.g., Cervone, 2005; Fleeson, 2004; Furr, 2009; Mischel & Shoda, 1995). The idea is that every person varies his or her behavior across the situations of life, and that each person's pattern of variation is both consistent and idiosyncratic.

Mischel and Shoda (1995) labeled this approach the *if-then* conceptualization of personality: An individual is described in terms of his or her behavioral reactions to particular situation. For example: *If* the person is at a party, *then* that person behaves boisterously; however, *if* the person is in a seminar, *then* that person behaves studiously. The collection of such patterns reflects an enduring and meaningful quality of his or her personality.

Interestingly, this illustrates a way in which personality psychology has rediscovered or has at least developed a renewed appreciation for earlier views. In 1937, Gordon Allport noted that every individual's pattern of behavior across contexts is unique and that, for this reason, all descriptions of individuals in terms of personality traits—which tend to assume a more-or-less common if-then pattern among the people they characterize—are at least a little bit misleading. For example, someone who is high on the trait of friendliness might initiate conversation when encountering a stranger. Although this might be true of friendly people, in general, a particular otherwise friendly person might hesitate to approach someone who reminds him of a previous, unpleasant encounter—a reaction that might be idiosyncratic to him and his personal history.

Going back even further, the classic pre-Skinnerian behaviorist John Watson (e.g., 1930) espoused a stimulus-response (S-R) conceptualization of personality, in which a person's behavioral repertoire was described in terms of how he or she responded to the various situations—stimuli—that he or she encountered. This pattern of response was held to be a function of his or her unique learning history; therefore, it was not presumed to have any general patterning or consistency across situations. Thus, Watson believed personality was manifested in an idiosyncratic pattern of S-R pairings. However, a fundamental problem with this kind of behavioristic approach stems from its primary virtue, which is that it is completely idiographic; that is, there are as many S-R or *if-then* patterns as there are people on earth, each of which was generated by a unique learning history. While this may well be true, it is analytically daunting.

Fortunately, personality psychology has gone beyond a focus on idiosyncratic if-then

patterns in at least three ways. First, it has demonstrated that a variety of stable and meaningful qualities of within-person behavioral variability can be identified, including qualities that reflect personality traits (e.g., Fleeson & Law, 2015; Moskowitz & Zuroff, 2004; Shoda, Mischel, & Wright, 1994). For example, Fleeson and Law (2015) examined participants who reported their actions and feelings in a wide variety of situations. By examining each participant's pattern of, say, extraverted actions/feelings across all of his or her reports, Fleeson and Law were able to examine various qualities of that pattern, including its typical level (i.e., whether the person enacted a generally high or low level of extraversion) and its variability (i.e., the degree to which the person's extraversion changes from one situation to another). Results revealed that participants' level of behavioral variability was stable across time and situations: People whose behavior changed dramatically across some situations tended to have dramatic changes across other situations. Similarly, results revealed that participants' typical levels of a given behavior were highly stable across time and situations: People who tend to act highly extraverted over some days also tend to act highly extraverted over other days. Importantly, these stabilities were not simply a function of being in the same situations repeatedly, they were properties of people.

Such results are important in several ways. First, they demonstrate, once again, that people have robust differences in their typical behavioral levels (closely akin to a trait disposition), as well as robust situational variability. This, again, rejects the competitive view of persons and situations, and calls for integrated theoretical models that account for both phenomena. Second, these results reveal potentially important new situationally oriented dispositions. For example, previous research has not frequently viewed "the degree to which a person tends to change his or her behavior from one situation to another" as a compelling facet of personality. However, this recent work suggests that such tendencies do exist: Some individuals have a greater tendency to vary their behavior than do other individuals, and such tendencies are stable. This reflects a way of thinking about person-situation interaction,

in that it highlights a stable personality disposition that is defined by cross-situational behavioral variability. Understanding the personality characteristics that explain such differences in peoples' variability (or skew or kurtosis, for that matter; Fleeson, 2001) is an important direction for future research.

A second and related way in which personality psychology has gone beyond a focus on idiosyncratic if–then patterns is by identifying consequences of behavioral variability. For example, Sadikaj et al. (2015, p. 722) examined the idea of behavioral “spin,” which is akin to behavioral variability and reflects “the range and extremity of a person’s interpersonal behavior around the person’s typical (i.e., mean) interpersonal behavior that unfolds across situations and over time.” They recently discovered that among people in a romantic relationships, if one person exhibits a high degree of spin, then his or her partner experiences low relationship satisfaction; that is, extreme behavioral variability seems to have negative consequences for relationships. Apparently, it is difficult to live with people whose behavior is erratic and unpredictable.

A third way in which personality psychology has gone beyond simply identifying idiosyncratic if–then patterns is by seeking their dispositional sources; that is, researchers are examining whether certain people are more or less likely to respond to certain classes of situations in particular ways. For example, imagine that you are at work, interacting with a coworker. Your coworker’s behavior can be seen as an aspect of *your* situation—a contextual stimulus to which you might respond in a variety of ways. How do you act when your coworker is warm and agreeable—do you also act warmly and agreeably? What if she is cold and quarrelsome—do you behave coldly as well? Perhaps not surprisingly, when faced with a quarrelsome coworker, the typical person acts quarrelsomely, and when in a situation with a warm coworker, the typical person acts warmly (Yao & Moskowitz, 2015). This shows the power of one’s “situation” (in this case, the degree of quarrelsomeness vs. warmth of another person) on the typical person’s behavior; one’s behavior is partially contingent on the situation. Also perhaps not surprisingly, people who are relatively

agreeable (one of the Big Five traits) tend to act warmer than people who are relatively disagreeable, in general, regardless of the situation. This finding shows the power of stable personality dispositions (in this case, agreeableness) on behavior across situations.

Even more interestingly, not everyone has this same pattern of responding to his or her coworkers’ quarrelsomeness, or at least not to the same degree. Rather, people who are relatively agreeable are less reactive to their coworkers’ behavior, as compared to people who are relatively disagreeable. Put another way, the stable personality disposition of agreeableness affects or moderates how people respond to a particular situational stimulus: People low on agreeableness respond more “in kind” to their coworkers’ behavior, being quarrelsome when their coworker is quarrelsome and warm when their coworker is warm. People high on agreeableness respond less “in kind,” with behavior that is not as strongly contingent on their coworker’s behavior. This moderating effect of agreeableness is very much in the spirit of person–situation interaction, and the suite of findings reported by Yao and Moskowitz (2015) is a nice illustration of the way that meaningful “pure” situational effects, meaningful “pure” dispositional effects, and meaningful person–situation interactions can all happen together.

This third way of going beyond idiosyncratic if–then patterns, as illustrated by Yao and Moskowitz (2015) and others (e.g., Fleeson, 2007), also illustrates a way of reconciling a trait approach and an if–then approach. Rather than facing an infinite number of idiosyncratic if–then patterns, we might identify groupings of patterns that resemble each other sufficiently well and classify people with those patterns as similar in some way. For example, the syndrome of rejection sensitivity (e.g., Romero-Canyas et al., 2009) characterizes a person who manifests the pattern of being kind and supportive in the early stages of a relationship but insecure and demanding in the latter stages. Perhaps other if–then patterns could be identified that are shared by substantial numbers of individuals, which would allow individual differences to be conceptualized in a way that takes account of within-person behavioral variance.

Again, these contemporary attempts to identify and understand groupings of if-then patterns resonate with earlier theorizing in the field. Gordon Allport followed his discussion of the way in which every person's pattern of behavior is unique with an admission that for psychological analysis, some kind of simplification was necessary, and that was all right because "some basic modes of adjustment . . . from individual to individual are *approximately* the same" (Allport, 1937, p. 298, emphasis in original). He said, in effect, that maybe one person's extraversion is different from another's in minor respects, but they are still similar enough that it is useful and maybe even necessary to treat them as if they were the same. Even though Allport is remembered by some as a proponent of idiographic assessment, the bottom line for him was that some patterns of behavior are common *enough* across individuals that they are worth thinking about and assessing, then aggregating to produce measures of dispositions.

Integrating Traits with Social-Cognitive Variables

A third and related way of embracing person-situation interaction is the theoretical integration of traditional personality trait concepts (i.e., stable, cross-situationally broad dispositions) with more highly contextualized psychological constructs. Personality psychologists are increasingly developing theories that merge these two sets of concepts.

For example, recent theoretical work argues that traits in general, and the Big Five in particular, are fundamentally motivational in nature. Read et al. (2010, p. 64) presented a motivation-based definition of traits, suggesting, for example, that "the trait *helpful* can be represented in terms of a goal of helping others, plans for achieving that goal, resources needed to achieve the goal, and beliefs related to the goal (e.g., whether one's actions would actually assist the other and whether the other desired assistance)." Such goals, beliefs, and so on are theorized as being activated in response to particular types of situational stimuli, underscoring the contextual nature of those constructs. Similarly, Denissen and Penke (2008, p. 1286) articulate each of the Big Five traits in terms

of "stable individual differences in people's reactions to circumscribed situational cues," with each trait reflecting sensitivity to a certain class of situational stimuli. For example, they view extraversion in terms of the incentive value of social interactions: Extraverted people are those who see social interaction as highly rewarding. Thus, people's behavior is outgoing and bold in certain types of situations (i.e., those in which social interaction is possible) they see as potentially rewarding. Some people see those same types of situations as less rewarding. This difference, according to Denissen and Penke, is at the heart of extraversion.

Some recent theoretical work is even broader in scope, integrating traits with a wide variety of contextualized constructs (e.g., DeYoung & Weisberg, 2019; Fleeson & Jayawickreme, 2015; Heller, Perunovic, & Reichman, 2009; Wood, Gardner, & Harms, 2015). Fleeson and Jayawickreme's (2015) whole trait theory views traits as having two parts—the underlying causal processes and the manifestations of those processes. They argue that the causal processes underlying traits are, in fact, contextualized processes such as cognition/interpretation (e.g., of situational stimuli) and goal activation/pursuit (again in response to situational stimuli). Furthermore, they argue that these causal processes produce patterns of behavior that constitute the Big Five traits; that is, the causal processes become overlapping in ways (e.g., by becoming responsive to similar sets of situational stimuli) that lead to behavioral patterns structured in ways that can be described in terms of the Big Five.

This type of theoretical work not only holds promise for developing our understanding of core concepts in the field (i.e., traits), but it also has the potential to integrate concepts that evolved from different traditions—broad, trait concepts reflecting a strong "person effect" perspective, and narrow, highly contextualized concepts emerging from a more "situationist" perspective. In this way, it may lead to and crystalize new advances in psychological theory.

Person Effects on Situations

A fourth way in which researchers and theorists have explored person-situation inter-

action is to seek to understand how people shape situations. Personality dispositions can indirectly affect behavior by shaping the situations in which people find themselves. Years ago, Buss (1979; see also Scarr & McCartney, 1983; Snyder & Ickes, 1985) noted two ways in which this occurs: situational *selection* and situational *evocation*. To this, we can add situation *perception* as a third mechanism by which different people experience different situations, or experience the same situation differently.

Situational selection is important, because it addresses the fact that individuals do not just passively find themselves in the situations of their lives; they often actively seek and choose them (Ickes, Snyder, & Garcia, 1997). In particular, individuals may seek situations that “fit” their personalities—situations that allow them to engage in the types of activities they enjoy, to have the types of experiences they value, to be in environments that they find comfortable, or to express themselves in ways that they value. Thus, while a certain kind of bar may tend to generate a situation that creates fights at closing time, only a certain kind of person chooses to go to that kind of bar in the first place. Even if everybody at the bar ends up in the fight, therefore, the psychological excuse that “the situation made me do it” is less than completely persuasive. Instead, attributes of the person and the situation he or she chose have worked in tandem.

Situational evocation refers to the ways in which an individual's actions or even mere presence in a situation can change the situation's dynamics. An aggressive person walking into a quiet discussion may change the situation dramatically for everyone there. What was originally a cordial conversation might become a hostile argument, with the aggressive person him- or herself being attacked and, in turn, attacking others. Reflecting on the situation, the aggressive person might suggest that his or her attacks was simply a reasonable response to being attacked—again, a version of “the situation made me do it.” However, the person created the conditions that ostensibly led to those attacks. Again, notice how the attributes of a person are not *competing* with the attributes of the situation for control of behavior; they work together to produce the final result.

Despite the importance of this conceptualization of person–situation interaction, both situational selection and evocation are understudied. In part this is because of the difficulty in empirically capturing dynamic processes, such as the ways in which situations change during interactions as a function of what people do during them (see, e.g., Gottman & Bakeman, 1986). An even more important consideration is the lack of general variables for describing the psychologically important elements of situations. Although the literature of experimental social psychology contains, latently, an enormous range of information about how situations affect behavior, it is not organized in such a way as to yield insights about which aspects of situations are important for determining which behaviors, or how they do it; that is, there is no clear agreed-upon categorization of “situational variables” that represent the most fundamental ways that situations differ from each other. Such variables are necessary before researchers can study how situations are chosen and the ways in which they may change over time (see the later section on situational assessment).

Nevertheless, important work in this area is evolving (e.g., Rauthmann, Sherman, Nave, & Funder, 2015; Sherman, Rauthmann, Brown, Serfass, & Jones, 2015). For example, Wrzus, Wagner, and Riediger (2016) discovered links between the Big Five personality traits and certain types of situations. Perhaps not surprisingly, extraverted participants reported being with friends, colleagues, and strangers more than did introverted participants. Similarly, neurotic participants reported being alone more than did emotionally stable participants. Although this work does not reveal intentional selection or evocation of situations, it certainly suggests that such processes might be occurring, and it points future researchers in the direction of specific person–situation links.

Going beyond the relatively concrete effects of selection and evocation, many psychologists have observed that the effect of a situation depends on the person who apprehends it. For example, Mischel (1977, p. 253) commented that “any given, objective stimulus condition may have a variety of effects, depending on how the individual construes and transforms it”; Bem and Allen

(1974, p. 518) wrote that “the classification of situations . . . will have to be in terms of the individual’s phenomenology, not the investigator’s”; and Allport (1937, p. 283) noted that “similarity is *personal*” (emphasis added). In shaping a particular person’s behavior in a particular situation, the person’s perception of the situation has a more direct effect on his or her behavior than does the “objective” situation itself.

Indeed, different people might perceive the same objective situation in dramatically different ways. For example, an extravert might perceive the presence of other people at a party as exciting, whereas a shy person might perceive the presence of the very same people, doing the very same things, as threatening.

Although we can view such effects through the contemporary lens of person–situation interactions (e.g., Atherton, Schofield, Sitka, Conger, & Robins, 2016), this is exactly the kind of mechanism that is the long-standing province of personality research, as shown, for example, in Gordon Allport’s famous observation that “for some the world is a hostile place where men are evil and dangerous; for others it is a stage for fun and frolic. It may appear as a place to do one’s duty grimly; or a pasture for cultivating friendship and love” (1961, p. 266). Allport was clear that the basis of these differences in perception was personality traits, which have “the capacity to render many stimuli functionally equivalent” (1961, p. 347). Thus, an analysis of how people perceive situations differently leads us right back to the traits that are the origins of these differences in perception and blends the analysis of situations with the analysis of dispositions. To fully understand the effects of a situation on a person’s behavior, we must understand that person’s perceptions and, more fundamentally, his or her personality.

One general cautionary point regarding the analysis of situational effects is that it often leaves researchers unable to differentiate what the situation “actually is” from what individuals perceive it to be (Rauthmann, Sherman, & Funder, 2015; Rauthmann & Sherman, 2019). The difference is between what the classic personality psychologist Henry Murray (1938) called *alpha*

press, the objective situation, and *beta press*, the subjective one. The difference is important. Indeed, an individual who manifests too large of a discrepancy may be fairly said to suffer from a delusion.

Fortunately, subjective and objective conceptualizations of situational effects may not be as much at odds as is sometimes presumed. In a pair of studies, we examined the similarity between pairs of situations using both subjective and objective methods (Furr & Funder, 2004). In the first study, participants rated the degree to which two experimental situations they had actually experienced seemed (subjectively) similar, tapping what Murray might have called *beta press*. In the second study, we assessed the relative pairwise similarity of six experimental situations in terms of two aspects of objective similarity (task and participants), tapping *alpha press*. Behavior, using the Riverside Behavioral Q-Sort (RBQ; Funder, Furr, & Colvin, 2000), was coded from videotapes in both studies. The first study revealed that participants who saw the two experimental situations as similar tended to be consistent in their behavior across them. The second study revealed that participants were more consistent in their behavior across situations that were more objectively similar. These results demonstrate the importance of both alpha and beta press—the objective and subjective aspects of a situation—by showing that behavior is more consistent across situations to the degree that those situations are similar in either sense.

The relations between persons, situations, construal and behavior was recently summarized in the Situation Construal Model (Funder, 2016; see Figure 31.1). The model is interactionist, in the terms used in the present chapter, by illustrating how situations and personality affect each other in an ongoing process. It also portrays how both individual personality and objective aspects of the situation combine to produce each individual’s construal of the situation, which in turn influences what he or she does. (Other pathways in the model show that some aspects of personality, such as temperament, and certain objective aspects of situations, such as rules, might affect behavior independently of individual construals.)

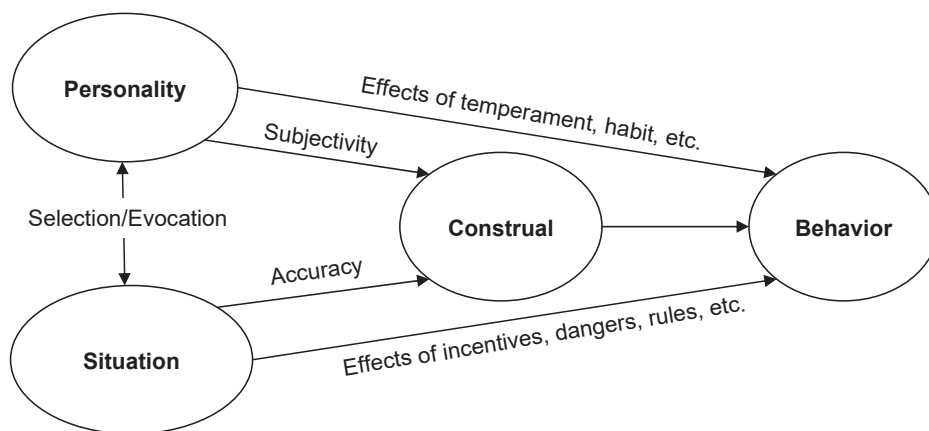


FIGURE 31.1. The situation construal model.

The Assessment of Situations

As we noted earlier, situationally oriented research has generated a venerable research tradition; however, the situational variables examined in past research have not been coherently organized across different areas of situational research. Although interesting and important effects of situational variables have been reported, the lack of organization creates difficulty when trying to systematically integrate situations with dispositional factors. To what precisely about situations should researchers and theorists attend? What are the fundamental components, dimensions, or qualities of situations that must be integrated into an interactionist theory of personality and behavior? In particular, to empirically assess a model such as the situation construal model, a methodology is needed to assess all three aspects of the “personality triad” (Funder, 2006): not just persons and behaviors, but situations as well.

Many creative researchers have attempted to develop situational taxonomies (e.g., Magnusson, 1971, 1981; Price & Blashfield, 1975; Van Heck, 1984), and important conceptual developments have been offered (e.g., Kelly et al., 2003; Rauthmann et al., 2014; Ten Berge & de Raad, 2002; Van Heck, Perugini, Caprara, & Froeger, 1994; Yang, Read, & Miller, 2006). Despite all of this work, however, an instrument for the

psychological assessment of situations was never provided.

Fortunately, psychologists have recently offered instruments designed to fill this void (e.g., Brown, Neel, & Sherman, 2015; Rauthmann & Sherman, 2016; Wagerman & Funder, 2009). The Riverside Situational Q-Sort (RSQ; Wagerman & Funder, 2009; Funder, 2016), one such instrument, is based on two theoretical principles. The first is that it seeks to describe situations at the middle or basic level likely to be easily communicated and useful for behavioral prediction and understanding. Its items are intended to be general enough to be psychologically meaningful and behaviorally relevant, but specific enough to be rated with adequate reliability.

The second principle is that the items seek to describe situational variables that are directly relevant to the expression of personality, in a manner that is as comprehensive as possible. To accomplish this, the RSQ draws from a previously developed instrument for personality assessment, which has been widely acclaimed for its broad range: the California Adult Q-Sort (CAQ; Bem & Funder, 1978; Block, 2008; McCrae, Costa, & Busch, 1986). RSQ items were written to describe characteristics of situations that afford the opportunity for expression of each personality characteristic in the CAQ. For example, the CAQ item “Is critical, skeptical, not easily impressed” yields the RSQ item “Someone is trying to impress some-

one or convince someone of something.” The assumption is that in a situation that is accurately described by this property, a skeptical and critical person has an excellent opportunity to act accordingly, whereas the opposite sort of person may reveal his or her gullibility.

The RSQ is proving useful for researchers, particularly those interested in understanding both the separate and interactive effects of persons and situations. For example, one study using the RSQ found that individuals experience similar situations over time, compared to situations experienced by other people (Sherman, Nave, & Funder, 2010). Moreover, behavior is more consistent across similar situations, but personality characteristics predict individual behavioral consistency even after researchers statistically control for situational similarity. Similarly, researchers using the RSQ have begun to explore the nature and implications of various kinds of situational construals. In an experimental study, participants used the RSQ to describe situations portrayed on video clips. Construing a situation “distinctively” (i.e., differently from most other observers), was associated with personality attributes including neuroticism and openness (Todd & Funder, 2012). A larger, experimental study, which placed participants in three video-recorded three-person interactions, found that that personality is associated with how positively people construe the situations they experience, and that this positivity is associated with beneficial social outcomes, such as being liked (Morse, Sauerberger, Todd, & Funder, 2015). Similarly, in a separate study, Morse, Sweeny, and Legg (2015) found that personality traits predicted how people construed their medical visits, and more positive construals were associated with better health outcomes. All these studies suggest that focusing on the good rather than the bad aspects of situations can be advantageous, although the limits to this advantage remain to be explored.

These findings reflect fundamental points regarding personality, situations, and behavior, but they had not been reported in the empirical literature before, because a method for assessing and comparing situations was previously unavailable. The RSQ and similar instruments offer psychologists

new tools for pursuing important directions in personality theory and research.

Conclusion: Beyond the Person–Situation Interaction

It is easy, perhaps too easy, to view situational and dispositional causes of behavior as locked in opposition to each other. Except in extreme cases, they are not. Dispositions and situations both have important, robust main effects. Going beyond these main effects, dispositions and situations have powerful *interactive* effects on behavior.

But precisely how do dispositions and situations interact to determine what people do? How do people shape their environment? How does personality determine one’s interpretation of situations? Which dispositions and which aspects of situations (specifically) affect which behaviors? The search for specific answers to these questions, and other interactional types of questions addressed in this chapter, lays out a formidable research agenda.

Importantly, this agenda goes beyond person–situation interactions to the three interactions derived from the *personality triad* of persons, situations, and behaviors, in which any element of the triad can be conceptualized in terms of the other two (Funder, 2006; also see Bandura, 1978). Behavior can be seen as a function of the person and the situation, as we have discussed in this chapter. In addition, a person can be seen in terms of the behaviors he or she performs in all the situations of his or her life (cf. Mischel & Shoda, 1995), and a situation, psychologically, can be conceptualized in terms of the behaviors that different people perform in it (cf. Bem & Funder, 1978). Another way to summarize these points is in the classic terms used by Lewin (1951): It is true, as he observed, that behavior is a function of the person and the situation, or $B = f(P, S)$. But it is also the case that $P = f(B, S)$ and $S = f(P, B)$. Pursuing the research implied by this conception moves the field of personality psychology far beyond the competitive tug between person and situation that has characterized so much of our history. Fortunately, many personality psychologists are now conducting creative and

important research that takes seriously the concept of person–situation interactions (e.g., for an extensive set of contributions by many of these researchers, see Rauthmann, in press). Such work may yield important new insights into what might be the most fundamental question in psychology: Why do people do what they do?

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NOTE

1. The traditional interpretation, of course, is that the situational forces toward obedience (e.g., the experimenter's orders) were stronger than dispositional forces toward disobedience (e.g., the participants' tendencies to be empathic to the victim). However, it would be precisely as valid—and equivalently misguided—to conclude that the dispositional forces toward obedience (e.g., the participants' conformist personalities) were generally stronger than situational forces toward disobedience (e.g., the victim's protests).

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CHAPTER 32

Culture and Personality

Current Directions

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I am *Homo sapiens*, I am American.
—PAUL ROZIN (2003, p. 281)

Personality is shaped by both genetic and environmental factors; among the most important of the latter are cultural influences (C. Kluckhohn & Murray, 1948). *Culture* comprises shared meaning systems that provide the standards for perceiving, believing, evaluating, communicating, and acting among those who share a language, a historic period, and a geographic location (Triandis, 1996). As the simple and yet compelling opening quotation illustrates, our overall sense of self is often, at its most basic level, rooted in our awareness of the cultural group(s) to which we belong. Certainly, attributes such as culture and nationality relate to events and qualities that are seen by many as essential to one's own and others' self-definition, such as birthplace, citizenship, collective history, and learned cultural norms and values.

Culture is transmitted through language, media messages, cultural practices and institutions, values and artifacts, and through the modeling of behavior (Triandis, 2007). Social scientists have recognized for decades that these influences have substantial psy-

chological effects on individuals. However, culture does not have a deterministic influence on individuals' behavior. Rather, its influence is interactive and probabilistic (e.g., Allport, 1961; A. Leung & Cohen, 2011; Mendoza-Denton & Mischel, 2007; Oishi, 2004). Rohner's (1984) metaphor comparing culture to a game (with various rules) and people to its players clearly illustrates this point. Players can pick from different strategies and options, and sometimes even violate or modify the rules if they think they can get away with it. In other words, the degree to which players follow the rules differs across individuals, depending on their personal preferences, moods, and understanding of specific situations. This variation results in a great deal of within-culture heterogeneity and individual differences in the degree to which people endorse, internalize, and utilize particular "rules," that is, norms and values (for a discussion of these important definitional issues, including the finding that values often differ more within-culture than across-cultures, see Chiu, 2014; Morris, 2014).

In this chapter, we review recent theory and research addressing cultural differences in levels and processes of various personality constructs (e.g., traits, self-concept, emotion, motivation). Given the growing concern with understanding globalization and multiculturalism processes, we also review new studies examining the links between personality and these culture-related processes (how personality dispositions influence and are influenced by cross-cultural transitions, multicultural identity, etc.). The recent political events in multiple Western countries against multiculturalism make this research particularly important. Note, however, that a discussion of the conceptual and methodological issues personality researchers need to consider when conducting cultural research is beyond the scope of this chapter (for reviews, see Benet-Martínez, 2007; Cohen, 2007). A secondary goal of this review is to persuade personality researchers that cultural research offers exciting and interesting benefits and opportunities. Cultural personality studies help elucidate how macrocontextual factors mediate and moderate personality outcomes (e.g., Bleidorn et al., 2016; Schimmack, Radhakrishnan, Oishi, Dzokoto, & Ahadi, 2002), help dispel shaky cultural stereotypes (e.g., Terracciano et al., 2005), and test the generalizability of well-known theories and findings (e.g., Bleidorn et al., 2015). Furthermore, the cultural perspective, in fact, may make us better at “seeing” personality. By understanding the cultural backdrop of a particular construct, behavior, or script, culturally informed personality researchers may correctly see individual differences and patterns of personality consistency and coherence where other researchers would see only extraneous or random variability (Friedman & Schustack, 2009).

A Brief Historical Analysis

Because of the serious methodological, theoretical, and ethical limitations of some of the studies on culture and personality conducted in the first half of the 20th century (e.g., “national character” studies), the study of culture in psychology was dormant for the better part of the 20th century (see

Benet-Martínez & Oishi, 2008, for review). Cultural studies in personality, however, resurged in the 1990s. Today, many personality psychologists agree that the systematic study of how culture influences personality, both intra- and interpersonally, should be an essential part of our discipline. Church (2001) notes some of the factors that led to this comeback: (1) refinement of the concept of personality and its ability to predict behavior across situations; (2) acceptance of the five-factor model (FFM) as an adequate taxonomy to organize personality differences; (3) emergence of individualism and collectivism (I-C) as dimension that may link ecology, culture, and personality; (4) the multicultural movement in the United States; (5) refinement of statistical methodology to address cross-cultural conceptual, linguistic, and measurement equivalence issues; and (6) internationalization of scientific activity, which makes cross-cultural collaboration easier. In addition, the Internet has made it much easier to conduct large-scale cross-national studies.

Currently, the study of culture and personality is prosperous and is being approached from a variety of theoretical perspectives. A Google Scholar search for academic work published since 2001 with titles that include either the words “culture” and “personality,” or “cultural” and “personality” yields 805 and 771 hits, respectively. Obviously, this is a very conservative count, since many studies dealing with cultural issues in personality use narrower terms (e.g., “ethnicity,” “self-esteem,” “goals”). In addition, according to PsycINFO, only four articles on “culture” appeared in *Journal of Research in Personality* during the 1980s, and only five articles during the 1990s. In contrast, 33 articles appeared during the 2000s, and 20 more between 2010 and 2016.

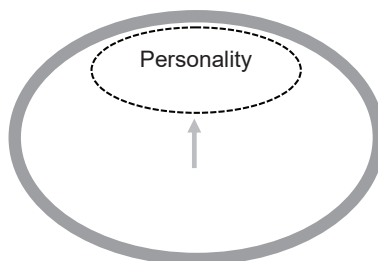
Current Theoretical Models

Broadly speaking, current research examining issues at the interface of culture and personality/social processes can be seen as falling within either the cultural or cross-cultural approach. These two approaches have relatively distinct conceptual, methodological, and historical elements (Green-

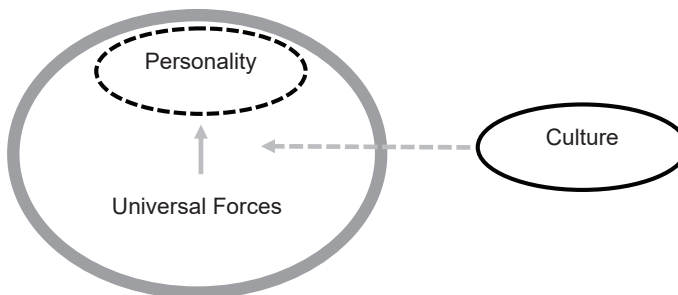
field, 2000), although at times the differences between these two camps have been overemphasized (for integrative reviews, see Church, 2010).¹

The *cultural psychology* view endorses relativist and constructivist notions of personality and tends to favor emic (i.e., indigenous) over imposed-etic (i.e., imported) approaches to theory and measurement. Specifically, it posits that personality—the affective, motivational, and cognitive dispositions that influence our evaluations and reactions to the environment—cannot be separated from the macro- and microsocial and cultural context in which it develops and is expressed (see Figure 32.1). As eloquently

stated by Markus and Kitayama (1998), “A cultural psychological perspective implies that *there is no personality without culture*; there is only a biological entity” (p. 67, emphasis added). Thus, culture provides the context in which personality (including its genetic and inherited component) develops, is observed, and acquires meaning (for both the individual and the observer) and, as a result, the existence of entirely universal personality traits has been questioned (see McCrae, 2004, for the universalist approach). Cultural psychology also speaks to the socially constructed nature of the concept of personality (e.g., how the notions of traits and personality consistency are par-



The Cultural Psychology (Emic) View of Personality. Cultural psychologists believe that culture shapes personality. The concept of personality is fundamentally shaped by culture (e.g., the meaning of “extraversion” might be different in some important way from a culture to another).



The Cross-Cultural Psychology (Etic) View of Personality. Cross-cultural psychologists believe that personality is something that is measureable everywhere, and comparisons are possible. Culture might modulate the expression of universal forces (e.g., genetics) in observable behaviors (e.g., the manifestations of “extraversion” might be different across cultures: talkativeness with a stranger vs. talkativeness with a familiar individual).

FIGURE 32.1. Cultural psychology versus cross-cultural psychology views on personality.

ticularly meaningful in the West), while acknowledging the seemingly universal desire to understand individual differences (Heine & Butchel, 2009). Church (2001) notes that the cultural approach is often characterized by (1) a concern with psychological processes (vs. individual differences); (2) a focus on highly contextual descriptions of psychological phenomena in one or more cultures, often with little expectation of finding cultural universals; and (3) an emphasis on experimental methodology, coupled with other methods, such as the use of survey data (e.g., Kim, Zeppenfeld, & Cohen, 2013), cultural products (e.g., Morling & Lamoreaux, 2008), and public records (e.g., Nisbett & Cohen, 1996). In contrast, the *cross-cultural approach* (e.g., Hendriks et al., 2003; Schmitt, Allik, McCrae, & Benet-Martínez, 2007) has traditionally been characterized by (1) a focus on individual differences (in values, beliefs, etc., but particularly personality traits); (2) comparisons of multiple cultures in the search for cultural universals, or culture-specifics along with universals; (3) use of traditional, standardized psychometric questionnaires to measure both personality and cultural values; and (4) concern with the cross-cultural equivalence of constructs and measures (see Figure 32.1).

Recently, the boundaries between cultural and cross-cultural approaches have become less significant due to a range of welcome developments. The study of personality has become more contextualized. Findings from emic and imposed-etic studies are becoming ever more integrated, and the processes by which culture influences behavior are better understood. In addition, new generations of cultural researchers are trained in multiple methods (psychometric, experimental, and interpretive), and new data-analytic techniques (e.g., use of big data, multilevel techniques, multigroup latent class analysis) are becoming ever more readily available. Currently, most personality researchers see personality variables (e.g., self- and other-ascribed traits, self-concept and identity, well-being, goals) as reflecting, at least in part, distal and proximal cultural processes, in that cultural norms and values influence the meaning, function, and expected levels of these psychological attributes (McAdams & Pals, 2006). Similarly, there is growing

interest in examining how personality predicts the way situations and contexts are construed across different cultures (e.g., Guillaume, et al., 2016)

An integrative view of the contributions made by the cultural and cross-cultural approaches leads to some basic conclusions. In understanding behavior, personality researchers ought to be mindful of the dynamic interplay between the macrocontext (i.e., culture), the microcontext (the situation), and the individual's dispositions and preferences (i.e., personality). In other words, "culture is important because it helps define psychological situations and create meaningful clusters of behavior according to a particular cultural logic. Individual differences are important because individuals vary in the extent to which they internalize or endorse (or reject) a cultural syndrome. Individuals are always in a cultural context, though they are not always of it" (A. Leung & Cohen, 2011, pp. 521–522).

New Approaches

Beyond the traditional cultural and cross-cultural approaches, there have been important theoretical developments in culture and personality research. First, the *dynamic constructivist approach* (Hong, Morris, Chiu, & Benet-Martínez, 2000) was developed to address some of the limitations in the initial wave of cross-cultural social–personality research, namely, its implicit or explicit view of culture as a stable, unitary, and all-encompassing influence. The dynamic constructivist approach, which is rooted in social constructivism (Gergen, 1985) and social psychological research on the dynamics of knowledge activation (Higgins, 1996), does not view culture as a highly general structure (e.g., an overall mentality, worldview, or value orientation). Rather, culture is internalized in the form of a loose network of domain-specific knowledge structures, including implicit theories about the social world (Chiu, Hong, & Dweck, 1997). Examples of these are viewing human traits as relatively fixed attributes versus malleable, or seeing individual behavior as largely reflecting choice and internal traits versus responses to contextual pressures.

Other premises in the dynamic constructivist approach are that (1) individuals can acquire more than one such cultural meaning system (i.e., be multicultural), even if these systems contain conflicting elements (Benet-Martínez & Haritatos, 2005); (2) individuals can switch (consciously or unconsciously) between their different cultural meaning systems in response to cues in the social environment, a process known as cultural frame switching (CFS); (3) an individual's acquired meaning system(s) do not influence his or her behavior continuously or uniformly. With regard to the last tenet, for culture to influence behavior, three conditions must be met: The relevant cultural schemas have to be cognitively *available* to the individual (relevant cultural values, norms, attitudes, etc., have been internalized through enculturation and/or acculturation processes), cognitively *accessible* (these schemas have been recently activated by explicit or implicit cues embedded in the micro- and macrosituation), and *applicable* to the situation (the schemas are relevant to the situational demands perceived by the individual (Hong et al., 2000; Hong, Benet-Martínez, Chiu, & Morris, 2003).²

The dynamic constructivist approach has been applied to the study of cultural influences on a wide range of personality-relevant constructs, such as traits (e.g., Mok & Morris, 2009; Ramirez-Esparza et al., 2006), self-construals (e.g., Brannon, Markus, & Taylor, 2015), motives (e.g., Briley, Morris, & Simonson, 2005), identity (e.g., Wiley & Deaux, 2010), personal memories (e.g., Bender & Ng, 2009), and emotion (e.g., Perunovic, Heller, & Rafaeli, 2007), among many others (for a review, see Benet-Martínez, 2019). We return to this approach in a later section of this chapter, when we discuss findings from personality research conducted with multicultural individuals.

A recent extension of the dynamic constructivist approach is the polyculturalist framework (Morris, Chiu, & Liu, 2015). In many ways, the polyculturalist approach clarifies and articulates a paradigm shift that had been “fermenting” for a while with regard to how culture and cultural membership are defined; that is, the polyculturalist framework brings attention to the fact that in today's global and mobile society, individ-

uals take influences from multiple cultures (through media, travel, and other forms of transnational exposure). Furthermore, rather than being categorical and singular, individuals' relationships to cultures are partial and plural instead (see Morris et al., 2015, Figure 2). Last, cultural traditions are not unique and independent entities but rather are interacting systems with overlapping features.

Another theoretical addition is the *evolutionary perspective*, which has been taken to provide explanations for cultural universals and variations in personality. For instance, Shi et al. (2015) showed that two types of pride (authentic and hubristic) appear to be universal across cultures with divergent views of pride (e.g., Americans, Koreans, Mainland Chinese). Tracy, Shariff, Zhao, and Henrich (2013) argued that cultural variations in correlates of pride might arise from local variations in how to achieve a high status. Likewise, Schaller and Murray (2008) maintain that there is a universal reaction to a threat (e.g., fear, avoidance), but there are cultural variations because the degree of environmental threats vary across cultures. Specifically, they found that historical pathogen prevalence was associated with introversion and lower levels of openness, presumably because contact with an outgroup would be potentially dangerous in an ecology with lots of pathogens. Similarly, because infectious diseases are transmitted invisibly and mysteriously, people living in such an environment prefer a centralized, controlled (i.e., authoritarian) government and are more likely to possess authoritarian personalities than those living in a low-pathogen environment (Murray, Schaller, & Suedfeld, 2013). Likewise, people living in a pathogen-prevalent environment are more religious, presumably because a ritualized behavior is one way to battle infectious diseases (Fincher & Thornhill, 2012).

In addition, several researchers have used the *life-history theory* (Belsky, Steinberg, & Draper, 1991) to explain cultural variations in attachment styles and mating-related behaviors. According to the life-history theory, people in predictable environments (e.g., in which both parents are present, economically stable) are more likely to invest in long-term relationships than those with less pre-

dictable environments. Schmitt et al. (2009) indeed found that cultural differences in emotional investment (e.g., “loving” “affectionate”) and attachment styles were systematically associated with the United Nations’ Human Development Index. Consistent with the evolutionary hypothesis, dismissive attachment style was associated with sexual permissiveness among men but not among women; however, this gender difference was not present in many nations in Africa and East Asia (Schmitt & Jonason, 2015).

Related to evolutionary theories, *socio-ecological* explanations for cultural differences in personality has been offered. For instance, Schug, Yuki, and Maddux (2010) found that Americans are more likely to self-disclose than are Japanese, and that this cultural difference can be explained by relational mobility (how easily one can form new relationships and exit from old relationships; see Oishi, Schug, Yuki, & Axt, 2015, for review). Fischer and Van de Vliert (2011) explored climatic challenge as a key to understanding cultural differences in subjective well-being (see also Gelfand et al., 2011, for cultural differences in perceived norms). They found that among poor nations, climatic harshness is inversely associated with subjective well-being (the harsher the climate, the lower the subjective well-being). In contrast, climatic harshness is not associated with subjective well-being among wealthy nations, because climatic harshness can be alleviated by various modern technologies. Combining the life-history theory with the ecological theory, Sng, Neuberg, Varnum, and Kenrick (2017) found that residents of highly densely populated nations show a slow life (later marriage, having a child later in life) than residents of sparsely populated nations.

The person–culture fit theory has also gained some popularity. For instance, promotion-oriented individuals are happier in nations in which the dominant mode is promotion than in nations in which the dominant mode is prevention (Fulmer et al., 2010). Likewise, although extraverts were higher in self-esteem in 106 nations, the association was stronger in extraverted nations than in introverted nations (Gebauer et al., 2015). Finally, individuals high in openness to experience are happier if they live in cen-

tral areas (more ethnically diverse, densely populated areas) of London, whereas agreeable individuals are happier if they lived in peripheral areas of London (Jokela et al., 2015; see also Bleidorn et al., 2016, for person–city fit effect in the United States).

Notable Developments

We summarize below the new developments in culture and personality research, mostly circa 2008 (please see Benet-Martínez & Oishi, 2008, for an earlier review).

Methods

There have been numerous and exciting methodological developments. First, the increasing availability of large, often internet-based, data from a wide range of countries has clearly facilitated a surge in cross-cultural personality studies. Many new studies on culture and personality have used large international data, using Internet (Gebauer et al., 2015), Gallup Global Polls (Diener, Tay, & Oishi, 2013), the European Social Survey (Saris, Knoppen, & Schwartz, 2013), and World Values Surveys (Gere & Schimmack, 2017). This is a welcome development, as statistical power is a key to replicability (Schimmack, 2012).

Second, several researchers have utilized non-self-reports such as informant reports (Kim, Schimmack, & Oishi, 2012) and naturalistic facial expressions (Matsumoto, Keltner, Shiota, O’Sullivan, & Frank, 2008; Tracy & Matsumoto, 2008). Some researchers used semistructured interviews (Galinha, Garcia-Martin, Gones, & Oishi, 2016; Valchev, Van de Vijver, Nel, Rothmann, & Meiring, 2013) and free association (Oishi, Seo, Koo, & Miao, 2011; Uchida & Kitayama, 2009). This methodological diversity is critical to deepening our understanding of issues at the interface of culture and personality.

Third, the use of sophisticated statistics has also increased. For instance, Lenton, Slabu, Bruder, and Sedikides (2014) utilized latent class analysis to study experiences of authenticity across cultures and found that East Asians and South Asians reported fewer experiences of extraordinary authenticity compared to Westerners. Davidov, Dülmer,

Schlüter, Schmidt, and Meuleman (2012) demonstrate how multilevel structural equation modeling (SEM) can be used to test and explain measurement invariance across cultural groups. Church et al. (2011) used multigroup confirmatory factor analysis to detect differential item function (DIF) in the NEO Personality Inventory (NEO-PI). They found a high rate of DIF among Americans, Mexicans, and Filipino (56.3–71.2% by $\Delta\chi^2$ and 44.6–48.8% by ΔCFI [comparative fit index]). Furthermore, when they removed the DIF items and recomputed the facet means, they observed substantial changes in mean differences (see Oishi, 2006, for another DIF analysis). Church et al. (2011, p. 1079) state that “for seven of these eight facets, the cultural differences that were statistically significant for the original scales were no longer significant for the purified scales.” Thus, equivalence of questionnaire items continues to be a major concern for culture and personality researchers.

Fourth, novel approaches have been taken to address response style issues. For example, Möttus et al. (2012) utilized anchoring vignette ratings to control for response styles; participants from 20 countries rated exactly the same 30 hypothetical persons’ behaviors related to conscientiousness, and the researchers used extreme and neutral ratings to correct for self-reported conscientiousness. Raw self-reported conscientiousness was the lowest among Japanese, followed by South Koreans among the 20 nations. Once they corrected for the response styles, both Japanese and Korean self-reported conscientiousness scores moved up. Similarly, Hong Kong and Germany’s conscientiousness rankings moved up substantially, whereas rankings for Burkina Faso, Philippines, and Malaysia moved down after the corrections.

Finally, to circumvent social desirability and various other issues that characterize self-reports, some researchers have used archives that are created by ordinary citizens in naturalistic everyday settings. For instance, in studying cultural differences in approach-avoidance motivation, Hamamura, Meijer, Heine, Kamaya, and Hori (2009) analyzed comments made on the website’s (Amazon) book reviews by ordinary consumers, and helpfulness ratings of the comment. Results showed that approach-focused content was more prevalent in American reviews com-

pared to Japanese reviews, and that the opposite pattern exists for avoidance-focused content. Likewise, Koopmann-Holm and Tsai (2014) studied cultural differences in affect valuation by analyzing Hallmark greeting cards in the United States and Germany, and found that American sympathy cards contain less negative and more positive content than German sympathy cards. Last, some researchers have utilized official speeches made by politicians to gauge historical changes. For example, Oishi, Graham, Kesebir, and Galinha (2013) content-analyzed the State of the Union addresses from 1790 (George Washington) to 2010 (Barack Obama) to understand historical changes in the meaning of happiness.

Traits

When certain personality questionnaires are translated into other languages, considerable cross-cultural similarities in the structure of personality have been demonstrated (e.g., McCrae et al., 2005). However, when natural (i.e., indigenous) language descriptors are used, researchers often find many culture-specific dimensions. De Raad et al. (2010) used factor analysis to derive the structural equivalence of 14 trait taxonomies from 12 languages. They found that three factors (extraversion, conscientiousness, agreeableness) comprise a cross-culturally replicable structure of personality. Saucier et al. (2014) analyzed person descriptors in nine languages and found that two dimensions are universal: social self-regulation (e.g., honest, kind, generous) and dynamism (e.g., active, brave, bold). Using the semistructured interview method, Valchev et al. (2013) also examined natural language personality descriptions of South African Blacks, Whites, and Indians, and found that the two dimensions (agency–communion) similar to Saucier et al. (2014) emerged. Furthermore, they found that South African Blacks used contextual descriptions far more frequently than Whites.

Recently, researchers have also explored cultural variations in lay philosophies about traits. Church and colleagues (2012), for instance, found that Americans and Mexicans are more likely to believe that a person behaves consistently across situations than did Filipinos and Japanese. Likewise, Mexicans

believed in dispositions (“How people behave is mostly determined by their personality”) more strongly than Americans and Filipinos, who in turn believed in dispositions more strongly than did Japanese. Similarly, Owe et al. (2013) developed the contextualism scale that captures a very similar aspect of person perception (“To understand a person well, it is essential to know about his or her family”) and showed that people living in collectivist nations endorse contextualism more than do those in individualist nations. Furthermore, contextualism was associated with ingroup favoritism and differentiated trust (relative trust of ingroup over outgroup members).

Self

Since Markus and Kitayama’s (1991) seminal work on independent and interdependent self-construals, various modifications have been suggested. Most recently, Vignoles et al. (2016) extended the two-dimension model to seven dimensions of the self: difference versus similarity, self-containment versus connection to others, self-direction versus receptiveness to influence, self-reliance versus dependence on others, consistency versus variability, self-expression versus harmony, and self-interest versus commitment to others. This study, which examined these dimensions in 55 cultural groups in 33 nations, yielded patterns of global variation that support some of Markus and Kitayama’s (1991) predictions, yet the emerging picture is more complex. Cultures differ in the ways they emphasize being both independent and interdependent, and these differences are related to individualism–collectivism, socioeconomic development, and religion.

Likewise, since Suh’s (2002) seminal work on culture and consistency of the self, there have been several new developments. First, Church et al. (2008) replicated the original findings among Japanese but not among other collectivist nations such as Malaysia, Mexico, and the Philippines. Second, more recent research showed that consistency is more directly associated with subjective authenticity and relationship quality among European Americans than among East Asians (English & Chen, 2011), suggesting that Suh’s original finding (consistency is more directly associated with subjective

well-being among European Americans than among East Asians) could be explained in part by authenticity and relationship quality.

Recent cross-cultural research exploring the conceptual basis of self-concepts found that the distinctiveness motive is also present among collectivist nations (i.e., distinctive self-descriptors were rated more central to the self-definition than less distinctive self-descriptions), but that distinctiveness was more closely associated with difference and separation among respondents from individualistic nations than those from collectivist nations (Becker et al., 2012). Similarly, a recent cross-cultural study showed that although self-esteem is predicted from control, duty, altruism, and status, cultural norms with regard to each aspect moderated this relation, such that in nations high in self-transcendence (universalism, benevolence), people’s self-esteem was more strongly associated with benefiting others than in nations low in self-transcendence (Becker et al., 2014).

Emotion

Like research on traits, culture and emotion research also has expanded the scope of investigation beyond the traditional East versus West. Particularly noteworthy is a greater concern for linguistic aspects of emotion (cf. lexical approach in traits). For instance, Dzokoto and Okazaki (2006) explored Fante’s (Ghana) emotion terms and found that most emotion words are literally referring to body (e.g., envy = Ahowoyaw, which means skin-pain; anger = Ebufo, which means chest-grow; anxiety = Ayemhyehye, which means stomach-burn). Not surprisingly, then, Ghanaians are more likely to somatize emotional experiences than are European Americans (Dzokoto, 2010), yet Ghanaians were less accurate about physiological changes than European Americans (Chentsova-Dutton & Dzokoto, 2014). To this end, it is interesting that East Asians, who are thought to somatize more than European Americans (Tsai, Simeonova, & Watanabe, 2004), also showed less accuracy in identifying physiological cues (Ma-Kellams, Blascovich, & McCall, 2012).

Along with somatization of emotion, it has been long recognized that there is a large degree of cultural variation in emotion

recognition (e.g., embarrassment; Chung & Robins, 2015) and emotional expressiveness (Matsumoto, Yoo, & Fontaine, 2008). Rychlowska et al. (2015) found that these variations could be due to differences in historical migration patterns. In the nations in which current populations descend from diverse ethnic groups (e.g., United States, Australia), residents were found to be more expressive than those in the nations whose current populations descend from homogeneous groups (e.g., South Korea, Japan). Intriguingly, historical heterogeneity predicted expressiveness above and beyond individualism–collectivism, residential mobility, and latitude. The basic idea is that in a heterogeneous population, people need to express their emotions and intentions very explicitly to avoid misunderstandings, whereas in a homogeneous population, people need not do so. Studies like this one help advance our understanding of the “why” of cultural variations.

It is important to note that many studies on emotion show cross-cultural similarities at the basic structural level and differences in terms of correlates. For instance, Shi et al. (2015) found that the structure of pride is authentic and hubristic among North Americans, Chinese, and Koreans. Likewise, Tracy and colleagues (2013) found that expression of pride and happiness was associated with high status both among North Americans and Fijians, but Fijians viewed happiness expression as a stronger indicator of high status than did Americans.

Like pride and happiness, anger is a universal emotion. Yet a relatively recent study has shown clearly that anger expression is differentially associated with physical health across cultures (Kitayama et al., 2015). Whereas anger expression was associated with inflammation and higher cardiovascular risk in the United States, it was associated with lower levels of inflammations and cardiovascular risk in Japan (Kitayama et al., 2015; also see Curhan et al., 2014, for similar results about negative affect in general), even after researchers controlled for age, gender, health status, health behaviors, social status, and the experience of negative emotions. This pattern of results indicates that the expression of anger in the two cultural contexts might serve as a reliable index

of different experiences. Whereas in the United States anger expression may index how much an individual is vulnerable and exposed to negative life events (e.g., life difficulties, annoyances, and frustrations), in Japan, it may index how empowered and entitled an individual is.

More recent research also has revealed some cultural variations in emotion within the West, with results that highlight the unique emphasis American culture places on positivity, the self, and agency. For instance, when expressing sympathy, Americans focus more on the positive and less on the negative compared to Germans (Koopmann-Holm & Tsai, 2014). The dictionary definition of happiness focuses on the satisfaction of one’s desires and goals in the United States, whereas it focuses on good luck and fortune in Germany, France, and Norway (as well as Senegal, South Africa, Turkey, Romania; Oishi et al., 2013). Interestingly, Oishi et al.’s analyses of the State of the Union addresses (1790–2010) and books published since 1800 showed that even in the United States, the main definition of happiness centered around good luck and fortune until the 1920s. The “good luck and fortune” definition of happiness suggests that the active pursuit of happiness is not realistic, whereas the “satisfaction of one’s desires and goals” definition of happiness suggests that active pursuit of happiness is possible.

Ironically, however, active pursuit of happiness was negatively associated with subjective well-being among Americans, whereas it was unrelated to subjective well-being among Germans, and positively correlated with subjective well-being among Russians, Japanese and Taiwanese (Ford et al., 2015). These results hint to some possible cultural differences in the motivational basis of happiness goals. Given American culture’s emphasis on happiness and positivity, it might be that Americans who are not happy about the current life conditions actively seek happiness to fulfill this cultural mandate. Relatedly, a recent cross-cultural study also showed that people in Malaysia, Singapore, Pakistan, Japan, and Taiwan thought that happiness is far more fragile (e.g., “Something might happen at any time and we could easily lose our happiness”) than people in Brazil, Russia, South Korea, Hong Kong,

Iran, the Netherlands, and the United States (Joshanloo et al., 2015).

Motivation

In the 1990s and the early 2000s, cultural psychologists showed that the locus of motivation differs across cultures. For instance, Iyengar and Lepper (1999) showed that Asian American children worked harder than European American children when they were led to believe that the task was chosen by their mother, whereas European American children worked harder than did Asian Americans when they chose the task by themselves. Recent studies have discovered some mechanisms underlying these cultural variations. For instance, feelings of closeness with parents and beliefs about who has better long-term foresight explained why Asian American children work harder when the choice is made by their mothers than European Americans (Rudy et al., 2015).

Extending earlier research on cultural differences on basic motivation orientations (e.g., Elliot, Chirkov, Kim, & Sheldon, 2001; Heine et al., 2001), recent studies indicate that North Americans try to maximize positive emotions and minimize negative emotions (Sims et al., 2015). Likewise, Hamamura et al. (2009) found that North Americans are more attentive to approach-oriented information, whereas East Asians are more attentive to prevention-oriented information. For instance, Japanese found avoidance-focused book reviews more helpful, whereas Americans found approach-focused book reviews more helpful (Hamamura et al., 2009).

These cultural differences could then translate into cultural differences in interpersonal motivation. For instance, Americans are in general more motivated to expand their social network than others. This approach orientation in friendship formation was found to be due in part to residential mobility (Oishi et al., 2013) and relational mobility (how easy it is to exit an undesirable relationship and form a new relationship; Li, Adams, Kurtiş, & Hamamura, 2015); that is, in a society where people move around and form new relationships freely, people seem to have an approach orientation toward interpersonal relationships,

including self-disclosure (Schug, Yuki, & Maddux, 2010) and new friendships (Oishi et al., 2013), whereas in a society where people do not move around or easily form new relationships or exit old, undesirable ones, people seem to have an avoidance approach toward interpersonal relationships (i.e., caution about intimacy and forming new friendships).

Studies have also explored motivational underpinnings of cultural variations in emotional experiences. For instance, Tsai, Knutson, and Fung (2006) have shown that East Asians tend to desire the experience of low-activation positive emotions (e.g., calm), whereas European Americans tend to desire high-activation positive emotions (e.g., excitement). These cultural differences could be due to differences in religious traditions (Tsai, Miao, & Seppala, 2007) and socialization (Tsai, Louie, Chen, & Uchida, 2007). In addition, Tamir et al. (2016) have shown that cultural differences in values determine the type of ideal affect people pursue, which in turn affects the typical emotional experiences. Specifically, they found an association between supporting self-transcendence values (e.g., benevolence) and wanting to feel more empathy and compassion, valuing self-enhancement (e.g., power) and desiring to feel more anger and pride, valuing openness to change (e.g., self-direction) and wanting to feel interest and excitement, and valuing conservation (e.g., tradition) and wanting to feel more calmness and less fear.

Personality and Multicultural Experiences

The need for culture and personality studies to respond to the theoretical and methodological questions posed by the growing phenomenon of globalization and multiculturalism cannot be overestimated. The demographic changes brought by rapid globalization, speed of travel and communication, and continued massive migration have resulted in social spaces (schools, homes, work settings, media) that are culturally diverse, and in growing numbers of individuals who identify with and live in more than one culture (for comprehensive reviews, see Benet-Martínez & Hong, 2014). To understand how individuals manage and respond to being socialized in multiple cultures, a surge

of studies in the last decade has developed theoretical models and methodologies that capture the multiplicity and malleability of cultural meaning *within* individuals (see earlier discussion about the dynamic constructivist and polyculturalist approaches).

Some studies have shown important individual differences in these processes. Specifically, a broad spectrum of personality dispositions has been linked to different acculturation strategies (Kosic, Kruglanski, Pierro, & Mannetti, 2004; Luijters, Van Der Zee, & Otten, 2006), attitudes (e.g., integrative vs exclusionary) towards cultural change (Chen et al., 2016; Stupar, Van de Vijver, Te Lindert, & Fontaine, 2014), intercultural competencies (Van der Zee & Van Oudenhoven, 2014), types of multicultural identity (Benet-Martínez & Haritatos, 2005), and even bilingualism (Chen, Benet-Martínez, & Ng, 2014; Ramirez-Esparza et al., 2006). Openness to experience, for instance, predicts how much a multicultural individual sees him- or herself as a combination or blending of cultures, while neuroticism predicts how much the same individual sees elements of tension between his or her cultures (Benet-Martínez & Haritatos, 2005).

These personality traits also seem to make individuals more or less prone to experiencing certain kinds of acculturation stressors (see Benet-Martínez & Haritatos, 2005, Figure 1). There is also strong evidence showing that the integration/biculturalism strategy (which is, among other things, predicted by openness to experience), as compared to the other three acculturation modes (separation, assimilation, marginalization), is the most ideal, leading to greater levels of psychological and psychosocial well-being (Nguyen & Benet-Martínez, 2007; Schwartz et al., 2015). All in all, given the importance that aforementioned behavioral, identity, and attitudinal outcomes have in contexts of diversity, where these outcomes themselves predict levels of psychological and behavioral adjustment, there is a need for diversity researchers and practitioners to be more mindful of the role played by personality (for a review see Van der Zee & Van Oudenhoven, 2014).

Multicultural experiences also influence personality. In a longitudinal study that included youth studying abroad and a

matched control sample, Zimmermann and Neyer (2013) found that studying abroad led to increases in openness and agreeableness and decreases in neuroticism (even after they controlled for self-selection mechanisms); these personality changes were largely driven by the formation of new social support systems. A study of Japanese immigrants in the United States found that they became more “American” and less “Japanese” in their personality as they reported higher participation in the U.S. culture, thus suggesting that involvement with a new culture instigates changes in personality that result in a better fit with the norms of the culture of destination (Güngör, et al., 2012).

Experimental and longitudinal evidence also indicates that individuals with more extensive multicultural experiences, including those who self-identify as multicultural, show enhanced levels of integrative complexity and creativity, and these gains are particularly pronounced in individuals dispositionally high on openness (A. Leung, Maddux, Galinsky, & Chiu, 2008; Maddux & Galinsky, 2009; Saad, Damian, Benet-Martínez, Moons, & Robins, 2013; Tadmor, Galinsky, & Maddux, 2012). Because multicultural experiences involve learning new, and moving between, different cultural systems, richer associations with a single concept (e.g., food, politeness) might develop. Individuals who have these experiences might also develop greater tolerance for ambiguity, because they are comfortable with situations in which one basic idea may have different nuances depending on the community they inhabit at the time (Benet-Martínez, Lee, & Leu, 2006).

If the experience of managing different systems of thought (e.g., different sets of cultural norms, beliefs, contextual cues) leads to more creative and complex thinking, it is not surprising to find that some of these benefits also extend to individuals who speak multiple languages (Dewaele & Wei, 2013), those who are multiracial (Gaither, Remedios, Sanchez, & Sommers, 2015), individuals who had to adapt to new and even adverse circumstances (Damian & Simonton, 2015), and those possessing multiple social identities (Steffens, Gocłowska, Cruwys, & Galinsky, 2016). Steffens et al.’s experiment shows that the creativity gains are driven by

cognitive flexibility, and not by other psychological attributes such as self-affirmation needs, novelty seeking, and generalized persistence. Apparently, the high experiential diversity afforded by speaking multiple languages and/or belonging to multiple social/cultural/racial groups brings gains in cognitive flexibility, a skill that in turn leads to gains in creativity and tolerance to ambiguity. These attributes are an indispensable skill in our global world.

New Developments and Future Directions

Our personalities shape the cultural contexts in which we live (personality → culture effects) by influencing both microcultural spaces (e.g., personal spaces, music preferences, content, style of personal Web pages, geographical preferences; Gosling, Ko, Mannarelli, & Morris, 2002; Oishi, Lee, & Talhelm, 2015; Rentfrow & Gosling, 2003; Vazire & Gosling, 2004) and macrocultural elements (e.g., political orientation and participation; e.g., Gallego & Oberski, 2012). McCrae (2004) theorizes that aggregate levels of certain traits may contribute to and reinforce features of cultures such as individualism versus collectivism. In fact, personality effects (at individual, interpersonal, or social/institutional levels) are ubiquitous, influencing each of us all the time, and when aggregated to the population level, such effects are routinely consequential (Ozer & Benet-Martínez, 2006). In short, we believe that future cultural work in personality will benefit from using designs in which researchers also explore personality effects on culture.

Future cultural research in personality can also benefit from exciting methodological advances in the analysis of individual and cultural data (Van de Vijver, Van Hemert, & Poortinga, 2008). Because cultural, social, and personality processes operating at the individual level may not replicate at the cultural level, and vice versa (K. Leung & Bond, 1989; see Benet-Martínez, 2007, Tables 3 and 4), researchers can use multi-level modeling and latent-class techniques to deal with these complexities (e.g., Eid & Diener, 2001; Reeskens & Wright, 2011). These (still relatively underused) techniques

have the potential to foster a fruitful synergy between the fields of personality and social psychology—which have provided a wealth of information regarding individual- and group-level characteristics (e.g., traits and values, majority/minority status)—and the fields of economics, anthropology, and sociology, which are very informative regarding culture-level phenomena (e.g., economy, religion, and many other key demographic factors).

Conclusion

As shown in this chapter, the contribution of culture and personality research is substantial, ranging from elucidating links between individual and ecological influences on personality to dispelling cultural stereotypes and national characters, to testing theory generalizability and revealing how personality influences and is influenced by multicultural and globalization experiences. Furthermore, cultural personality studies bring about tangible societal benefits by offering scientists, managers, policymakers, and the public ways to understand, manage, and benefit from the omnipresent cultural diversity that characterizes our society (Fowers & Richardson, 1996).

Once again, the excitement for research on culture and personality is palpable. The grand ambition of early culture and personality researchers (e.g., C. Kluckhohn & Murray, 1948) can be realized with more measurement precision and more sophisticated data-analytic techniques than ever before. Culture and personality research is finally fulfilling its promise to cultivate new and exciting horizons beyond the traditional research agendas.

NOTES

1. It is worth noting that there are other approaches as well, such as examining personality in specific ethnic/minority groups (e.g., López & Contreras, 2005); these are beyond the scope of this review.

2. Interestingly, cross-cultural group differences can also be understood from this framework. According to the “culture-as-situated-cognition” perspective (Oyserman, Sorensen, Reber, Chen, &

Sannum, 2009), cross-cultural differences in behavior are due to cross-national difference in the likelihood that particular mindsets are cued systematically. Institutions, media, folklore, and practices within each culture influence the nature of available cues and their ubiquity; thus, these mindsets will be more frequently cued (Hong et al., 2000).

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PART VII

APPLICATIONS AND IMPLICATIONS

CHAPTER 33

Personality and Religion

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Personality and the Capacity for Religious and Spiritual Experience

It used to be said that religion is overlooked, neglected, minimized, and marginalized in personality psychology, despite the fact that religion was of great interest to the founding figures of the field, including Gordon Allport and Henry Murray. Because of the recent surge in empirical research on religion from a personological perspective (Paloutzian, 2017) this claim is no longer convincing. One of the hallmarks of personality psychology that distinguishes it from other fields is its focus on a comprehensive understanding of the person. Accordingly, personality psychology should have a distinctive relationship with the psychology of religion. Personality psychology provides a natural home for the study of religion and spirituality in that a concern with the transcendent is an inherent part of what it means to be human (Emmons, 1999; Kirkpatrick, 1999). As spirituality and religiousness are profound aspects of people's lives, it would seem that in order to know people (McAdams & Pals, 2006), personologists must know about the religious side of people's lives. Therefore, it is encouraging to see the increased attention that religious processes are commanding

within personality research across cultures (Paloutzian, 2017; Saroglou, 2017).

Personality psychologists are said to provide glimpses "on what it's like to be human" (Carver, 1996, p. 331). Spiritual or religious goals, beliefs, and practices are not just a distinctive component of a person, for many *they are* the core of the personality. A national poll from late 2017 reports that 80% of Americans endorse belief in God (56% believe in God as described in the Bible; 23% believe in some other higher power/spiritual force), 9% endorse no belief in God but do believe in some higher power/spiritual force, and 10% report no belief in any type of higher power/spiritual force (Pew Research Center, 2018). Moreover, a majority of Americans say religion is somewhat or very important in their lives (73%; Pew Research Center, 2019). Even among groups thought to be unconcerned with spiritual matters, such as adolescents, religious engagement is still present—though steadily decreasing—with 34% of American adolescents attending religious services on a weekly basis (Twenge, Exline, Grubbs, Sastry, & Campbell, 2015). Looking beyond a single nation, as of 2012, over 7 billion people of the world's populations are adherents of one of the major religions, and only 16% of the

world population is unaffiliated with a religion (Pew-Templeton, 2012). Thus, for at least a substantial percentage of the population, an acute sense of spirituality is likely to be central to their self-concept, identity, and relationship to God and others.

Across the lifespan, spirituality and religion are important, perhaps central, dimensions of human experience and activity. According to the General Social Survey, about 57% of adults report praying at least once a day, and 37% attend religious services at least once a month. Among older adults (ages 60–74 years), rates of daily prayer and weekly attendance are substantially higher at 64% and 66%, respectively (National Opinion Research Center, 2014). In the United States, 72% of the population reportedly believes in life after death, and the majority (58%) of people believe in eternal judgment and Hell (Pew Research Center, 2014).

Although on an absolute level these numbers are impressive, data also indicate that people's religious commitments, behaviors, and identities change as they pass through adulthood. Longitudinal studies show that adults in the United States generally become more religious as they age. Religiousness is quite stable in a rank-order sense (test–retest correlations have ranged from .40 to .70 over 3-, 10-, 20-, 30-, and even 40-year intervals during adulthood; Idler & Kasl, 1997; Lubinski, Schmidt, & Benbow, 1996; Milfont, Milojev, & Sibley, 2016; Wink & Dillon, 2001), but many adults' absolute levels of religiousness also change over the life course. As personality psychologists concern themselves with stability and change in personality, these shifts in religious commitments are interesting theoretically.

The Religion and Personality Landscape

Religion and Spirituality Defined

In order for progress to occur in a scientific discipline, there must be some consensus concerning the meaning of core constructs and their measurement. However, agreement on the meaning of spirituality and religion has been hard to come by, as the religious landscape in the broader culture and in psychology is changing, with a new breed of spirituality that is often distinct

from traditional conceptions of religion. *Religion* often, but not necessarily, connotes a belief in a faith system, whereas *spirituality* connotes those values, ideas, or goals and purposes that transcend a person and to which he or she is committed. Both religion and spirituality involve commitment to something that transcends the individual person. At a psychological functional level, each one seems to imply the other, and there may be little difference between them other than personal preference for which language (and its connotations) one uses to describe transcendent values and ultimate concerns.

It has become fashionable, both culturally and in the scientific literature, to differentiate between the spiritual and the religious. The noun *spirit* and the adjective *spiritual* are being used to refer to an ever-increasing range of experiences rather than being reserved for those occasions of use that specifically imply the existence of nonmaterial forces or persons. Spirituality comes from the Latin *spiritus*, meaning breath, or “the animating or vital principle of a person” (*The Oxford English Dictionary*; Simpson & Weiner, 1989). *Spirituality* has been defined as “a deep sense of belonging, of wholeness, of connectedness, and of openness to the infinite” (Shafranske & Gorsuch, 1984, p. 233), as that which involves ultimate and personal truths, and as “a way of being and experiencing that which comes about through awareness of a transcendent dimension and that is characterized by certain identifiable values in regard to self, others, nature, life and whatever one considers to be the Ultimate” (Elkins, Hedstrom, Hughes, Leak, & Saunders, 1988, p. 12). Spirituality—in contrast to religion—means something spontaneous, informal, creative, and universal; it means authentic inner experience, freedom of individual expression, of seeking, even of religious experimenting.

In contrast, religions are rooted in authoritative spiritual traditions that transcend the person and point to larger realities within which the person is embedded. Durkheim proposed that “A religion is a unified system of beliefs and practices relative to sacred things, that is to say, things set apart and forbidden—beliefs and practices which unite into one single moral community, called a Church, all those who adhere

to them” (Wilson, 2002, p. 54). Spiritualities *may* be contextualized within faith communities, though they need not be. Religions are sets of beliefs, symbols, and practices about the reality of superempirical orders that make claims to organize and guide human life. They include a covenant faith community with teachings and narratives that enhance the search for the sacred and encourage morality. The term *religiosity* refers to motivating commitments to supernatural beings, powers, and places, as well as dispositions to form these beliefs. Such supernatural objects are normally viewed as “gods.” Although some have argued that the movement toward spirituality represents a movement away from traditional religion, others contend that the increased emphasis on spirituality indicates an increased respect for the inner, contemplative practices of traditional religious systems.

Religion and Spirituality at Various Levels of Personality

Determining how religiousness is related to the major dimensions of human personality has been an important starting point for making connections between personality psychology and the scientific study of religion. In their comprehensive theories of human personality, both McAdams and Pals (2006) and McCrae and Costa (2008) posit at least three levels of human personality: basic traits, midlevel characteristic adaptations (e.g., goals, schemas, defenses), and higher-order identity (e.g., narrative identity, biography). Moreover, both theories acknowledge the importance of considering how evolved human nature and culture exert influence on these basic components of personality. The human capacity for religiousness and spirituality relates to each of these levels of personality, as well as the evolutionary and cultural influences on personality.

Religion and Personality Traits

Religion and the Five-Factor Model (FFM). The five-factor trait model of personality offers a starting point for exploring the association between religiousness and personality functioning. Myriad studies have linked Big Five traits to religiousness

and spirituality. In a meta-analysis of 71 studies, Saroglou (2010; $N = 21,715$) found that agreeableness and conscientiousness are positively correlated with religiousness, spirituality, and religious fundamentalisms across cultures and religions, with small effect sizes. Other traits had more context-specific relations. Extraversion and openness to experience were positively correlated with more contemporary and reflective forms of spirituality, and openness to experience was negatively associated with religious fundamentalism. Likewise, HEXACO (Honesty–Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, Openness to Experience) personality factors and facets have been linked to religiousness. In an online sample of nearly 200,000 respondents, religiousness showed positive associations with conscientiousness and extraversion, as well as HEXACO agreeableness, honesty–humility, and emotionality, which relate to Big Five agreeableness; relations between openness and religiousness differed by religion (Ashton & Lee, 2019; see also Lee, Ashton, Griep, & Edmonds, 2018, for relations between HEXACO, religiousness, and political attitudes).

A sociocultural motives perspective on Big Five personality traits maintains that agreeableness and conscientiousness promote assimilation to cultural norms, whereas openness promotes divergence; thus, agreeableness and conscientiousness should be more positively correlated and openness more negatively correlated in more religious sociocultural contexts (Gebauer et al., 2014). Indeed, cross-sectional and longitudinal data from over 3 million participants sampling across diverse countries, states, and urban areas support these hypotheses using both self- and informant-reports (Ashton & Lee, 2019; Gebauer et al., 2014).

Spiritual Transcendence. In addition to linking religiousness to the FFM, some maintain that spirituality may represent a previously unrecognized sixth major dimension of personality (MacDonald, 2000; Piedmont, 1999, 2007). Piedmont (1999) demonstrated the value of the FFM for advancing the scientific study of religion through its provision of an empirical reference point for evaluating the development of

new measures of religiousness and the meaning of existing measures.

Spiritual transcendence is “the capacity of individuals to stand outside of their immediate sense of time and place and to view life from a larger, more objective perspective . . . in which a person sees a fundamental unity underlying the diverse strivings of nature” (Piedmont, 1999, p. 988). In developing the Spiritual Transcendence Scale (STS), a consortium of theological experts from diverse faith traditions, including Buddhism, Hinduism, Quakerism, Lutheranism, Catholicism, and Judaism, identified aspects of spirituality that were common to all of these faiths. The resulting items were analyzed within the context of the FFM and were shown to constitute an independent dimension. The STS manifested a single overall factor that comprises three “facet” scales: *Prayer Fulfillment*, a feeling of joy and contentment that results from personal encounters with a transcendent reality; *Universality*, a belief in the unitive nature of life; and *Connectedness*, a belief that one is part of a larger human reality that cuts across generations and across groups. The STS evidenced incremental validity by significantly predicting a number of relevant psychological outcomes even after the researcher controlled for Big Five traits (Piedmont, 1999).

For the STS to be shown to capture a universal aspect of spirituality, it would be necessary to provide evidence that the instrument remains reliable and valid in culturally diverse, religiously heterogeneous samples. The scale has been administered in Chinese, Filipino, Indian, and Israeli samples, with participants reporting Hindu, Muslim, Christian, Jewish, and nonreligious affiliation (Lau et al., 2016; Piedmont, 2007; Piedmont, Ciarrochi, Dy-Liacco, & Williams, 2009; Piedmont & Leach, 2002; Kor, Pirutinsky, Mikulincer, Shoshani, & Miller, 2019). Across studies, support is typically found for two of the facet scales, Prayer Fulfillment and Universality, and the overall domain. Connectedness is often unreliable, and certain items must be dropped across cultures. Nonetheless, these data highlight the value of cross-cultural research on spirituality and show that the STS reflects spiritual qualities relevant across very different religious traditions.

Religion and Characteristic Adaptations

In addition to connections among personality, religiousness, and spirituality at the level of basic traits, there are even more points of convergence at the level of characteristic adaptations.

Religion as the Characteristic Expression of Basic Tendencies. Both the McCrae and Costa (2008) and the McAdams and Pals (2006) models of personality may prove useful for understanding how basic trait tendencies are channeled into characteristic adaptations that include culturally conditioned religious and spiritual goals and attitudes. Religiousness can be conceptualized as a characteristic adaptation that some people in some cultural contexts adopt to “fulfill” or express basic personality tendencies. One way this might occur is that conscientious and/or agreeable people tend to fulfill their tendencies toward conformity, order, or prosociality by being religious (Saroglou, 2010).

People high in conscientiousness and agreeableness are motivated to conform to rules and laws, although for different reasons (Costa & McCrae, 1995). Conscientiousness motivates people to abide by rules and conventions, because the behavior of conscientious people tends generally to be rule-governed. Moreover, formal religious practices often provide a clear, delineated value system that might appeal to conscientious people but cause less conscientious people to bristle. Psychologically, religion may also be considered as a way to enhance self-control (McCullough & Willoughby, 2009). People desire to have things under control, to believe in their capacity both to change a situation, and to change themselves in order to change reality. People gain a sense of control by making sense out of what is happening (seeing misfortune as part of a large, cosmic plan) and being able to predict what will occur in the future. So, religion satisfies this need for control.

Agreeableness also motivates people to abide by conventions, particularly out of concern for the feelings and rights of others. Therefore, agreeableness might move people toward religiousness in adulthood in part out of concern for minimizing conflict and maintaining harmony with their families by

remaining faithful to the family's religious systems. It is also possible that agreeable people are more amenable to maintaining a religious faith in part out of an earnest desire to maintain positive relations with God or to be involved in a value system that promotes kindness, altruism, forgiveness, and love.

Although much of the theorizing about the dynamics of the personality-religiousness associations has focused on how certain traits might influence people's religiousness, the causal direction of these relationships remains an area of further inquiry. Several longitudinal studies in the United States and Australia support the premise that personality traits chronologically precede religiousness rather than religiousness preceding traits (Heaven & Ciarrochi, 2007; McCullough, Enders, Brion, & Jain, 2005; McCullough, Tsang, & Brion, 2003; Wink, Ciciolla, Dillon, & Tracy, 2007). These studies support the view that religion provides a characteristic way of expressing basic tendencies. However, socialization is still important, as religiousness may be a product of not only gene $\times$ environment interactions but also gene $\times$ environment correlation (e.g., assortative mating on religious similarity; Koenig, McGue, Krueger, & Bouchard, 2005). Additionally, some studies find that religious values predict subsequent changes in personality traits (Huuskes, Ciarrochi, & Heaven, 2013).

Ultimate Concerns. Another way to conceptualize personality and religion is in terms of goals or strivings, or what Emmons, Cheung, and Tehrani (1998) have called "ultimate concerns." Emmons (1999), following Tillich (1957), among others, argued that both religion and spirituality deal with ultimate concerns of people and developed a research program to identify ultimate concerns and their role in human personality and subjective well-being. Religions, as authoritative faith traditions, are systems of information that provide individuals with knowledge and resources for living a life of purpose and direction. Religion and goals are intertwined in human experience. One of the functions of a religious belief system and a religious worldview is to provide "an ultimate vision of what people should be striving for in their lives" (Pargament

& Park, 1995, p. 15) and the strategies to reach those ends. Religions recommend the ultimate goal of binding with the sacred and prescribe rituals for its realization. Emmons et al. (1998) found that it is not only possible to reliably assess the search for the sacred in personal goals, but that individual differences in sacred goals also predict well-being more strongly than any other category of striving that has been studied, exceeding those for intimacy, power, or generativity goals.

Sanctification of Goals. In addition to maintaining explicitly spiritual goals, people also imbue their daily goals with sacred or spiritual meaning (Emmons & Schnitker, 2013). For example, a man may imbue his goals to be a good parent and husband with sacred qualities and transcendent significance. Mahoney and Pargament (2005) found that people pursue sanctified goals with greater effort, derive greater meaning from them, and perceive greater social support for their achievement. Sanctification of goals and activities often leads to better goal outcomes, as well as decreased anxiety, depression, and hostility (Tix & Frazer, 1998). For example, sanctification of marriage predicted self-reported marital satisfaction (Stafford, David, & McPherson, 2013), as well as observed positive marital interactions across the transition to parenthood (Kusner, Mahoney, Pargament, & DeMaris, 2014). Similarly, sanctification of sexuality led to higher levels of marital, sexual, and intimacy satisfaction in newlyweds (Hernandez, Mahoney, & Pargament, 2011), and nontheistic sanctification of parenting was related to higher parent-child relational quality (Brelsford, 2013). However, when people fail in regard to their sanctified goals, they experience greater decrements in well-being (e.g., poorer psychological and physical well-being after the loss of a sanctified romantic relationship; Pargament, Magyar, Benore, & Mahoney, 2005). Thus, goal sanctification tends to magnify the well-being effects of both goal failure and achievement.

Religion and Narrative Identity

Not only are religiousness and spirituality expressed at the level of personality traits

and characteristic adaptations, but they are also highly relevant to narrative identity. According to McAdams (Chapter 5, this volume), *narrative identity* refers to the internalized and integrative story of the self. These self-stories are changing across time and are always told within the context of social relationships, culture, and moral norms. For many people, religion and spirituality feature prominently in their narrative identities and may even be the central feature (McLean, Syed, Yoder, & Greenhoot, 2016). In the context of a religious family or culture, most people incorporate religious content into their self-story, which is then reinforced as they engage in religious community through consensual validation (Becker, 1973; Krause, 2008).

Religion therefore provides a lens through which to interpret knowledge and experience (Silberman, 2005), as well as narrative scripts and prototypes (e.g., the redemptive self; see McAdams, Chapter 5, this volume). Religion is especially suited to provide meaning systems that can make sense of suffering and death, because it is capable of addressing existential questions brought to the fore by negative life events in a way that is more satisfying (to many, but not all) than naturalistic attributions (e.g., negative events as part of the plan of a benevolent deity vs. probabilistic outcomes; Park, Edmondson, & Hale-Smith, 2013). Even when religious meanings are not comforting (e.g., belief in punitive gods), they can still provide a sense of coherence and control. However, religious identity and meaning making may engender intergroup conflict as people cling to their own worldview and derogate outgroup beliefs to relieve existential anxiety, though this effect is moderated by intrinsic religiousness, quest religiousness, and religious fundamentalism (Vail et al., 2010).

Some have even argued that religions are uniquely capable of meeting demands for meaning given their ability to tap into supernatural and transcendent sources of knowledge and power (Pargament, Magyar-Russell, & Murray-Swank, 2005), likely because they are pertinent to meeting needs for control, purpose, coherence, and connection (Park et al., 2013), and alleviating

anxious uncertainty (McGregor, Nash, & Prentice, 2010). Empirical data support this claim. Not only do religious people tend to report higher levels of purpose and meaning in life (with r 's around .40; Steger & Frazier, 2005), but people who turn to religious meaning after stressful life events (as opposed to other forms of meaning-making) also demonstrate higher psychological adjustment and even posttraumatic growth (e.g., Laufer, Solomon, & Levine, 2010; Park, Edmondson, & Blank, 2009).

Religion, Evolution, and Culture

The field of personality deals with not only describing individual differences but also articulating universal laws of human behavior and culture. Thus, the field of personality must also grapple with explaining the universality of religious beliefs and behaviors, as well as particular cultural expressions of religion.

The evolution of religion and its possible adaptive function have been the subject of considerable investigation by a wide array of researchers with diverse theoretical and methodological approaches, including cognitive psychology, anthropology, and evolutionary psychology. Rather than focus on individual differences in religiousness, these scholars have primarily studied elements typical of religious life, including beliefs in supernatural agents, transmission of religious concepts, ideas about the afterlife, and the role of cognition and affect in ritual. Primary debates in the area concern whether religious thought and behavior arise from capacities evolved for other selective advantages (e.g., Boyer, 2001), or whether religion itself confers selective advantage (e.g., Wilson, 2002). Also disputed is the relative importance of implicit, less culturally variable cognition versus explicit, more culturally variable cognition in explaining religious thought and behavior (e.g., Whitehouse, 2004). Cognitive–evolutionary approaches to religion come in three varieties: neurotheology, group selection, and cognitive science of religion. Though all possess some connections to evolutionary perspectives, the three schools take importantly different approaches to explaining religion.

Neurotheology. *Neurotheology* primarily concerns identifying which components and dynamics of the brain underlie religious experiences and subsequent religious behavior. It emphasizes mystical experience of the sort William James (1902) regarded as central to religion. The aim of this area is to identify religious phenomena as the (perhaps accidental) output of evolved neural circuitry. Evolved brains have components that have arisen because of their usefulness to survival that happen to interact in such a way as to generate religious experiences. These experiences are shared and codified into common religious beliefs.

A recognized role for brain imaging in the study of human religious and spiritual phenomena has emerged. Studies using positron emission tomography (PET) or functional magnetic resonance imaging (fMRI) suggest that spiritual practices such as meditation and prayer involve increased activity in frontal brain structures, as well as those other brain areas that form a system to regulate and focus attention (McNamara & Butler, 2013). Specifically, meditation is associated with decreased activity in the superior parietal lobe, which is correlated with spatial and temporal orientation, thus contributing the sense of “oneness” or felt unity common in spiritual experiences. Perhaps unsurprisingly, there is also evidence that prayer involves increased activity in brain regions known to be involved in the production of language.

The Group Selection Hypothesis. According to the group selection hypothesis, religious systems encourage prosocial behavior, and groups that exhibit prosocial behavior (cooperation, lack of cheating and stealing, etc.) tend to outsurvive and outreproduce groups that do not exhibit these traits (Wilson, 2002). As religious communities have stronger prosocial tendencies, they cooperate better. As they cooperate better, they survive and thrive better than competing communities. Hence, religious communities—and whatever genetic information accounts for their religiosity and prosociality—tend to survive and expand at a greater rate than nonreligious communities. Over time, then, people with the biological disposition to be

religious increasingly outnumber nonreligious people. This selection process thereby accounts for the widespread existence of religious people. Group selection theory seeks to reconcile evolutionary biology with the frequently made paradoxical observation that many religious systems codify rules that appear to diminish reproductive fitness. Wilson’s solution is to view natural selection as a multilevel process, such that group selection plays an important explanatory role.

Evolutionarily minded social scientists have proposed that religious behaviors constitute costly signals that contribute to social cohesion. These behaviors publicize that one shares the same values as the group, and their costliness (in terms of time, effort, material resources, and sometimes pain) makes them hard to fake.

Research has verified that religious people across faith traditions are inspired by these prosocial ideals, at least in the way they perceive themselves and desire to be. Individual differences in Big Five agreeableness and conscientiousness based on religiousness translate into higher self-reported prosocial behaviors, emotions, and virtues. Religiousness and spirituality are correlated with both self- and sometimes other-reports of virtues such as honesty (Saroglou, Pichon, Trompette, Verschuere, & Dernelle, 2005), forgiveness (McCullough & Worthington, 1999), and generativity (Dillon, Wink, & Fay, 2003). Although religiousness is moderately related to social desirability (Sedikides & Gebauer, 2010), the link between religiousness and prosocial qualities is not completely explained by socially desirable responding (Saroglou, 2010). Informant reporters also tend to view religious targets as higher in prosocial and virtuous qualities, which may reflect an actual association between these variables and/or stereotypes of religious and atheistic people (Galen, 2012).

Even if future studies fully establish a robust association between religiousness and prosociality, the causal direction of effects is unclear. Does religiousness increase prosociality, do prosocial people adopt religion, or does some third variable (e.g., empathy or guilt) increase both? A recent longitudinal study of Israeli adolescents across three time points revealed that participants clas-

sified in a latent class representing high and increasing spirituality had higher prosociality at times 2 and 3 than participants in a class characterized by low and stable spirituality (Kor, Pirutinsky, Mijulincer, Shoshani, & Miller, 2019). Moreover, experimental studies of the effects of religious priming on prosocial behavior in the laboratory have been helpful in disentangling effects. A meta-analysis of 25 studies revealed that religious priming does increase prosocial behaviors, but effects were only reliable for religious participants (bias correct effect size for believers = 0.27), indicating that priming effects are dependent on the activation of preexisting religious beliefs (Shariff, Willard, Andersen, & Norenzayan, 2016). Understanding the role of religion in evolution and prosociality continues to be a vigorous area of inquiry with a diversity of perspectives represented (see target article and commentaries; Norenzayan et al., 2016).

Cognitive Science of Religion. The most developed field identified with evolutionary accounts of religion has come to be called the cognitive science of religion (CSR; Barrett, 2000; Boyer, 2001; Whitehouse, 2004). Cognitive scientists argue that religion is a constellation of human phenomena that is represented and communicated by naturally occurring cognitive processes. The CSR maintains that widespread belief in God arises from the operation of natural processes of the human mind, and that human mental architecture renders such belief “nearly inevitable. . . . Why would anyone believe in God? The design of our minds leads us to believe” (Barrett, 2004, pp. 122, 124).

Numerous research programs in cognitive and developmental psychology have converged on the view that religious concepts heavily rely on implicit, essentially universal causal reasoning. This perspective, known as the “naturalness of religion thesis,” posits that religious concepts, such as belief in god(s), the successful interpersonal transmission of these concepts, and the development of practices based on these concepts, rely on the use of mental tools operating in cross-culturally recurrent conditions (Barrett, 2000). In other words, ordinary cognition plus exposure to ordinary environments accounts for religion. No special domain for

religious thought need be postulated. Instead, the contours of human minds inform and constrain recurrent patterns of human thought and action, including religious (and other cultural) thought and action, so recurrent features of religious thought and action (e.g., belief in gods) can be explained by appealing to requisite conceptual structures.

For example, a number of cognitive scientists have noted that the *counterintuitive* concepts (ones that violate expectations) that characterize religious beliefs are both attention arresting and memorable (Barrett, 2000; Boyer, 2001). Experimental tests on four continents validate these observations (Barrett & Nyhof, 2001; Boyer & Ramble, 2001). Furthermore, people have a built-in bias to detect human-like agency in their environment, which might lead people to posit supernatural agents or gods to account for unexplained events such as miraculous healings or signs (Guthrie, 1993). Supernatural agents, or gods, are then likely to be ascribed not only with unusual powers that might enable them to perform acts resulting in great fortune or misfortune but also, perhaps more importantly, invisibility or superknowledge that gives them “strategic information” about what people do in private (Bering, 2006; Boyer, 2001). Morally sensitive gods may reward or punish them based on this information that is outside the perceptual boundaries of everyday human agents. Moral reasoning and the notion of gods with strategic information mutually reinforce each other’s plausibility and cultural transmission.

Accumulating research indicates that humans exhibit a developmental predisposition to believe in such socially infallible supernatural agents, appearing in early childhood (Barrett & Richert, 2003). Cross-cultural studies conducted with children between ages 3 and 12 indicate that young children may possess an “intuitive theism” that prompts them to see intentional purpose in the natural world that cannot be attributed to people but only to specially powerful supernatural agents (Kelemen, 2005). Therefore, mental tools predispose people to hold religious beliefs. In this sense, widespread belief in gods arises from the operation of natural processes of the human mind, such that belief is nearly inevitable (Barrett, 2000).

Personality and Religion: Empirical Points of Contact

Religion, Spirituality, and Well-Being

Positive Effects of Religion and Spirituality

The growth in empirical research on religious and spiritual topics has been influenced by many factors, not the least of which is the growing body of scientific findings that religious and spiritual variables impact human health and subjective well-being. Religious practices and experiences have measurable effects on important psychosocial and health outcomes, and these effects seem to be independent of at least some plausible alternative mediators (e.g., social support, age, and health status; Masters & Hooker, 2013). For example, religious practices, including participation in religious activities such as prayer and attending services, have been linked to better coping with stress, prevention of and recovery from illness, and even longevity. An impressive research literature, though not uncontroversial, has documented that religious practices are associated with morbidity and mortality across the lifespan (McCullough, Hoyt, Larson, Koenig, & Thoresen, 2000; Oman, 2018; Powell, Shahabi, & Thoresen, 2003). Protective effects of religion on mortality are primarily found in studies of initially healthy rather than diseased populations (Chida, Steptoe, & Powell, 2009). Proximal mechanisms for these links are being explored, as many religious rituals, ceremonies, and practices are biologically significant events.

A series of early studies controlling for personality with FFM personality measures tested the relationship between spirituality and most facets of subjective well-being. Considerable evidence now exists that the FFM accounts for considerable variance related to psychosocial outcomes but does not eliminate religiosity's predictive ability. Controlling for age, gender, marital status, and personality with Methodist ministers, spirituality predicted less psychological exhaustion and more cognitive well-being (Golden, Piedmont, Ciarrocchi, & Rodgeron, 2004). In a sample of Maltese undergraduates, spiritual transcendence predicted both positive affect and cognitive well-being over and above personality but did not predict nega-

tive affect (Galea, 2008). A similar pattern emerged in a sample of male sex offenders, with faith maturity predicting positive affect and cognitive well-being but not negative affect (Geary, Ciarrocchi, & Scheers, 2004). Faith maturity predicted cognitive well-being over personality but was unrelated to negative emotionality in female patients with breast cancer (Ciarrocchi & Deneke, 2005); spirituality made a unique contribution in predicting subjective well-being by virtue of its relation to positive emotionality and life satisfaction. Finally, relationship with the deity, religious denomination, and spiritual commitment predicted hope and optimism after researchers controlled for personality traits (Ciarrocchi, Dy-Liacco, & Deneke, 2008).

These results are notable in that, despite using a variety of instruments to measure both personality and well-being, the pattern of the outcomes is similar in most of the studies. Spirituality predicts the positive aspects of subjective well-being but fails to predict negative emotionality. Overall these results render plausible Fredrickson's (2002) theory that religion's major influence on well-being may be its ability to enhance positive emotions. She hypothesized that positive emotion mediates the beneficial effects of religion through the "most reliable path" (p. 211) of meaning. In other words, religion provides meaning that creates positive emotions, leading to the development of personal capacities that promote health and well-being.

Negative Effects of Religion and Spirituality

Although a great many studies have established positive relations among religion, spirituality, health, and well-being, there are also instances in which religion and spirituality lead to negative outcomes. A sizable corpus of research has documented the deleterious effects of religious and spiritual struggles, as well as negative religious coping.

Religious and spiritual struggles refer to elements of a person's religious or spiritual life (including beliefs, practices, relationships, or experiences) that cause or perpetuate distress, primarily in the forms of negative emotions or internal conflict (Exline,

2013). Religious and spiritual struggles fall into several domains that include divine (e.g., anger at God, concern about divine retribution/punishment), intrapersonal (e.g., spiritual doubts, facing moral imperfections), interpersonal (e.g., religious conflicts), and supernatural evil (e.g., demonic appraisals of negative events) struggles (Pargament, 2007; Exline, 2013).

Religious and spiritual struggles are reliably correlated with poor mental health. In a meta-analysis of 49 studies, Ano and Vasconcelles (2005) found a small but significant association ($r = .22$) between spiritual struggle and negative psychological adjustment (e.g., negative mood, social dysfunction, anxiety, depression, anger, guilt). Moreover, these associations have been replicated in Jewish (e.g., Rosmarin, Pargament, & Flannelly, 2009) and Muslim (e.g., Raiya, Pargament, Mahoney, & Stein, 2008) samples. Although many studies linking spiritual/religious struggles and poor mental health rely on cross-sectional data, researchers are beginning to apply longitudinal methods. For instance, spiritual struggle and loss of faith predicted less improvement in depression scores over 6 months in a sample of 145 depressed adolescents (Dew et al., 2010). In a sample of college students, spiritual struggle severity was related to both growth and decline in well-being outcomes (Desai & Pargament, 2015; see also Wilt, Hall, Pargament, & Exline [2017] for profiles of trajectories of spiritual struggle change). The ways people perceive the divine and cope with such struggles predict spiritual growth and decline across time (Wilt, Stauner, Harriott, Exline, & Pargament, 2019), but additional studies are needed to disentangle effects.

In addition to the mere presence of spiritual and religious struggles, negative religious coping is a maladaptive form of coping with life stressors that contributes to negative outcomes. Negative religious coping includes strategies such as demonic or divine punishment appraisals to understand negative events. In a meta-analysis of eight studies examining negative religious coping and depression, the two were modestly correlated ($r = .14$; Smith, McCullough, & Poll, 2003). Moreover, negative religious coping and spiritual struggle consistently predict outcomes in health-related longitudinal

studies. For example, cancer patients who experienced increases in anger toward God at a 1-year follow-up had lower adjustment, and those with chronic and recurrent anger (i.e., high anger at both time points) had the highest levels of distress (Exline, Park, Smyth, & Carey, 2011). Baseline spiritual struggle has also been found to predict later anxiety and depression in children hospitalized for asthma symptoms (Benore, Pargament, & Pendleton, 2008) and patients with congestive heart failure (Park, Brooks, & Sussman, 2009).

Spiritual struggle and negative religious coping can even affect mortality and health indicators. For example, spiritual struggles predicted inflammation and immune function, as indicated in excess plasma interleukin-6 in cardiac surgery patients (Ai, Seymour, Tice, Kronfol, & Bolling, 2009). In a longitudinal study of ill older patients, demonic appraisals and spiritual discontent predict increased mortality 2 years later, even after researchers controlled for illness severity, mental health status, and demographics (Pargament, Koenig, Tarakeshwar, & Hahn, 2001). Thus, the effects of religion and spirituality—both positive and negative—are substantial.

Religious Conversion and Spiritual Transformation

Religious conversion has long been a topic of interest for researchers concerned with understanding personality and religion. Religious conversion can be counted as one of the first psychological topics to be scientifically studied (Starbuck, 1899), and the underlying self processes of conversion receive considerable exposition in James's (1902) seminal work, *The Varieties of Religious Experience*. Long-standing interest in the study of religious conversions and spiritual transformations is in part attributable to the unique opportunity afforded by these phenomena to observe the dynamics of personality change. Due to a variety of factors, including genetic and environmental influences, person–environment transactions, and crystallized self-perceptions, researchers have found that adult personality is moderately stable across the life course (Roberts & Nickl, Chapter 11, this volume). Religious/

spiritual transformation may be one of the few life events recognized to engender substantial and dramatic personality change.

However, spiritual transformation is not always dramatic and complete, as is often typified by classical conversion paradigms. The extravagant and dramatic transformation of the individual's entire meaning system, goals, and ultimate concerns, referred to as "quantum change" (Miller & C'deBaca, 2001), is distinguishable from other forms of conversions or spiritual transformations. Paloutzian (2005) identifies a bevy of changes in personality that may result from a spiritual transformation, ranging from an increase or decrease in adherence to the same religion to a change in a specific element within a person's worldview, or to a complete overhaul of ultimate concerns and life purpose. Other researchers have also illuminated the diversity of experiences that may be labeled spiritual transformations or religious conversions. Given the plethora of conceptualizations, what are the defining aspects of religious conversion and spiritual transformation?

Religious conversion and spiritual transformation are both separable from learning, developmental, and maturational processes, in that transformative experiences display a distinctiveness of change whereby the convert can identify a time *before* which he or she held a different array of spiritual beliefs and goals than those held *after* the transformative experience (Paloutzian, 2005). This is not to say that transformative experiences must be sudden or acute; they may take variable amounts of time, ranging from seconds to years. Instead, distinctiveness is a key identifying theme of conversion and transformation.

Paloutzian (2005) models spiritual transformation and religious conversion as meaning system change. Paloutzian, Richardson, and Rambo (1999) maintain that spiritual transformation leads to changes in characteristic adaptations and narrative identity rather than basic traits based on findings from studies showing that conversion has no effect on converts traits but does effect values, goals, meaning, and self-narratives. For example, an atheist who becomes a Protestant, may accumulate new strivings such as "obey God" or "read my Bible" (see Em-

mons, 1999, for examples of spiritual strivings), or he may change his strivings so that he no longer desires to become an actor but instead strives to become an evangelist. Similarly, a recent convert may reframe her life narrative, utilizing a new redemption paradigm, to provide personal meaning. Thus, Paloutzian (2005) conceptualizes spiritual transformation as a reorganization of an individual's goals and meaning system. Other researchers would also add that spiritual transformation is not only a reorganization but also a reorientation of the individual toward the sacred (Mahoney & Pargament, 2004) and transcendent (Piedmont, 1999). Apparently, James (1902) was not far from modern conceptualizations when he described conversion as the movement of religious ideas from the periphery of one's consciousness to the more central "habitual centre of energy."

Researchers have produced some empirical work examining spiritual transformations and religious conversions, although several methodological limitations have restricted interpretation of the data. A large proportion of studies utilize retrospective reports of preconversion personality and measure the convert's perceived change instead of actual change. For example, in their study of religious change among college undergraduates, Zinnbauer and Pargament (1998) simply ask participants if they have experienced a conversion over the past 2 years, then ask them to retrospectively report their pre- and postconversion experiences. Although this is an acceptable launching point to commence inquiry into the topic, such retrospective reports pose serious limitations. It is unclear whether participants are able to accurately contrast their pre- and postconversion personality and experiences. Converts' retrospective reports are quite subjective and tend to overemphasize the negative past in contrast to the positive postconversion state as they narrate their own life stories to fit "scripts" provided by their religious traditions (Beckford, 1978). Retrospective reports may also be contaminated by stereotypical views of how spiritual conversions are "supposed" to change personality. Therefore, it seems quite imperative for researchers to adopt more longitudinal methods that utilize multiple measures be-

yond self-perceived change, including informant reports, as well as further measures of actual change. Researchers should especially aim to acquire true preconversion measurement by pretesting a large number of participants, then following up with those who actually experience a conversion over time compared to controls.

A few studies have begun to employ such longitudinal methods in examining the trajectories of personality change related to conversion. Examining the outcomes of conversion, longitudinal studies have demonstrated that religious conversion and spiritual transformation enhance psychological well-being, virtues, and life meaning, as well as change values. In a 3-year longitudinal study of Chinese adults recruited in Hong Kong and Macau, conversion to Christianity predicted subsequent decreases in stress and anxiety, as well as a decline in power and achievement values, accompanied by an increase in benevolence, conformity, and tradition values (traits did not change as a result of conversion; Hui et al., 2017). In two studies conducted with adolescents attending Christian summer camps, spiritual transformation and religious conversion predicted positive change in virtues, prosociality, and psychological well-being a year following (Schnitker, Felke, Barrett, & Emmons, 2014a, 2014b). Increased purpose in life was predicted by engagement with the religious group rather than the experience of spiritual transformation or a religious conversion at summer camp. This suggests previous findings that the incidence of a conversion is correlated greater postconversion purpose and competence (Paloutzian, 1981; Zinnbauer & Pargament, 1998) may reflect converts' greater engagement in religious community rather than the direct effects of a conversion.

Pertaining to the antecedents of conversion or transformation, researchers have amassed support for James's (1902) and Starbuck's (1911) seminal theories that people who are experiencing acute distress or self-fragmentation are more likely to experience a religious conversion or spiritual transformation. Schnitker, Ratchford, Emmons, and Barrett (2019) found that adolescents with higher conflict among goals and lower meaning on those goals were more likely to

report a subsequent conversion at evangelistic Christian summer camps. Likewise, stressors or attachment threats, in combination with an insecure attachment, often precede conversion. For instance, Kirkpatrick (1997, 1998) has shown that people who exhibit an insecure adult attachment style are more likely to report a new relationship with God in the 4 years following the initial measurement of adult attachment. Kirkpatrick's findings seem to support the hypothesis that conversion acts as compensation for insecure attachment relationships with other people. However, it should be noted that conversion is not equivalent to spiritual maturity, as higher levels of spiritual growth are actually reported for those with secure attachment styles (Granqvist, 1998).

Conversion, however, relies on the cultural scripts available to the individual. Rambo (1993) highlights the importance of broader cultural factors in providing individuals with access to religious symbols, myths, and rituals that may facilitate conversion. Those individuals who already possess a religious-based orienting system would be more likely to experience spiritual transformation during stress (Pargament, 1997). Finally, certain demographic groups report more conversions than others. For example, conversions are found to occur most often during adolescence, with females converting 1–2 years earlier than males on average (Hood, Spilka, Hunsberger, & Gorsuch, 1996; Regnerus & Uecker, 2006). This seems reasonable, as adolescence is a time of identity formation and is also when individuals challenge normative systems.

Conclusion

Over one-half century ago, Gordon Allport (1955, p. 93) stated, "If we ask what psychology has contributed to our understanding of the religious nature of man, the answer is, 'Less than we might wish.'" Over the past decade progress in understanding the role of religion and spirituality in personality has begun to accelerate. Much progress has been made at the interface of personality psychology and the psychology of religion, as personality researchers from diverse theoretical positions have begun to view religion

as a fruitful topic for empirical study. In addition to the work reviewed in this chapter, a leading textbook in the psychology of religion includes a chapter on personality processes in its newest edition (Paloutzian, 2017). Although personality psychology has made admirable advances since Allport's (1955) lament about our ignorance regarding religiousness, we still know considerably less about this domain of human functioning than we might wish. Continued dialogue and collaboration between personality psychologists who specialize in religion and our colleagues in evolutionary biology, neuroscience, philosophy, anthropology, and cognitive science will promote Allport's vision for a psychology of personality that takes seriously the religious and spiritual dimensions of understanding the whole person.

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CHAPTER 34

Personality and Subjective Well-Being

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Subjective well-being (SWB) reflects the extent to which people think and feel that their lives are going well. This construct—which is often referred to more colloquially as *happiness*—plays a somewhat unusual role within personality psychology. On the one hand, neither the first two editions of this handbook nor Hogan, Johnson, and Briggs's (1997) *Handbook of Personality Psychology* included chapters on the topic (though these handbooks did address the topic of emotion). This absence suggests that well-being research did not play a central role in the history of personality theory. On the other hand, the strong influence of personality is seen as one of the most replicable and most surprising findings to emerge from the last four decades of research on SWB. In fact, Gilovich and Eibach (2001) suggested that to those outside the field, the relatively weak influence of situational factors and the relatively strong influence of personality factors should be one of the most counter-intuitive findings from the entire domain of personality psychology. If the links between personality and SWB are so strong and so surprising, why hasn't SWB research played a more important role in personality theory? Furthermore, why are personality effects in the SWB domain viewed as being so surprising in the first place?

We believe that part of the answer to these questions comes when we consider the dual nature of the construct. SWB can be thought of both as an outcome for which individuals strive and part of a functional process that helps individuals to achieve other goals. In reference to the first point, William James (1902, p. 76) suggested that “how to keep, how to gain, how to recover happiness is . . . for most men at all times the secret motive for all they do.” We would argue that the only thing that James got wrong in this statement is the suggestion that this motive is secret. Most people agree that being happy is the ultimate goal toward which they strive. For instance, in one study, being happy was rated to be more important than having good health, a high income, or high levels of attractiveness, and it was rated as being more important than experiencing love or meaning in life (Diener & Oishi, 2004; Adler, Dolan & Kavetsos, 2017). Thus, happiness is seen as an ultimate goal that guides individual choices and may be achieved if the external circumstances in a person's life coincide with his or her desires.

When people conceptualize happiness in this way—as an outcome that can be achieved if things go well—they naturally think about it as something that can change. Not surprisingly, initial work in the area

focused on identifying the external life circumstances that reliably correlate with SWB (Wilson, 1967). It was thought that these correlations could reveal basic human needs and that by understanding these needs, psychologists could identify pathways to greater well-being. These efforts have continued over the years, and some progress has been made in identifying interventions that can lead to lasting changes in happiness (Sin & Lyubomirsky, 2009; Sheldon & Lucas, 2014). In fact, psychologists and economists have increasingly advocated for the implementation of large-scale surveys of well-being, so that population levels can be tracked over time (Diener & Seligman, 2004; Kahneman, Krueger, Schkade, Schwartz, & Stone, 2003). Indeed, governments throughout the world have begun to incorporate well-being into policy decisions, and some (e.g., Bhutan) even have “happiness ministries” to ensure that this goal remains a focus (see, e.g., Helliwell, Layard, & Sachs, 2019). Again, the principle that underlies this suggestion is that by identifying macro-level characteristics that reliably affect well-being, policy decisions could be optimized to increase well-being for all.

If happiness is conceptualized as an outcome that reflects the conditions in a person's life, it may seem counterintuitive and even somewhat distressing when research suggests that happiness is stable over time and not strongly affected by changes in life circumstances. It is this outcome-focused aspect of well-being research and theory that makes strong personality effects seem so surprising. Yet when SWB is thought of not as an outcome but as an integral part of an ongoing process, the strong effects of personality and the relatively weak effects of situations should come as no surprise. For at the heart of well-being judgments lie affective reactions (Lucas & Diener, 2008), and these emotions and moods likely play a functional role in people's lives (Fredrickson, 1998; Gross, 1999). Negative affect does not simply relay the news that something in one's life is not going well. Instead, it provides the motivation and perhaps even the tools that allow for corrections. Similarly, pleasant feelings are not simply a reward for a job well done; these feelings are functional. Thus, negative emotions should not cease

when a person's life circumstances become ideal, nor should pleasure endure forever, when all important goals are achieved. In fact, the pleasure that one experiences after the achievement of a goal may actually promote the desire to seek new goals (Carver, 2003; Fredrickson, 1998). If there are individual differences in these underlying affective processes, then SWB will also exhibit the characteristics of a personality trait. Thus, well-being should play an important role in personality research. In this chapter, we first discuss general issues regarding the nature of SWB, then address concerns about the measurement of well-being. Finally, we review the evidence linking personality and well-being constructs.

Defining SWB

Although researchers sometimes discuss SWB as if it reflects a unitary construct, there is no single judgment that captures the entirety of SWB. Instead, researchers divide the domain into narrower classes of constructs that tap distinct ways in which one's life may be evaluated (see Diener, Lucas, Schimmack, & Helliwell, 2009, for a more detailed review). For instance, SWB researchers often distinguish between cognitive judgments of well-being and affective experience (Busseri & Sadava, 2011; Diener, 1984). The cognitive component reflects an individual's judgment that his or her life or the circumstances of that life are going well. To assess this component, researchers often administer measures of life satisfaction or domain satisfaction—measures that ask people to consciously evaluate the conditions in their lives.

This type of reflective judgment can be contrasted with the emotions and moods that individuals actually experience as they live their lives. Experience sampling studies, which assess experience repeatedly over time, indicate that very few moments are affectively neutral: People report some affective feeling almost all the time (Diener, Sandvik, & Pavot, 1991). Furthermore, one of the most basic features of these feelings is that people can tell whether they are pleasant or unpleasant (Kahneman, 1999). Thus, a life might be considered to be a good one

if there are more pleasant experiences than unpleasant ones over an extended period of time. Thus, *reflective judgments* and *affective experiences* provide two distinct ways in which a person's life may be evaluated (Kahneman & Riis, 2005).

In addition, affective experiences themselves can be further divided into narrower categories. The study of these more precise affect variables often reveals unique information about the quality of a person's life and the processes that underlie the evaluation of that life. For instance, although it is tempting to conceptualize affective experience simply as the ratio of positive to negative, much information is lost when such an index is constructed. Two individuals who have equal amounts of positive and negative experience may have very different lives, depending on the intensity of their experiences. In addition, because positive and negative feelings are not polar opposites, it may be inappropriate to combine them in a single index. As early as 1969, Bradburn recognized that pleasant and unpleasant affect were empirically separable (Bradburn, 1969). Following up on this work, Watson, Clark, and Tellegen suggested that positive and negative affect are distinct and orthogonal factors (Clark & Watson, Chapter 6, this volume; Watson & Tellegen, 1985). Furthermore, these distinct factors often correlate with unique sets of predictors (Steel, Schmidt, & Shultz, 2008). To be sure, the independence view is not without its critics (see Schimmack, 2008, for a review), but SWB researchers often recommend assessing positive and negative affect separately.

Although it is easy to understand the conceptual distinctions among the various facets of well-being, it is still important to ask how the various components interrelate, both at theoretical and empirical levels. First, it is clear that the various components are, in fact, separable. For instance, multimethod studies show that when different methods of assessment are used to measure distinct well-being components, different measures of the same construct tend to correlate more strongly than do different constructs assessed by similar methods (Lucas, Diener, & Suh, 1996). This means that at a measurement level, the various components are distinct. However, at a theoretical level, it is

necessary to explain the associations among the various constructs and to develop theories about factors that will influence each (Bussèri & Sadava, 2011). As shown by the evidence from discriminant validity studies, life satisfaction judgments are not equivalent to measures of one's affective experiences over time (Lucas et al., 1996). Instead, these cognitive judgments and affective measures provide different information about the quality of people's lives as a whole. It appears that affective experience may provide one source of information individuals can use to judge the overall quality of their lives. However, they may also consider additional factors, including the objective conditions in their lives or their satisfaction with narrower domains (Schimmack, 2008).

Furthermore, the role that these affective experiences play in the construction of global judgments may vary across individuals. For instance, positive and negative affect predict life satisfaction to different degrees in different cultures (Suh, Diener, Oishi, & Triandis, 1998). Among participants from individualist cultures, affective experience was strongly correlated with life satisfaction, whereas among participants from collectivist cultures, the associations were somewhat weaker. Because people living in individualist cultures tend to view the self as an autonomous, self-sufficient entity (Markus & Kitayama, 1991), feelings and emotions weigh heavily as determinants of behavior. Collectivist cultures, on the other hand, stress harmony with family and friends rather than one's autonomy from these people. Feelings about the self (including emotional reactions) weigh less heavily in these cultures. Thus, people appear to rely on their emotions when making satisfaction judgments, but the exact role that these experiences play may vary depending on the value that individuals place on these experiences.

In summary, SWB can be defined as an individual's subjective belief or feeling that his or her life is going well. There is no single judgment that can capture the diverse ways that life can be evaluated. Instead, a variety of cognitive and affective components are needed to provide a relatively complete picture of one's life as a whole. It is important to stress that each component may be

affected by different predictors and may result from distinct but overlapping processes (Kim-Prieto et al., 2005). Thus, researchers who study SWB must carefully consider which components are most useful for their purposes—not all components behave in similar ways. An important goal for ongoing and future research will be to identify and explain the links between these diverse ways of evaluating a person's life.

Measuring SWB

Because SWB researchers value an individual's own opinion about his or her life, it is sometimes assumed that self-reports of well-being provide the “gold standard” measure of the construct. This assumption, however, can be challenged. Although it is true that self-reports are used quite frequently within the field, there are also reasons to be skeptical of these measures. For instance, people may not want to reveal their true level of happiness, and method factors such as scale use or acquiescence bias can overwhelm the true variance that is captured by self-report techniques. Furthermore, if certain cognitive theories are correct, people may not have the cognitive capacity to report accurately on their experiences over time (Robinson & Clore, 2002; Schwarz & Strack, 1999). Thus, the validity of self-reports must not be taken for granted simply because they have strong face validity as measures of subjective feelings. Researchers must make sure that responses to these measures make sense in a larger nomological network that includes non-self-report measures and criteria.

Research examining the psychometric properties of SWB measures has shown that self-report scales tend to be reliable and valid. For instance, multiple-item measures of life satisfaction, domain satisfaction, and positive and negative affect scales all show high reliability, regardless of whether reliability is assessed using interitem correlations or short-term test-retest correlations (Anusic, Lucas, & Donnellan, 2012; Diener, Suh, Lucas, & Smith, 1999). Indeed, even the single-item measures that are common in the field have impressive levels of reliability, which can be tested by examining these measures over time. For instance, Lucas

and Donnellan (2007, 2012) used data from nationally representative panel studies to separate stable trait variance from variance that reflects reliable change in life satisfaction. These models show that approximately two-thirds of the variance in single-item measures in these studies appears to be reliable. Cheung and Lucas (2014) showed that patterns of correlations between single-item measures and predictors were virtually identical to the patterns of correlations between multiple-item measures and predictors, supporting the idea that single-item measures perform well.

More importantly, there is increasing evidence for the validity of these measures. Different measures of the same well-being construct tend to correlate more strongly with one another than with measures of related but theoretically distinct constructs (Lucas et al., 1996). In addition, these measures also converge with non-self-report methods of assessment. For instance, Schneider and Schimmack (2009) conducted a meta-analysis of correlations between self- and informant reports of well-being and found an average correlation of .42. Similarly, Sandvik, Diener, and Seidlitz (1993) showed that expert ratings of participants' happiness correlated approximately .50 with self-reports. Even indirect measures, such as the number of positive versus negative life events an individual could remember and list, tend to correlate with self-report measures of happiness (Sandvik et al., 1993). This evidence suggests that unwanted method variance does not overwhelm the valid variance that is captured by self-report methods of assessment (for comprehensive reviews, see Diener et al., 2009; Diener, Lucas, & Oishi, 2018).

Research also shows that self-report measures are responsive to life events and sensitive to life circumstances. Although we review this evidence in more detail when we discuss the factors that influence well-being, it is worth noting here that well-being measures change when significant life events occur (Lucas, 2007a). Furthermore, individuals living in disadvantaged circumstances tend to report lower well-being than do those living in more ideal settings. For instance, Biswas-Diener and Diener (2001) found that individuals living in the slums of Calcutta reported life satisfaction scores

that were considerably lower than individuals living in more affluent circumstances. Similarly, individuals with severe spinal cord injuries or other lasting disabilities tend to report well-being scores that are much lower than those of individuals without such injuries (Brickman, Coates, & Janoff-Bulman, 1978; Dijkers, 1997; Lucas, 2007b).

It is also the case that SWB measures predict relevant behaviors and outcomes. For instance, Koivumaa-Honkanen and colleagues have examined the predictive validity of self-report life satisfaction and happiness measures in a sample of over 29,000 Finnish adults (mostly twins) who were followed for up to 20 years. Their analyses show that life satisfaction prospectively predicts outcomes that include suicide (Koivumaa-Honkanen, Honkanen, Koskenvuo, & Kaprio, 2003; Koivumaa-Honkanen et al., 2001) and the onset of depression (Koivumaa-Honkanen, Kaprio, Honkanen, Viinamäki, & Koskenvuo, 2004). These results show that people who say they are unsatisfied do things that psychologists would expect unsatisfied people to do.

Of course, this evidence does not mean that SWB measures are beyond reproach. Researchers have raised serious challenges to the validity, and these challenges must be acknowledged and addressed by any psychologist who wishes to use these measures. For instance, Schwarz, Strack, and their colleagues have argued that a variety of irrelevant contextual factors (including minor changes in instructions, setting, question wording, question order, or response options) can have a strong influence on well-being judgments, and that these reports should not be trusted. For instance, in a study that is often cited as evidence for the malleability of well-being reports, Strack, Martin, and Schwarz (1988) showed that simply changing the order of two questions could dramatically influence the correlation between them. In their study, when questions about satisfaction with a specific domain (e.g., relationship satisfaction) preceded a question about general life satisfaction, the correlation between the two measures was strong, but when the general life satisfaction question was asked first, however, then the two measures correlated quite weakly. This pattern of associations suggests that asking

about specific life domains makes information about these domains salient when an individual is later asked to judge his or her life as a whole. It also implies that life satisfaction judgments are constructed “on the fly” and are susceptible to irrelevant contextual effects.

Schwarz and Strack (1990) have amassed an impressive body of research that provides insight into the processes that underlie self-reported judgments of well-being. They concluded that one might interpret this body of evidence to mean that “there is little to be learned from self-reports of global well-being” and that “what is being assessed, and how, seems too context-dependent to provide reliable information about a population’s well-being” (p. 80). However, we believe that such statements are much too strong and are not supported by the large body of evidence showing that SWB measures are stable and valid. Experimental studies in controlled laboratory settings reveal important information about the processes that may underlie complex psychological phenomena. But it is important to remember that demonstrating that such processes exist does not reveal the extent to which these processes affect real-world judgments. Additional research is needed to determine the extent to which irrelevant contextual factors influence SWB measures, and existing research suggests that these influences are not strong.

For instance, Schimmack and Oishi (2005) conducted a meta-analysis of studies that had manipulated the order of life satisfaction and domain satisfaction ratings (along with five new replication studies of their own) showing that the item-order effect that Strack et al. (1988) identified is, on average, quite small. In addition, Schimmack and Oishi (2005), along with Schimmack, Diener, and Oishi (2002), showed that people tend to use chronically accessible information rather than transient sources of information when constructing well-being judgments.

More recently, Yap et al. (2017) conducted nine studies in an attempt to replicate the classic findings by Schwarz and Clore (1983), showing that life satisfaction judgments are strongly influenced by mood at the time of judgment. In the original stud-

ies, participants reported much higher levels of life satisfaction when exposed to positive mood manipulations (e.g., writing about a positive life event, completing the survey on a day with pleasant weather) than when exposed to negative mood manipulations. Yap et al. (2017) used much larger samples than the originals and found evidence for only small (at best) effects of mood manipulation procedures on life satisfaction judgments. These results are consistent with more naturalistic studies showing that contextual factors such as current mood have only a very small influence on well-being judgments that theoretically should be stable (Eid & Diener, 2004). Together, these studies suggest that although people may be influenced by transient and irrelevant contextual information, these effects are quite small.

Although the evidence reviewed above suggests that global self-reports of subjective well-being have relatively strong psychometric properties, this does not mean that alternative approaches to measurement do not have value. One method that has received increasing attention over the years is to rely on approaches that tap more *experiential* forms of well-being. For instance, experience sampling measures (Stone, Shiffman, & DeVries, 1999) assess participants' emotions repeatedly throughout the day, and day reconstruction methods (Kahneman, Keueger, Schkade, Schwarz, & Stone, 2004) ask participants to reconstruct their activities and feelings from a prior day. The idea is that when asked about very recent events, participants will be able to accurately remember and report on their feelings. Although such measures are face valid and appear to address limitations of global measures, much less research has been conducted on their psychometric properties. What research has been conducted suggests that these measures may not correspond as well to alternative measures, such as informant reports, as do traditional global measures (Anusic, Lucas, & Donnellan, 2017; Hudson, Anusic, Lucas, & Donnellan, 2020). Additional research is needed, however, that pits the two types of measures against one another when predicting relevant criteria.

In summary, evidence to date suggests that self-report measures of SWB are reliable and valid, sensitive to external circum-

stances, and responsive to change. They correlate with additional self-report measures and with non-self-report measures and criteria. Finally, they prospectively predict theoretically relevant behaviors and outcomes, which indicates that they can be useful in both research and practice. It is true that there may be times when contextual factors influence these judgments, but we are aware of no research that suggests that such contextual effects have a large impact on the validity of the measures. Thus, researchers can be confident that SWB can be assessed well with standard self-report measures. That being said, we also believe that the self-report does not provide a "gold standard"; thus, alternative techniques should be used when possible. Experience sampling techniques (Scollon, Kim-Prieto, & Diener, 2003) or other self-report procedures that do not require memory for, and aggregation across, numerous events can help. In addition, non-self-report measures, including informant reports, psychophysiological measures, textual analysis, and other novel techniques, can provide important information about the extent to which a person's life is going well.

Evidence for the Importance of Personality

After decades of research on SWB, researchers arrived at what, to some, seemed like a startling conclusion: The most important factor in determining a person's happiness appears to be the personality with which he or she is born. Evidence for this conclusion comes from at least four lines of research. First, studies of objective life circumstances (including factors such as a person's income, age, education level, doctor-rated health, and social relationships) appeared to show that associations with such factors tended to be quite small. Second, SWB is moderately (approximately 50%) heritable, which means that some inborn factors are at work. Third, SWB is stable over time, even in the face of changing life circumstances. And finally, when effect sizes are compared directly, correlations with personality traits tend to be much larger than correlations with external circumstances. This evidence has been interpreted to mean that happiness cannot

change, and that individuals are stuck with a biologically determined level of happiness that is only weakly linked to the circumstances they experience in life. In the following sections, we review evidence from these four different lines of research. Although we believe that personality plays an important role in SWB, a careful examination of the existing evidence suggests that life circumstances also matter, and that there is room for change.

Associations with External Life Circumstances

People's behavior is often guided by their beliefs about the types of things that will make them happy (Gilbert, 2006). People may choose a high-paying job, an expensive house, or a short commute over other alternatives, because they believe that these life circumstances will improve or maintain their happiness. Thus, one goal for psychological research is to identify the factors that actually do correlate with happiness. Through such research, people's intuitions can be tested, and practical guidance can be offered. However, one most common conclusion from such inquiries is that very few objective life circumstances exhibit strong associations with SWB (see, e.g., Diener et al., 1999).

Perhaps the most surprising finding in this line of research concerns the link between income and happiness. Many studies have been conducted, and a number of consistent findings have emerged (Diener & Biswas-Diener, 2002). Most important for the current discussion, research shows that at an individual level, correlations tend to be positive but small. For instance, Lucas and Dyrenforth (2006) reviewed evidence from two meta-analyses (Haring, Stock, & Okun, 1984; Pinquart & Sörensen, 2000), a narrative review of cross-national results (Diener & Biswas-Diener, 2002), and many waves of an annual nationally representative survey (General Social Survey; Davis, Smith, & Marsden, 2003). This review showed that the correlation between income and happiness tends to fall between .17 and .21. The typical interpretation of these data is that people overestimate the importance of money, and that once people have their basic needs met, income does not matter (see

Lucas & Schimmack, 2009, for a discussion).

Although we do not dispute the size of the correlations that have been found in previous research, we caution that such correlations need to be interpreted carefully. For instance, a .20 correlation would mean that each additional standard deviation of income would only "buy" one-fifth of a standard deviation in happiness. However, income standard deviations are quite small relative to the range of the distribution. Thus, when people's intuitions suggest that money will make them happier, they may be concerned with moving closer to the endpoint of the distribution rather than just moving up one or two standard deviations. Even with a relatively weak .20 correlation, the intuition that money matters could still be correct (see Lucas & Schimmack, 2009, for a more complete discussion and illustration).

Additional interpretational concerns about the importance of external circumstances arise when inappropriate measures of the predictor variables are used. This problem can be illustrated by examining the association between health and well-being. Correlations with health tend to be small to moderate in size. Okun, Stock, Haring, and Witter (1984) conducted a meta-analysis of over 200 effect sizes and found correlations around .30. Similarly, Brief, Butcher, George, and Link (1993) found that subjective reports of health tended to correlate between .30 to .40 with life satisfaction. Effects of this size might suggest that health plays a reasonably important role in SWB. However, both groups of researchers have suggested that when more objective measures of health are obtained, the correlation drops close to zero. For instance, Okun and George (1984) found that physician ratings of health were not correlated with well-being, and Brief et al. (1993) found that the number of doctor visits only correlated about .10 with life satisfaction.

Although some have suggested that this type of discrepancy provides evidence that self-reports of health are not valid (e.g., Diener et al., 1999; Kahneman & Riis, 2005), there are some indications that the opposite might be true. Self-reports may in fact be more valid than other objective measures. For instance, self-reports of health predict

mortality over and above more objective measures (e.g., Ganz, Lee, & Siau, 1991; Rumsfeld et al., 1999), and studies that have investigated the discrepancies between self- and doctor-rated health have found evidence that it may be the doctors' judgments that are wrong (e.g., Nelson et al., 1983).

The examples we just described show that associations that appear to be very small can actually be quite large when alternative effect size indices are examined or when appropriate measures of predictor variables are used. Unfortunately, the opposite can also be true. Effects that have been considered very large may not be so large when examined closely. We have argued that this is the case with variables related to the existence of social relationships (Lucas & Dyrenforth, 2005, 2006). When predictors of SWB are compared, variables such as the existence of strong social relationships are presented as if they are the strongest correlates to emerge from the literature (e.g., Argyle, 2001). However, reviews of this literature often focus on satisfaction with relationships, or the extent to which people value relationships, rather than on the existence of relationships themselves. If these more objective measures are evaluated, the correlations are similar to, and perhaps even smaller than, the association with income.

For example, Lucas and Dyrenforth (2006) reviewed the literature on the associations between SWB and the number of friends a person has, whether an individual has a close friend to whom he or she can talk, the amount of time that a person spends with friends, and the amount of time that a person spends with family members. Existing meta-analyses (e.g., Okun et al., 1984; Pinquart & Sörensen, 2000), along with new analyses of data from nationally representative surveys, showed that correlations with these variables tended to be around .15 and very rarely exceeded .20. Even marital status, which has often been held up as one of the most important demographic predictors, only correlates .14 with measures of SWB (Haring-Hidore, Stock, Okun, & Witter, 1985). Thus, at least when relatively objective measures are assessed, these associations are smaller than the effect of income or health (e.g., Hudson, Lucas, & Donnellan, 2020).

We acknowledge that the same concerns about the interpretation of effect sizes that we raised for income and health may also apply to correlations with social relationship variables. A very small correlation may be meaningful, and simple count- and frequency-based measures of social relationships may not adequately capture the quality of these relationships. Furthermore, social relationships, including marriage, predict a wide variety of outcomes that include risk for mental illness, poor physical health, and even death (e.g., Berkman & Syme, 1979; House, Landis, & Umberson, 1988; House, Robbins, & Metzner, 1982). Thus, the robustness of these effects across domains may be important, even if the individual effects are quite small. However, because it is difficult to say whether an individual effect size is practically important, researchers must be careful to compare apples to apples when drawing conclusions about the relative importance of different life circumstances.

The three domains we have reviewed provide just a small sample of effects from the large body of literature linking SWB to demographic characteristics and other external life circumstances. Considerable research has also investigated factors such as age, gender, education, employment status, ethnicity, and religion. A more detailed review is beyond the scope of this chapter, though we refer the reader to other sources, including Argyle (1999, 2001) and one of our previous reviews (Diener et al., 2018) for more detailed coverage. Our goal here is to point out that although effect sizes have often been found to be quite small, these effects must be interpreted carefully. The types of characteristics reviewed in this section do not account for much variance in SWB scores, but this lack of variance does not necessarily mean that they are unimportant. Individuals who become unemployed, acquire a disability, or lose contact with a close friend may, in fact, experience lasting changes as a consequence of these losses. Thus, SWB may be more strongly influenced by life circumstances than has generally been assumed.

Heritability of SWB

The second piece of evidence for personality effects comes from behavioral genetics stud-

ies that examine the heritability of the various SWB components. In the typical design, identical and fraternal twins complete happiness measures and the cross-twin correlations are compared. Simple additive genetic effects are implied when the cross-twin correlation for identical twins is approximately twice as large as the cross-twin correlation for fraternal twins. Nonadditive genetic effects are implied when the ratio of identical to fraternal twin correlations is higher than two (though more sophisticated designs are often required to isolate these effects). Extensions of the basic twin design can be used to examine additional questions about the heritability of happiness. For instance, the inclusion of twins raised in different households allows researchers to isolate shared-environment effects more precisely and to rule out alternative explanations of the results. In addition, by acquiring multiple waves of data over time, researchers can examine the genetic effects on stability and change.

A number of studies have been conducted to examine the heritability of various well-being measures, and most arrive at similar conclusions about the broad heritability of SWB (for a review see Roysamb, Nes, & Vitterso, 2014). For instance, in perhaps the first such study, Tellegen and colleagues (1988) examined twins reared together and those reared apart to estimate the contribution of genes and environment to various scales from the Multidimensional Personality Questionnaire. The estimated heritabilities of the well-being facet and global positive emotionality factor were .48 and .40, respectively. The heritabilities of the stress reaction facet and negative emotionality factor were .53 and .55, respectively. These estimates suggest that about half of the variance in these well-being measures could be accounted for by shared genes. Importantly, this study also suggested that growing up in the same household played a very small role in the similarity of twins. The only significant shared-environment effect was for the global positive emotionality trait, where this component accounted for 22% of the variance.

One criticism that could be raised about this study is that the assessed measures were not developed as measures of SWB. Instead,

they were developed to assess stable personality characteristics that have an affective core. Thus, they may not reflect "happiness" as it is typically studied by SWB researchers. However, studies have replicated this basic effect using a variety of measures. For instance, Roysamb, Harris, Magnus, Vitterso, and Tambs (2002; also see Roysamb, Tambs, Reichborn-Kjennerud, Neale, & Harris, 2003) examined the heritability of a four-item global well-being measure that assessed satisfaction, happiness, nervousness, and activity level. Like Tellegen and colleagues (1988), they found that about 50% of the variance could be accounted for by a genetic component, and the shared-environment component contributed very little. Similarly, Stubbe, Posthuma, Boomsma, and De Geus (2005) reported that 38% of the variability in the Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985) was heritable.

These studies consistently show that regardless of the measure used, broad heritability estimates for well-being constructs tend to fall between .40 and .50. However, this does not mean that behavioral genetics research is without controversy. Perhaps the most controversial issue relates to questions regarding the heritability of the stable component of happiness. According to one prominent model of SWB, people have a set-point level of happiness that is stable over time (Brickman & Campbell, 1971). Events and life circumstances can move people away from this set point, but eventually people adapt and return to baseline. Thus, at any given moment, a person's happiness score might reflect the combined effects of the stable baseline and the temporary influence of life events. If so, the heritability of happiness might be higher if the stable baseline could be isolated from these temporary deviations.

In 1996, Lykken and Tellegen attempted to accomplish this goal using data from identical and fraternal twins who completed happiness measures on two occasions separated by approximately 10 years. They found that the stability of well-being was about .50, which means that approximately 50% of the variance on either of the two occasions was stable trait variance. But more importantly, they found that the cross-

time, cross-twin correlation was .40 in the identical twins. Because this cross-twin, cross-time correlation is 80% as large as the stability coefficient, Lykken and Tellegen estimated that 80% of the stable component of well-being is heritable. They suggested that this extremely high heritability means that “trying to be happier [may be] as futile as trying to be taller” (p. 189).

There are three reasons why this conclusion may be too extreme (also see Roysamb et al., 2014 for a discussion). First, as Rutter (1997) noted, estimates of heritability “provide no unambiguous implications for theory, policy, or practice” (p. 391). In other words, even if Lykken and Tellegen’s (1996) estimate of heritability is correct, this does not necessarily mean that happiness cannot be changed. Until the mechanisms by which these genetic effects work are discovered, questions about the possibility for change remain even when the heritability is known to be strong.

Second, the high heritability only refers to the part of happiness that is stable over time, and this makes up only about half of the variance at any given wave in Lykken and Tellegen’s (1996) study. Furthermore, these stability estimates appear to be at the upper bound for what is typically found in longitudinal studies of SWB. As we review in the section on stability, most studies find 10-year stabilities that are somewhat lower than that found by Lykken and Tellegen. Thus, even if the stable component was 100% heritable and completely unchangeable, there would still be considerable room for change.

Finally, Lykken and Tellegen’s (1996) conclusion is based on a single study with a relatively small sample of twins. Although a more recent study has replicated these findings in a much larger sample (Nes, Roysamb, Tambs, Harris, & Reichborn-Kjennerud, 2006), a second study has not. Johnson, McGue, and Krueger (2005) presented cross-twin, cross-time correlations that suggest 38% of the stable variance in well-being is heritable (though they did not set out to address this question and did not explicitly analyze their data in this way). The major difference between these two samples was age of the participants. Johnson and colleagues’ study included older adults, whereas the study by

Nes and colleagues (2006) and the original Lykken and Tellegen (1996) study included a sample of participants in their 20s. Thus, with only three studies available, the replicability of this more controversial effect (along with the role that age plays in this effect) cannot be evaluated.

Stability of SWB

For decades, psychologists have recognized that there is considerable stability in people’s affective and cognitive evaluations of their lives. This stability is reflected both in the consistency of individuals’ affective reactions to distinct situations and in the maintenance of their relative level of global happiness over time. For instance, in his early studies on the consistency of personality, Epstein (1979) showed that affect during any single day correlates relatively weakly with affect on any other day. However, once affect is aggregated over multiple days, strong correlations emerge. Similarly, momentary affect was assessed across multiple situations using the experience sampling method (Diener & Larsen, 1984). Like Epstein, they found that moment-to-moment correlations were quite weak. However, once affect ratings were aggregated within similar types of situations, average levels of affect were highly consistent over time and across situations. For instance, average positive affect at work correlated .70 with average positive affect experienced during recreation. Similarly, average negative affect at work correlated .74 with average negative affect during recreation. Thus, there are stable individual differences in the levels of positive and negative affect that emerge even across diverse situations.

Of course, cross-situational consistency does not guarantee long-term stability; therefore, to determine whether happiness can change, it is necessary to conduct longitudinal studies over very long periods of time. Results of such studies show that the various SWB components exhibit moderate long-term stability. For instance, Schimmack and Oishi (2005) conducted a meta-analysis of existing studies that had examined the stability of life satisfaction measures. Not surprisingly, they found that stability decreased with increasing intervals. However,

even after relatively long periods of time had elapsed, life satisfaction measures were moderately stable. For instance, the predicted 2-, 5-, and 10-year stabilities were approximately .60, .50, and .35, respectively.

More recently, Lucas and Donnellan (2007, 2012) used data from large-scale panel studies to estimate the stability of single-item life satisfaction measure. They calculated that between 24 and 38% of the variance in single-item life satisfaction measures is trait variance that is perfectly stable over time. Thus, these estimates predict that long-term stabilities should asymptote around .30. Anusic and Schimmack (2016) used meta-analytic techniques to calculate similar estimates from a variety of constructs, including life satisfaction and affect, but also self-esteem and personality. They found that although all constructs exhibited some degree of stability over time, a greater percentage of the reliable variance in personality traits was accounted for by a stable component as compared to the well-being variables. Measures of life satisfaction, in contrast, were influenced by reliable but changing sources of variance.

Most of the studies we described earlier assess broad measures of SWB that are meant to tap general experiences of well-being over longer periods of time. As we noted earlier, however, it is also possible to assess well-being using more experiential measures that track affect as it is experienced over time. One disadvantage of such an approach is that it is relatively burdensome for researchers and participants, which means that it is often only feasible to assess experienced affect over a short period of time. One question that emerges is whether the aggregated reports of well-being that result from such short assessment periods are stable over time; one could imagine that experienced affect could fluctuate substantially from day to day, which would mean that many days would need to be aggregated before a stable individual difference would emerge. However, large-scale panel studies such as the German Socio Economic Panel Study have started to include experiential measures like the day reconstruction method, and even these measures appear to be quite stable over time. For instance, Hudson, Lucas, and Donnellan (2017) examined day reconstruc-

tion method measures across a 4-year period and found that stability was similar to that found in broader, global measures of affect.

Examination of stability coefficients provides one important piece of information about the extent to which personality can change. However, there are alternative techniques for investigating change that go beyond simply assessing rank-order stability. For instance, stability coefficients alone cannot distinguish stochastic change (in which a variety of factors causes random changes that accumulate over time) from systematic change resulting from major life events (Fraley & Roberts, 2005). To assess the reasons for change, more sophisticated designs are required. For instance, the analysis of large-scale, long-running, nationally representative panel studies can be used to determine whether major life events have lasting effects on SWB. These studies can be used to examine long-term levels of SWB both before and after events occur. This means that preexisting differences between those who experienced a particular life event and those who did not can be separated from true longitudinal change. A number of important conclusions can be drawn from these studies (for reviews, see Diener, Lucas, & Scollon, 2006; Lucas, 2007a; Luhmann, Hofmann, Eid, & Lucas, 2012).

First, life events have important associations with long-term levels of SWB. Divorce (Lucas, 2005), unemployment (Lucas, Clark, Georgellis, & Diener, 2003), and the onset of a long-term disability (Lucas, 2007b) are all associated with lasting changes in life satisfaction, and the effects can sometimes be quite large. For instance, onset of a lasting disability was associated with more than a half a standard deviation drop in life satisfaction. The effects of severe disabilities were even larger, with effect sizes over a full standard deviation.

Second, there is no single answer to the question of whether people adapt to major life events. Very little adaptation occurred following the onset of disability, even over very long periods of time (Lucas, 2007b; though see Oswald & Powdthavee, 2008). For events such as unemployment and divorce, on the other hand, some amount of adaptation occurred, but this adaptation was incomplete (Lucas, 2005; Lucas, Clark,

Georgellis, & Diener, 2004). Finally, for events such as marriage and widowhood, a great deal of adaptation occurred, with average levels of happiness returning to pre-event levels (Lucas et al., 2003; but see Anusic, Yap, & Lucas, 2014a, 2014b; Yap, Anusic, & Lucas, 2012).

Third, there are considerable individual differences in the amount of change that occurs following life events. Because pre-event levels of SWB are known in these studies, it is possible to examine both average change and variability around this average level. Analyses show that the amount of variability is often quite large. For instance, Lucas and colleagues (2003) showed that, on average, people adapt to marriage. Within approximately 2 or 3 years after marriage, participants who got married were no happier than they were before they got married. However, the amount of variability in the change scores was almost as great as the variability that existed in pre-event baseline levels. Thus, many people reported lasting positive changes in happiness following the marriage, but there were also many people who reported lasting negative changes. Importantly, results showed that those people who had very positive initial reactions to marriage were also still far from baseline many years later. Thus, the fact that happiness levels are not greater after marriage than they were before marriage does not mean that adaptation is inevitable. Instead, the results from this study of marriage show that the same event may affect individuals in different ways, and these differential reactions may hide the amount of true change that occurs.

Finally, research using panel studies highlights the difficulty in clarifying how life events affect well-being. For instance, our research on divorce highlights the fact that life event research that does not use a prospective design has the potential to conclude that life events have an effect, even though the effect that is identified results from preexisting differences. Lucas (2005) found that although those who experienced divorce ended up less happy than they had been during the happiest portions of their marriage, there was also evidence that these to-be-divorced participants were less happy than those who would remain married, even

before the marriage occurred. Thus, any differences between those who have experienced an event and those who have not after the event has occurred could be due to such preexisting differences.

Furthermore, even when prospective panel studies are used, it is not always easy to isolate the effects of the life event under investigation. For example, although our earliest studies showed that people adapt fully to the event of marriage (Lucas et al., 2003), later work with more sophisticated models suggested that the marriage may protect against declines that participants might have experienced had they not gotten married. By using propensity score-matching techniques, we attempted to match those who eventually married with similar others who did not. Results from these models suggest that marriage protected against declines that occurred among the unmarried (Anusic et al., 2014a, 2014b; Yap et al., 2012). Of course, conclusions about the causal effect of marriage depend on the adequacy of the matching procedure. Thus, additional work using a variety of designs is needed to determine whether these events causally affect well-being outcomes.

Future research will be required to identify the factors that promote or hinder adaptation, both to positive and negative life events. Again, prospective studies can help in this regard. Anusic and Lucas (2014), for instance, looked at whether social support buffers the effects of widowhood on life satisfaction. Most work examining this question only looks at the buffering effects of social support that people report after the event has occurred. However, the protective effect of social support is ambiguous when it is measured after the event has occurred—it is possible that those who bounce back quickest following a loss are more likely to perceive, seek out, or attract more social support than those who are more strongly affected. Indeed, Anusic and Lucas showed that although social support in the years after the loss of a spouse was associated with life satisfaction, the social support that a person reported having before the event occurred did not seem to buffer the effects of the loss. Additional work has examined the role that personality plays in moderating the effects of life circumstances, and this work

generally finds weak buffering effects (Anusic et al., 2014a; Dyrda & Lucas, 2013; Yap et al., 2012).

Associations with Personality Traits

The personality characteristics that have been studied most frequently in relation to SWB are extraversion and neuroticism (Diener & Lucas, 1999). The focus on these two traits is often traced to a landmark study by Costa and McCrae (1980), who argued that the broad trait of extraversion influences feelings of positive affect, the trait of neuroticism influences negative affect, and together these two components of emotional well-being influence overall feelings of life satisfaction. In support of this hypothesis, Costa and McCrae found that extraversion was correlated with feelings of positive affect, and neuroticism was correlated with negative affect. Although the correlations in their study were quite weak (e.g., r s around .20), the fact that they were stable over time led Costa and McCrae to suggest that stable individual differences were important for well-being.

This finding has been confirmed in a large meta-analysis that focused on the associations between SWB and personality trait measures from three widely used personality inventories. Steel et al. (2008) found small to moderate correlations between SWB measures and most of the personality traits they examined, with especially high correlations with extraversion and neuroticism. For instance, the correlations between extraversion and positive affect were .44 for the NEO Personality Inventory (NEO-PI; Costa & McCrae, 1992), .35 for the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975), and .25 for the Eysenck Personality Inventory (EPI; Eysenck & Eysenck, 1968). The correlations between neuroticism and negative affect were .54 for the NEO, .53 for the EPQ, and .46 for the EPI. These results confirm the importance of extraversion and neuroticism as moderately strong predictors of SWB (though most of these associations are from studies that assessed both constructs at the same time using the same methods, which can inflate correlations).

Steel et al.'s (2008) meta-analysis also shows that extraversion and neuroticism

are not the only traits that matter for SWB. For instance, Steel et al. showed that correlations between agreeableness and SWB constructs were consistently significantly different from zero and ranged from .12 for positive affect to .30 for happiness. Similarly, correlations with conscientiousness ranged from $-.21$ for negative affect to .40 for overall quality of life. A separate meta-analysis by DeNeve and Cooper (1998), one that focused on a broader set of traits than that of Steel et al. (2008), found that repressiveness–defensiveness, trust, hardiness, and some forms of locus of control and self-esteem also exhibited relatively high correlations (though many of these correlations were derived from a very small number of studies). Finally, personality traits such as optimism and self-esteem reflect general positive views about the self and the world, and they too have been shown to correlate with well-being (e.g., Lucas et al., 1996; Schimmack & Diener, 2003).

Explanations for these associations generally take one of two forms. McCrae and Costa (1991) suggested that *instrumental theories* posit an indirect link from personality to SWB through choice of situations or the experience of life events. For example, extraverts may enjoy and participate in social activities, which may in turn affect the amounts of positive affect that they experience. These instrumental theories can be contrasted with *temperament theories*, which posit a direct link from the trait to the outcome in question. According to temperament theories, the association does not flow through life choices, life events, or life experiences.

The most widely studied temperament theories link extraversion and neuroticism to affect through two basic motivational systems that have been proposed and investigated by Gray (1970, 1981, 1991; see also Elliot & Thrash, 2002; Tellegen, 1985). According to Gray, much of the variability in personality can be explained by three fundamental systems: the behavioral activation system (BAS), which regulates reactions to signals of conditioned reward and nonpunishment; the behavioral inhibition system (BIS), which regulates reactions to signals of conditioned punishment and nonreward; and the fight–flight system (FFS), which regulates reactions to signals of unconditioned

punishment and nonreward. Extraverts are thought to be higher in BAS strength; thus, they should be more sensitive to signals of reward. This reward sensitivity should be expressed in the form of enhanced information processing and increased positive emotions when exposed to positive stimuli. Similarly, the neuroticism dimension is thought to reflect individual differences in BIS strength. Thus, neurotics should be more sensitive than emotionally stable people to signals of punishment.

Tests of these hypotheses have proceeded either by ruling out instrumental explanations of the associations (e.g., by determining whether social activity mediates the association between extraversion and positive affect; e.g., Lucas, Le, & Dyrenforth, 2008; Srivastava, Angelo, & Valleroux, 2008) or by examining possible direct links between the constructs. For instance, Larsen and Ketelaar (1991) showed that extraverts are more sensitive than introverts to laboratory-based positive mood induction procedures, and that neurotics are more sensitive than emotionally stable individuals to negative mood induction procedures. Lucas and Baird (2004) provided meta-analytic evidence that the extraversion effect is not reliable; but subsequent research suggests that such reactivity emerges when mood inductions reflect appetitive stimuli (Smillie, Cooper, Wilt, & Revelle, 2012). Other researchers have used paradigms that assess attention to and memory for positive and negative events (e.g., Derryberry & Reed, 1994; Rusting, 1998). Finally, researchers have linked these individual differences and affective reactions through specific psychophysiological processes (e.g., Canli, 2004; Depue & Collins, 1999; Depue & Morrone-Strupinsky, 2005). Theoretical progress on the links between these traits and well-being outcomes have advanced rapidly in recent years.

Summary

The research we have reviewed in this chapter shows that when studying SWB, personality matters. Happiness, like most personality characteristics, is moderately heritable and moderately stable over time. In addition, happiness has been linked to specific personality traits and processes. In fact, the

correlations between SWB and personality characteristics such as extraversion and neuroticism are stronger than correlations with any demographic predictor or major life circumstance that has been studied so far. Thus, a theory of well-being that fails to incorporate personality characteristics would be incomplete, and much of what we know about well-being comes from taking a personality perspective on the construct.

That being said, some caution is warranted when interpreting the evidence that has been presented in support of personality effects. For instance, it is important not to interpret strong heritabilities as evidence that happiness cannot change. Until researchers understand the processes that underlie stable individual differences in SWB, questions about the possibility for change remain unanswered. In addition, our review suggests that researchers should be careful not to dismiss effects that may appear at first to be quite small, but that have important implications for individual experience. Income may only account for about 5% of the variance in happiness, but this relatively small effect can hide the fact that the wealthy are considerably happier than individuals who live at the poverty level and below. Finally, although the stability of SWB over long periods of time is impressive, it appears that, at most, about 35% of the variance reflects a stable trait component that does not change over time (though the percentage of reliable variance is probably higher). In addition, the study of major life events shows that significant changes in life circumstances can have large and lasting effects on happiness. Thus, well-being is responsive to life events and changing life circumstances—which leaves hope that it can be improved.

Researchers and practitioners hoping to use SWB in applied settings are sometimes dismayed by the effects described in this chapter. But it is important to realize that even if there is a reasonable amount of stability and strong personality effects, attempts to improve overall levels of SWB can still be a worthwhile goal. As an analogue, we can consider physical health. If it were possible to construct a purely objective index of overall physical health, it is likely that this index would be moderately to strongly stable over time, moderately heritable, and at least somewhat related to personality traits.

Yet these facts alone would probably not persuade medical researchers to give up their quest to improve levels of health. Instead, research on the stability and personality correlates of this construct would be incorporated into broad theories that explain the processes that underlie these stable individual differences in physical health. This should also be true of research on SWB. Much of what we know about the construct comes from studies that investigate the personality predictors of the trait. This research can be used to develop broad theories that explain both stability and change in happiness over time.

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CHAPTER 35

Personality and Psychopathology

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Psychopathology refers to the broad category of emotional and behavioral disturbances in social, psychological, or occupational functioning, often described in terms of psychiatric disorders and symptoms (e.g., in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* [DSM-5]; American Psychiatric Association, 2013). Broadly speaking, psychopathology can be characterized in three general areas: (1) internalizing disorders, indexed by internal distress (e.g., sadness and anxiety), (2) externalizing disorders, indexed by externally disinhibited behaviors (e.g., aggression and substance use), and (3) thought disorders, indexed by cognitive and perceptual disturbances (e.g., psychosis) (e.g., Kotov, Ruggero, et al., 2011). Notably, this overarching structure maps onto models of normal personality in robust and meaningful ways (Kotov et al., 2017; Widiger et al., 2019). Thus, we use these broad categories to organize and synthesize the content in this chapter (intentionally excluding personality disorders, which are covered by Widiger & Oltmanns, Chapter 36, this volume).

Research at the intersection of personality and psychopathology is a vibrant and growing area. Over the past 15 years, research on personality and psychopathol-

ogy has increased from just over 8,000 new research products in 2001 to over 20,000 new research products every year for the past 5 years, based on cited works indexed in Google Scholar (see Figure 35.1). In this growing area, the overall number of published findings and theoretical writings is enormous. In this chapter, we first review the various ways in which personality traits are associated with psychopathology and briefly summarize the most common causal models of personality–psychopathology associations. We then highlight several areas of particular interest in the broader field: personality as a framework for psychopathology; personality as it relates to structural models of psychopathology; developmental considerations; and clinical utility and applications of personality.

How Is Personality Related to Psychopathology?

In this section, we briefly summarize personality–psychopathology associations separately for internalizing disorders, externalizing disorders, and thought problems. The vast majority of research on personality and psychopathology has been descrip-

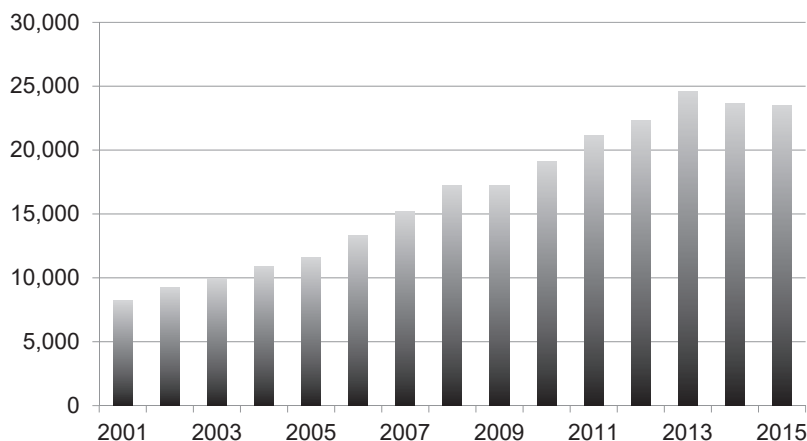


FIGURE 35.1. Citation counts for “personality” and “psychopathology” over the last 15 years, as indexed by Google Scholar.

tive and has produced cross-sectional associations between specific personality traits and disorders or disorder categories or dimensions. Although such associations do not offer direct information about cause or process, the sheer magnitude of work examining these associations offers a robust estimate of overall trait–disorder relations. Before discussing questions of cause, process, and function, we first highlight the now largely established pattern of personality–psychopathology associations. In general, we use the Big Five domains (John, Chapter 2, this volume) to describe personality–trait associations, with the understanding that different measures of each domain map onto one another and reflect shared trait variance (Markon, Krueger, & Watson, 2005).

Internalizing disorders, which are characterized by problems with anxiety and depression, typically show strong associations with the higher-order trait of neuroticism (Brandes & Tackett, 2019; Kotov, Gamez, Schmidt, & Watson, 2010; Kushner, Tackett, & Bagby, 2012; Tackett, Lahey, et al., 2013; Tackett, Quilty, Sellbom, Rector, & Bagby, 2008). Internalizing disorders can be further split into distress (e.g., depression) and fear (e.g., panic) categories, with some indication that distress may be slightly more strongly related to neuroticism (Kotov et al., 2010), although this may also be account-

ed for primarily by distress–fear comorbid cases (Tackett, Quilty, et al., 2008). Internalizing disorders also show associations with low extraversion and low conscientiousness, with somewhat mixed findings for agreeableness and openness to experience (Kotov et al., 2010; Naragon-Gainey, Watson, & Markon, 2009; Tackett, Quilty, et al., 2008; Watson, Stanton, Khoo, Ellickson-Larew, & Stasik-O’Brien, 2019).

Externalizing disorders, which are characterized by problems with disinhibited behavior, including aggression, substance use, and gambling, also show associations with higher levels of neuroticism (Kotov et al., 2010; J. Miller et al., 2013; Mullins-Sweatt, DeShong, Lengel, Helle, & Krueger, 2019; Tackett, Daoud, De Bolle, & Burt, 2013; Tackett, Herzhoff, Reardon, De Clercq, & Sharp, 2014). Indeed, neuroticism accounts for substantial variance in internalizing–externalizing disorder comorbidity (or above-chance co-occurrence; Brandes & Tackett, 2019; Tackett, Lahey et al., 2013), positioning neuroticism as a potential “general” personality liability for psychopathology of any type. Beyond neuroticism, the strongest personality associations for externalizing disorders are typically with low agreeableness and low conscientiousness (Eisenberg et al., 2009; Kotov et al., 2010; Lahey & Waldman, 2003; J. Miller, Zeich-

ner, & Wilson, 2012; Mullins-Sweatt et al., 2019; Tackett, Daoud, et al., 2013; Tackett et al., 2014). Associations with extraversion and openness to experience, and externalizing psychopathology, tend to be more mixed (Kotov et al., 2010; Tackett, Daoud, et al., 2013).

Finally, thought disorder, or psychosis, has been less extensively investigated relative to normal-range personality traits, in part because these symptoms are much less common in the larger population. However, this domain of psychopathology has been the center of some debate around whether psychosis is dimensionally related to normal-range openness to experience or a fully distinctive component from openness to experience (e.g., Chmielewski, Bagby, Markon, Ring, & Ryder, 2014; DeYoung, Grazioplene, & Peterson, 2012; Tackett, Silberschmidt, Krueger, & Sponheim, 2008). Beyond the extensive discussions around associations between psychosis and openness to experience, psychosis appears to be associated with higher levels of neuroticism and lower levels of extraversion (Dinzeo & Docherty, 2007).

Why Is Personality Related to Psychopathology?

There are four major models of the etiology, nature, and implications of the relationship between personality and psychopathology: *scar-complication*, *vulnerability-risk*, *pathoplasty*, and *spectrum-continuum* models (Krueger & Tackett, 2003; South, Eaton, & Krueger, 2011; Tackett, 2006; Widiger & Smith, 2008). Each of these models is discussed in more detail, but it should be noted that there is no consensus about which model provides the best explanation for these relationships, and the models are not mutually exclusive (Clark, 2005).

Scar-Complication

The scar and complication models suggest that the experience of psychopathology leads to change in premorbid personality functioning; that is, the psychopathology experience essentially “scars” the underlying personality. For example, premorbid

traits of dependency, introversion, and neuroticism might be increased following the occurrence of multiple major depressive episodes (Shea & Yen, 2005; Tackett, 2006). Unfortunately, there are very few empirical studies of this model.

Vulnerability-Risk

The vulnerability or risk model hypothesizes that preexisting personality traits predispose an individual to develop particular mental disorders. For example, individuals high in neuroticism and low in extraversion are more likely to experience anxiety disorders, major depressive disorder, and attempted suicide, while individuals low in conscientiousness are more likely to engage in antisocial behaviors and have substance use problems (Tackett, 2006). Similarly, neuroticism may be a predisposing vulnerability that contributes to the development and presentation of borderline personality disorder (BPD) symptoms in adulthood (Barlow, Sauer-Zavala, Carl, Bullis, & Ellard, 2014; Skodol et al., 2002; Widiger, 2005). In fact, neuroticism has been demonstrated to be an early vulnerability factor for many disorders—notably, for not only major depression (e.g., Fanous, Neale, Aggen, & Kendler, 2007; Kendler, Neale, Kessler, Heath, & Eaves, 1993) but also for schizophrenia (van Os & Jones, 2001). A key aspect of the vulnerability-risk model is that the earlier personality traits are conceptualized as qualitatively distinct from the later psychopathology they predispose an individual to develop. Thus, the “presence” of the earlier personality trait places an individual at elevated risk for developing the disorder later in life.

Pathoplasty

In contrast to the vulnerability model, the pathoplasty model does not assume that personality traits predict the onset of psychopathology. Instead, the pathoplasty model suggests that once psychopathology occurs, personality traits impact the presentation, course, and severity of the disorder (Widiger & Smith, 2008). An example might be the increased suicide risk in an individual with major depressive disorder who also has high

levels of disinhibition—in this case, the presence of a specific personality trait (disinhibition) modifies the specific nature of disorder expression. The experience of major depressive disorder without disinhibition would not show this same modification (i.e., increased risk of suicidality).

Spectrum

The spectrum model proposes that personality and psychopathology are part of the same continuum, ranging from general traits to subclinical characteristics to diagnostic disorders (DeBolle, Beyers, De Clercq, & De Fruyt, 2012). The spectrum model is largely consistent with a “common cause” explanation, such that the traits and disorders lying on the same spectrum are expected to be both quantitatively related, rather than qualitatively distinct, and influenced by similar causal factors. One example of this model is the “schizophrenia spectrum” of disorders (i.e., schizophrenia, schizotypal personality disorder, and paranoid personality disorder), which is commonly described as differing manifestations of a common etiology (e.g., Nicolson et al., 2003). Research linking neuroticism to other disorders, as well as latent psychopathology factors (such as the “general factor” of psychopathology) has also supported a spectrum association by defining shared causal factors underlying an individual’s neuroticism level and psychopathology manifestation (e.g., Hettema, Neale, Myers, Prescott, & Kendler, 2006; Mikołajewski, Allan, Hart, Lonigan, & Taylor, 2013; Tackett, Lahey, et al., 2013). Evidence for the risk–vulnerability model may actually support a spectrum model conceptualization, if not directly tested (ideally with strong tests of potential common causes that may account for trait–disorder associations).

How Do We Organize These Relationships?

There are a number of important questions to consider when examining the organizational structure of personality–psychopathology associations. For example, what is the best way to organize the extensive corpus of research findings on trait–disorder associations (which we have only briefly highlighted here)? How do personality findings advance

our understanding of psychopathology, and vice versa? Can such findings inform our understanding of disorder emergence or trait change? In this section, we tackle these broad but interconnected questions.

Personality as Context

Personality trait structure has been studied for a century now, with hierarchical models of personality traits well established in the literature, connecting models of normal and abnormal personality traits, clinical and community samples, and age groups across the lifespan (Markon et al., 2005; Tackett et al., 2012). Personality models are comprehensive and far-reaching, offering an empirically validated framework for organizing the myriad individual differences across many populations. As such, they can serve a useful and powerful framework for organizing and understanding other psychological constructs—including psychopathology (Watson, Clark, & Harkness, 1994; Widiger et al., 2019). Use of personality as a framework can occur in various ways. For example, personality trait associations may be used to answer questions regarding relatedness between various symptom dimensions or disorders, distinctiveness between symptom subdomains or subfactors, and even broader questions of whether certain behaviors should be considered psychopathology. Although many examples of personality serving these functions can be found throughout the literature, we highlight some illustrative examples below.

Most disorders evidence moderate to high correlations with neuroticism, including virtually all of the disorders typically characterized as “internalizing” disorders. However, only some internalizing problems show moderate associations with low extraversion, or positive emotionality (Watson, Gamez, & Simms, 2005; Watson et al., 2019). This particular pattern of associations indicates common groupings of internalizing disorders that may be otherwise masked using a rational sorting approach (e.g., differentiations between anxiety and depressive disorders). Specifically, internalizing disorders showing moderate correlations with low extraversion include both

depressive disorders (e.g., major depressive disorder) and anxiety disorders (e.g., social phobia; Naragon-Gainey, Watson, & Markon, 2009; Watson et al., 2005). In this case, the personality framework argues for a different grouping of disorders based on their empirical associations with personality traits.

In addition to using personality to group psychologically similar disorders together, personality associations may also point to important distinctions between symptoms that are grouped together, for example, within a given diagnosis. Attention-deficit/hyperactivity disorder (ADHD) is a diagnosis with many symptoms, often differentiated by symptoms reflecting problems with inattention versus problems with hyperactivity. Temperament–trait associations indicate that low conscientiousness is particularly associated with inattentive ADHD symptoms, whereas high neuroticism and low agreeableness are associated more generally with hyperactive ADHD symptoms (Martel, Nigg, & von Eye, 2009). In this case, personality offers empirical validation of symptom clustering, while also pointing to potential underlying mechanisms and pathways through which distinct symptoms emerge and develop (Martel et al., 2009).

In addition to informing overall groupings of psychopathology structure, the personality framework can also inform fundamental questions about what should be considered psychopathology. For example, *relational aggression* is defined as aggressive acts intended to damage one's social status or interpersonal relationships. There has been some controversy over whether relational aggression should be considered a form of psychopathology or a normative behavior qualitatively distinct from other types of aggression or externalizing problems. Personality associations offer some insight: Relational aggression typically shows moderate correlations with neuroticism, (low) agreeableness, and (low) conscientiousness, a profile virtually identical to that for physical aggression and many other externalizing disorders (Burt, Donnellan, & Tackett, 2012; Tackett, Daoud, et al., 2013). Such findings offer support for a common grouping between relational aggression and other problems classified as psychopathology.

Structural Models of Psychopathology

Although hierarchical structural models are the historic norm in personality research, they were introduced to the field of psychopathology much later—to child psychopathology in the 1960s and 1970s (e.g., Achenbach, 1966), then decades later to adult psychopathology (e.g., Krueger, 1999). Nonetheless, a sizable movement has grown to argue for an empirically based approach to classifying and organizing symptoms of psychopathology (Kotov et al., 2017; Widiger et al., 2019). It is notable that the move toward hierarchical structural models of psychopathology has been highly informed by personality research. The long-standing use of hierarchical structural models to characterize personality traits offers a rich theoretical and methodological history on which psychopathology researchers can draw (Markon et al., 2005; Markon, 2009).

Like personality traits, psychopathology symptoms exist on the same dimensions as normal manifestations of the underlying construct, and are therefore most accurately conceptualized as continuous (Haslam, Holland, & Kuppens, 2012; Markon & Krueger, 2005; Widiger & Samuel, 2005). Dimensional hierarchical models are particularly useful in organizing psychopathology constructs, as they offer an empirical answer to problems of *comorbidity* or co-occurrence of multiple disorders at greater than chance levels (Forbes, Tackett, Markon, & Krueger, 2016; Kessler, Chiu, Demler, & Walters, 2005; Ormel et al., 2015). A dimensional classification retains information about an individual's functioning across all dimensions simultaneously, increasing the amount of information about a person's functioning while eliminating problems created by a categorical system. The concept is likely unsurprising to personality researchers, who easily comprehend what it means for a single individual to be high on extraversion, low on neuroticism, and average on conscientiousness. The benefits of these models are increasingly recognized in psychopathology circles.

As noted previously, such empirical approaches typically characterize three broad domains at higher-order levels: internalizing, externalizing, and thought problems.

Somatoform disorders and symptoms may ultimately form a fourth higher-order dimension, but data on this issue are quite limited (Kotov et al., 2011). One recent proposal offers two additional dimensions—detachment and antagonism—beyond the four already mentioned: internalizing, externalizing, thought disorder, and somatoform (Kotov et al., 2017), which are notably both anchored by personality content. Dimensions falling lower in the hierarchy have not been as clearly delineated, an issue that has received focused attention (Kotov et al., 2017) and is not unlike questions about lower-order hierarchical structure in personality frameworks. Importantly, personality research and constructs play a critical role in the developing work on psychopathology structure and modeling. In addition to the vast knowledge base of constructing, measuring, and analyzing dimensional hierarchical models in personality research (Markon, 2009), personality trait associations and contributions to various symptoms and disorders form a primary theoretical basis for ongoing decisions about characterizing psychopathology structure (Kotov et al., 2017).

These movements also have some analogue in other, relatively recent proposals for organizing and guiding psychopathology research. In particular, the National Institute of Mental Health has recently promoted the Research Domain Criteria (RDoC) framework to guide mental health conceptualization and, in particular, research (Cuthbert & Insel, 2010, 2013). The RDoC framework aims to characterize major dimensions undergirding psychopathology syndromes and symptoms, ideally, with established connections to biological causal factors and mechanisms. The RDoC framework comprises negative valence systems, positive valence systems, cognitive systems, systems for social processes, and arousal/regulatory systems. On some level, a basic description of the RDoC framework sounds eerily similar to a description of broad-band personality models used in psychopathology research: a set of dimensional constructs thought to undergird mental disorder and cut across existing diagnostic boundaries in summarizing behavior and functioning. Yet the development of the RDoC was quite different than, say development of the five-factor model

(FFM), as RDoC dimensions were closely tied to underlying biology and neuroscience constructs. Thus, the RDoC dimensions do not cleanly map onto empirically derived phenotypic structures such as that of the FFM or the dimensional structural models of psychopathology we have highlighted here (e.g., internalizing–externalizing). Additionally, the coverage of clinical phenomena within the RDoC dimensions is neither highly detailed nor comprehensive. Nonetheless, this movement is promising in that it underscores renewed interest in dimensional approaches in psychopathology, and will (we hope) increase acceptance of these models in the broader community.

Developmental Perspectives

Although the development of dimensional structural models for psychopathology constructs was initially pioneered in child and adolescent samples (Achenbach, 1966) and only later extended to adults, the research trends in personality research have flowed in the opposite direction, with much less attention directed toward understanding personality in youth (Shiner, Chapter 12, this volume; Soto & Tackett, 2015). Nonetheless, it is clear that child personality foreshadows the development of psychopathology later in life (e.g., Hengartner, Ajdacic-Gross, Wyss, Angst, & Rössler, 2016; Muris & Ollendick, 2005; Shiner, Masten, & Roberts, 2003). It seems likely that research on personality–psychopathology relationships in early life will increase, following advances in measurement and assessment of early personality traits (Soto & Tackett, 2015). Despite the fact that research on child personality is less developed than that for adults, child clinical psychologists have frequently drawn on temperament and personality traits to inform their understanding of psychological disorders and symptoms. Similar to work with adults, researchers have drawn on child personality and temperament to inform the development of structural models and classification approaches to psychopathology (e.g., De Pauw & Mervielde, 2010; Lahey et al., 2008; Slobodskaya, 2016).

There are also prominent examples of developmental theories of problem behav-

iors that integrate personality concepts in a meaningful and substantive way. For example, researchers examining the development of externalizing psychopathology in youth have noted that many of these behaviors onset or peak in adolescence (e.g., delinquency, addictive behaviors, risky sexual behavior; Burt, 2012; Stanger, Achenbach, & Verhulst, 1997). More recent theories of adolescent risky behaviors (including disinhibitory psychopathology), invoke developmental increases in sensation-seeking and reward sensitivity in combination with lower levels of self-control (all personality traits) as potential mechanisms underlying these developmental trends (Steinberg, 2008).

Personality can easily be integrated into a broader developmental psychopathology framework that emphasizes concepts of multifinality and equifinality, delineating mechanisms leading to change and continuity over time, and examining the role of development in psychopathology (Rutter & Sroufe, 2000). The concepts of *multifinality* (when the same risk factor results in multiple and distinct outcomes) and *equifinality* (when different risk factors results in the same outcome) are commonly investigated as developmental causal processes for psychopathology. These processes can be readily integrated with the vulnerability model, described previously, when considering early personality traits as risk factors for later psychopathology. For example, behavioral inhibition—a temperamental risk factor for later anxiety disorders—is moderated by social involvement in adolescence (Frenkel et al., 2015), a finding consistent with a multifinality process in personality–psychopathology associations.

Clinical Utility and Applications

Despite the research examining the intersection of personality and psychopathology, the use of personality is quite limited within clinical settings. While the trait-based personality literature has a rich supply of empirical scholarship demonstrating clear links between personality traits and psychopathology, it has been argued that this literature is difficult to generalize to clinical settings (Lengel, Helle, DeShong, Meyer, & Mullins-Sweatt, 2016). We argue that this

intersection has vast implications for clinical application.

Significance of Personality in Aspects of Living

Personality measurement is a valuable clinical assessment and intervention tool. Traits are meaningfully associated with clinically relevant personal, social, and occupational problems in living (Hopwood et al., 2009; Mullins-Sweatt & Widiger, 2010; Ozer & Benet-Martinez, 2006). Additionally, they are related to maladaptive behaviors such as nonsuicidal self-injury (NSSI; Brown, 2009; Glenn & Klonsky, 2010), relational aggression (Atherton, Tackett, Ferrer, & Robins, 2017), alcohol abuse (Turiano, Whiteman, Hampson, Roberts, & Mroczek, 2012), pathological gambling (Ledgerwood, Alessi, Phoenix, & Petry, 2009), mood and anxiety disorders (Clark, Watson, & Mineka, 1994), and personality disorders (PDs; Widiger & Oltmanns, Chapter 36, this volume). Finally, traits may contribute to how clinicians select appropriate treatments, provide realistic progress expectations (e.g., which behaviors are amenable to change), and help improve a client's sense of self (Harkness & Lilienfeld, 1997).

Personality traits are associated with a variety of physical and mental health outcomes, as well as aspects of daily living. For example, Malouff, Thorsteinsson, and Schutte (2005) found that mental disorders are associated with high levels of neuroticism and low levels of conscientiousness, extraversion, and agreeableness. Neuroticism appears to relate most highly with several clinical disorders and maladaptive behaviors, and seems to be the primary trait that distinguishes between individuals with and without psychopathology (Krueger, Caspi, Moffitt, Silva, & McGee, 1996). Broadly, mood, anxiety, and substance abuse are associated with high neuroticism and low conscientiousness, while, more specifically, dysthymic disorder and social phobia are associated with low extraversion (Kotov et al., 2010).

Personality traits are also linked to a variety of clinically relevant physical health outcomes as well. For example, extraversion and conscientiousness are correlated with longevity (e.g., Danner, Snowdon, & Fries-

en, 2001; Friedman & Hampson, Chapter 37, this volume), possibly as a result of stronger social support and inhibition of risky behaviors. Additionally, conscientiousness has been linked to a number of maladaptive health behaviors (e.g., substance use, unhealthy eating patterns, risky sex; Boggs & Roberts, 2004; Friedman & Hampson, Chapter 37, this volume). Low agreeableness predicts poorer physical health outcomes such as cardiovascular disease and decreased lifespan (T. Miller, Smith, Turner, Guijarro, & Hallet, 1996), and high neuroticism is related to increased risk of physical disease and illness behaviors (Smith & Spiro, 2002). There also are strong links between personality and chronic stress and stress-related diseases. Finally, personality pathology is related to physical health problems, such that individuals who have extreme or maladaptive personality traits show increased health care utilization and medication use (Chen et al., 2009; Powers & Oltmanns, 2012).

Assessment and Intervention

Assessing traits of personality might have benefits for clinicians treating patients. Trait-based dimensional personality models can aid individualized treatment planning, allowing for better specification of problematic areas and obstacles, targeted or tailored treatments, and identification of strengths that might impact treatment (Skodol et al., 2011). For example, adaptive personality traits, such as moderate conscientiousness, may imply that an individual might be receptive to therapeutic approaches that are more rigorous or involve homework (e.g., cognitive-behavioral therapy). Similarly, maladaptively low extraversion might suggest that an individual may experience inadequate social support, that there may be difficulties building a therapeutic alliance, or that individuals may eschew recommendations for group therapy.

Although there are few empirical studies investigating the use of personality models in treatment planning, there is much speculation about how personality traits might inform and guide clinical intervention. For example, individuals high in neuroticism likely experience heightened personal distress and

may benefit from psychopharmacological and therapeutic interventions aimed at reducing negative affect and regulating emotions (e.g., Barlow et al., 2014). Birath, Demarinis, Stenbacka, and Klinteberg (2011) found that certain personality characteristics (e.g., vulnerability to stress) may be utilized to target specific aspects of intensity and planning for women receiving substance abuse treatment. Maladaptive high agreeableness is associated with problematic relationships, and such individuals may benefit from interventions that facilitate assertiveness. There are a number of potential translational applications of personality including development of targeted treatments, predicting treatment outcome, and guiding treatment planning. Thus, the intersection of personality, psychopathology, and treatment has great potential for future study.

Summary

Personality models provide a compelling framework for understanding the etiology, presentation, course, and treatment of psychopathology (Widiger & Smith, 2008; Widiger et al., 2019). Research has advanced beyond simply examining relationships and considering the causal mechanisms within these associations, and is now moving toward the successful translation of personality to other, related psychological constructs and applied fields. Additionally, personality research continues to play a crucial role in psychopathology structure and modeling, with impressive strides in recent years. Much of the work described in this chapter has examined broad dimensions of personality. To advance the field in meaningful ways, future research should examine the associations of lower-order personality facets to specific pathological traits and disorders, and test these associations longitudinally and in clinical settings.

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CHAPTER 36

Personality and Personality Disorder

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There is a substantial body of research on personality traits and structure, which is quite evident from the chapters in this volume. There is also a body of literature and research concerning personality disorders, the conceptualization and diagnosis of which is governed within the United States by the fifth edition of the American Psychiatric Association's (2013) *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5). Historically, there was little integration of the psychiatric understanding of personality disorders with the psychological research on general personality structure (Widiger & Frances, 1985). Nevertheless, over the past few decades there has been an effort by many researchers to conceptualize the personality disorders of the American Psychiatric Association in terms of dimensional trait models developed within psychology, more specifically, the five-factor model (Widiger & Costa, 1994).

Section II of DSM-5 (American Psychiatric Association, 2013) provides the official diagnostic categories, including 10 personality disorders: antisocial, avoidant, borderline, dependent, histrionic, narcissistic, obsessive-compulsive, paranoid, schizoid, and schizotypal. Proposed for DSM-5, however, was the deletion of four to five of

these categories, as well as a significant reformulation of those retained, replacing the specific and explicit criterion sets that were a major innovation of DSM-III (Kendler, Muñoz, & Murphy, 2010) with paragraph descriptions consisting of 10–17 often complex sentences, with no rules or guidance as to how many of the features need to be present, or even a requirement that each sentence be considered (Skodol, 2012). “Diagnosticians rate the overall similarity or ‘match’ between a patient and the prototype . . . considering the [narrative] prototype as a whole rather than counting individual symptoms” (Westen, Shedler, & Bradley, 2006, p. 847). Also included within the initial proposal was a six-domain, 37-trait model (eventually reduced to five domains and 25 traits) that was to be used to describe patients who did not meet criteria for one of the five to six retained syndromes.

The narrative paragraphs were eventually abandoned due to an absence of adequate empirical support and concerns over poor reliability (Widiger 2011; Zimmerman, 2011). The narrative paragraphs were replaced with another novel proposal, identified as a “hybrid model,” in which each personality disorder is diagnosed on the basis of a combination of four self–interpersonal defi-

cits (Criterion A) and a set of maladaptive personality traits (Criterion B). The self and interpersonal deficits were obtained from psychodynamic literature, which has suggested that fundamental and unique to all personality disorders are deficits in the sense of self and interpersonal relatedness (Kernberg, 2012). The traits were obtained from the dimensional trait model.

The hybrid proposal for DSM-5 was approved by the DSM-5 Task Force but ultimately rejected by a scientific oversight committee (Skodol, Morey, Bender, & Oldham, 2013; Widiger, 2013). That was not particularly surprising given the absence of any research on the hybrid model. In the end, all of the DSM-IV (American Psychiatric Association, 1994) diagnoses were retained for DSM-5, unchanged. However, the proposed revisions were included in a Section III appendix (for emerging measures and models; American Psychiatric Association, 2013, p. 729).

An even more radical proposal was made for the personality disorders section of the World Health Organization's (WHO) 11th edition of the *International Classification of Diseases* (i.e., ICD-11). The ICD is the authoritative classification for the diagnosis of mental disorders for its 194 member states, which includes the United States. Each member country can alter the ICD in a manner that will be optimal for that particular country. Indeed, DSM-IV was America's version of ICD-10. Proposed for ICD-11 was the deletion of all of the personality disorder categories, to be replaced by a five-domain dimensional trait model, along with a rating of overall level of severity (Tyrer et al., 2011). This proposal met substantial opposition in the final year of its consideration (Herpertz et al., 2017). However, an approved compromise revision (Reed, 2018) comprised a modified version of the level of severity (now including self-interpersonal deficits comparable to those included in Criterion A of DSM-5 Section III), the five-domain dimensional trait model, and a borderline syndrome (Tyrer, Mulder, Kim, & Crawford, 2019). In summary, the forthcoming ICD-11 will retain only one of the personality disorder syndromes of ICD-10 (WHO, 1992), replacing (for instance) the antisocial, dependent, his-

trionic, and paranoid personality disorders with a dimensional trait model.

Our purpose in this chapter is to familiarize the reader with DSM-5 Section II personality disorders, as these are the current official diagnoses within the United States. We cover as well, though, an understanding of these syndromes from the perspective of general personality structure, particularly the five-factor model. Also considered will be the forthcoming ICD-11 personality disorders section, along with the comparable proposal for DSM-5 that was placed in Section III of the diagnostic manual.

DSM-5 Section II Personality Disorders

There is a significant body of research concerning some of the DSM-5 Section II personality disorders, more specifically, the antisocial, schizotypal, borderline, dependent, and narcissistic personality disorders. There are many studies involving the other five, but much of this research involves matters common to all 10 personality disorders. There is relatively little research addressing issues specific to or particularly important for the histrionic, avoidant, schizoid, paranoid, or obsessive-compulsive disorders. There are some exceptions (e.g., research concerning the effort to differentiate avoidant personality disorder from generalized social phobia, and research concerning potential gender bias for histrionic disorder), but relative to the antisocial, schizotypal, borderline, dependent, and narcissistic disorders, this research literature is sparse. Another way to consider this point is that there are researchers (and edited texts) devoted specifically to the antisocial personality disorder (e.g., Robert Hare and David Cooke), the schizotypal (e.g., Larry Siever), the borderline (e.g., John Gunderson and Marsha Linehan), the dependent (e.g., Robert Bornstein), and the narcissistic (e.g., Elsa Ronningstam), but this has not been the case for the other five.

It is not really clear why the schizoid, paranoid, histrionic, avoidant, and obsessive-compulsive personality disorders have not generated as much research interest. Borderline, schizotypal, and narcissistic disorders were new additions to DSM-III (American Psychiatric Association, 1980), reflecting at

that time strong interest in these personality syndromes. Avoidant personality disorder was also a new addition to DSM-III, but it was a creation of one work group member and did not represent a strong wider interest (Gunderson, 1983). It might be the case that paranoid, schizoid, histrionic, and obsessive-compulsive disorders represent relatively old, if not archaic, personality syndromes developed during the early history of the diagnostic manual, dominated at that time by psychodynamic theory. However, that should not be interpreted as suggesting that they are not worthy of scientific research or fail to identify important maladaptive personality traits. In any case, we cover herein the five personality disorders for which there has been significant research interest: antisocial, borderline, schizotypal, dependent, and narcissistic personality disorders.

Antisocial Personality Disorder and Psychopathy

Psychopaths are “social predators who charm, manipulate, and ruthlessly plow their way through life. . . . Completely lacking in conscience and feeling for others, they selfishly take what they want and do as they please, violating social norms and expectations without the slightest sense of guilt or regret” (Hare, 1993, p. xi). Psychopathy is one of the more heavily researched and intriguing personality disorders. Some of the most famous, or perhaps infamous, criminals, real or imagined, have been considered to be psychopathic (e.g., Clyde Barrow, Dexter, Ted Bundy, Tony Soprano, Hannibal Lector, Bernie Madoff, Henry Hill).

The DSM-5 diagnosis for this disorder is antisocial personality disorder (ASPD; American Psychiatric Association, 2013). For many years there was a contrast between psychopathy as defined by Hare’s (2003) Psychopathy Checklist—Revised (PCL-R) and ASPD as defined by the APA (Crego & Widiger, 2015). The PCL-R placed relatively more emphasis on personality traits, such as glib charm, manipulation, arrogance, impulsivity, irresponsibility, and callous lack of empathy, whereas the APA diagnostic criteria placed relatively more emphasis on behavioral indicators, particularly criminal

acts. Most research now concerns psychopathy rather than DSM-5 Section II ASPD. This may reflect the fact that psychopathy, as assessed by the PCL-R, was much closer to the conceptualization of this disorder by the historically influential theorist and clinician, Hervey Cleckley (1955).

The optimal definition for what constitutes psychopathy, though, remains unclear (Lilienfeld, Watts, Francis Smith, Berg, & Latzman, 2015). Three recently developed models and measures have deviated importantly from the influential and predominant PCL-R, converging with one another through the inclusion of such comparable traits of boldness within the Triarchic Psychopathy Measure (TriPM; Patrick, Fowles, & Krueger, 2009), fearlessness with the Psychopathic Personality Inventory—Revised (PPI-R; Lilienfeld & Widows, 2005), and invincibility within the Elemental Psychopathy Assessment (EPA; Lynam et al., 2011).

Psychopaths are largely comfortable in their skin, even though their psychopathic traits cause considerable trouble for them. The life of a psychopath is at times glamorized, and is typically very appealing at a young age. The New York City mobster Henry Hill famously stated, “At the age of twelve my ambition was to be a gangster” (Pileggi, 1985, p. 13). However, the exciting psychopathic lifestyle can come with a heavy cost. Psychopathic persons have a very difficult time maintaining employment, their relationships are unstable, they are at risk of serious injury and even death, they are prone to drug and alcohol abuse, and many spend a considerable amount of time imprisoned (Hare, Neumann, & Widiger, 2012), much of which was true for Henry Hill.

For many years, researchers have searched for the specific etiology and pathology for psychopathy, including a cognitive deficit in response modulation, deficits in anxiousness, incapacity for empathy, impulsive disinhibition, and inadequate autonomic arousal (Derefinko & Widiger, 2016; Hare et al., 2012). However, it has become increasingly evident that there is no specific etiology or pathology. Psychopathy is a constellation of diverse personality traits (Crego & Widiger, 2015; Lilienfeld et al., 2015; Lynam & Widiger, 2007a), a view that applies to all of the DSM-5 personality disorders, ques-

tioning the validity in understanding them as discrete categories (Clark, 2007; Livesley, 2007; Skodol, 2012; Widiger & Trull, 2007). Psychopathy has been of substantial clinical and social interest as a particular entity, probably because it is essentially the most dangerous and virulent constellation of personality traits one can perhaps imagine. It is bad enough for a person to be manipulative, deceitful, exploitative, aggressive, callous, and cruel (traits of antagonism), but it is even worse for such a person to also be charming and fearless (traits of low neuroticism), assertive, and interpersonally engaging (traits of extraversion), and reckless, rash, and disinhibited (traits of low conscientiousness; Widiger & Lynam, 1998).

Borderline Personality Disorder

Borderline personality disorder (BPD), a new addition to DSM-III (American Psychiatric Association, 1980), quickly became the single most frequently diagnosed and most heavily researched personality disorder. Its primary diagnostic criteria include frantic efforts to avoid abandonment, affective instability, unstable and intense relationships, impulsivity (e.g., substance abuse and sexual promiscuity), recurrent suicidal thoughts and gestures (that at times can be manipulative, but fatal as well), self-mutilation, and episodes of rage and anger (American Psychiatric Association, 2013).

BPD is among the most difficult syndromes to treat, as patients with BPD tend to recreate their intense and dramatic relationships within the context of the therapeutic relationship. Such patients can become intensely attached to their therapists, at times idealizing them as if they are the best therapists they ever had, and at other times devaluing them for failing when needed the most (Gunderson, 2001; Linehan, 1993). They can have a long history of treatment failures, interspersed with visits to the emergency room, hospitalizations secondary to suicidal ideation or gestures, and treatment for an array of problems, including mood disorder, substance use, and eating and anxiety disorders. The majority of patients with BPD are females with a long history of failed relationships that were typically quite stormy, turbulent, and at times even violent.

However, BPD is one of the few personality disorders for which persons will seek treatment, as BPD is defined in large part by traits of negative affectivity (or neuroticism), which involve feelings of pain and suffering. BPD is also the only personality disorder for which empirically validated therapies have been developed. The two most predominant forms of treatment are mentalization-based treatment (MBT; Bateman & Fonagy, 2012) and dialectical behavior therapy (DBT; Lynch, Trost, Salsman, & Linehan, 2007). MBT is a psychodynamic treatment that uses structured techniques to help patients “mentalize” or more accurately perceive the feelings within themselves and others. Patients with BPD tend to misperceive the intentions and feelings of others, interpreting (for instance) innocent remarks as signs of rejection, responding with alarm, fright, dismay, terror, and/or rage. DBT is a cognitive-behavioral therapy that is coupled with Zen Buddhist principles of overcoming suffering through acceptance (Linehan, 1993). Mastery of conflict is achieved in part through no longer fighting adversity. This principle is taught in part through the meditative technique of mindfulness, in which one attempts to focus attention solely on the present moment in a nonjudgmental way. This technique can be particularly useful to patients with BPD, because their thoughts naturally shift to feelings and memories of rejection and abuse.

Schizotypal Personality Disorder

Schizotypal personality disorder (STPD) was also a new addition to DSM-III (American Psychiatric Association, 1980). Its diagnostic criterion set was developed in part from interviews of biological relatives of persons with schizophrenia (Kwapil & Barrantes-Vidal, 2012). The researchers were seeking to confirm a family history of schizophrenia in persons diagnosed with schizophrenia. They found a surprisingly low rate of actual schizophrenia. However, they did find a curious prevalence of odd, eccentric persons with subthreshold symptoms. The diagnostic criteria for STPD include odd beliefs and magical thinking that are below threshold for a delusion, social withdrawal, unusual perceptual experiences that are below

threshold for a hallucination, odd speech, inappropriate or constricted affect, and social anxiety (American Psychiatric Association, 2013).

STPD is not included within the personality disorder section of the WHO (1992) ICD-10, and is instead classified as a form of schizophrenia. There is compelling empirical support for a genetic association of STPD with schizophrenia (Kwapil & Barrantes-Vidal, 2012), which is not surprising given that the diagnostic criteria were obtained from observations of biological relatives of persons with schizophrenia. Many of the neurobiological risk factors and psychophysiological correlates of STPD are also shared with schizophrenia (e.g., eye tracking, orienting, startle blink, and neurodevelopmental abnormalities), and the treatments that are effective in ameliorating schizotypal symptoms overlap with treatments used for persons with schizophrenia (Lenzenweger, 2006). The close relationship of STPD to the phenomenology, genetics, and pathology of schizophrenia suggests that perhaps it should be classified as a variant of schizophrenia rather than a personality disorder (Skodol, 2012). In DSM-5, STPD is included in both the personality disorders and the schizophrenia spectrum sections (American Psychiatric Association, 2013). There are, however, a number of compelling reasons to consider STPD to be a personality disorder rather than a variant of schizophrenia. STPD is much more comorbid with other personality disorders than with psychotic disorders, persons with STPD very rarely develop schizophrenia, and schizotypal traits are evident within the general population in persons with no apparent genetic relationship to schizophrenia (Kwapil & Barrantes-Vidal, 2012). The diagnosis of schizophrenia has considerable negative connotations, and associating STPD with the disorder of schizophrenia could be rather stigmatizing for the persons who receive the diagnosis.

Dependent Personality Disorder

Dependent personality disorder (DPD) involves an excessive, clinging attachment to others, along with submissiveness and fears of separation (American Psychiatric Association, 2013; Bornstein, 2012). Its primary

diagnostic criteria include extreme difficulty making decisions, needing others to assume responsibility for daily life, difficulty disagreeing with others, inability to initiate projects due to lack of self-confidence, and going to excessive lengths to obtain the approval of others. The diagnosis was slated for deletion in DSM-5 (Skodol, 2012), despite there being a considerable body of research to support the validity and clinical importance of dependent personality traits (Bornstein, 2012; Gore & Pincus, 2013).

Persons with DPD suffer from intense feelings of insecurity, fears of abandonment, loneliness, helplessness, and fears of negative evaluation. Dependency is related to increased risk for suicide, and excessive use of medical and mental health services (Bornstein, 2012). Dependency is also one of the few personality traits with a well-established role in predicting future episodes of depression. Multiple longitudinal studies have confirmed that dependent cognitions and behaviors result in depressive episodes in reaction to interpersonal loss or rejection (Hammen, 2005). The self-esteem of persons with DPD depends substantially on the maintenance of a nurturant, loving, and secure relationship, yet their intense needs for reassurance can have the paradoxical effect of driving their partner away (Romero-Canyas, Downey, Berenson, Ayduk, & Kang, 2010).

Narcissistic Personality Disorder

Narcissistic personality disorder (NPD) is a pervasive pattern of grandiosity (in fantasy or behavior), need for admiration or adulation, and lack of empathy (American Psychiatric Association, 2013). Its primary diagnostic criteria include a grandiose sense of self-importance; preoccupation with success, power, brilliance, or beauty; the belief that one is special and can only be understood by high-status individuals; a demand for excessive admiration; and a strong sense of entitlement, exploitation of others, lack of empathy, and arrogance.

NPD was a new addition to DSM-III (American Psychiatric Association, 1980). NPD was not included in the subsequently developed ICD-10 (WHO, 1992) despite its presence in the DSM since 1980, as it has been perceived internationally as largely an

American concept. It was also initially slated for deletion in DSM-5 (Skodol, 2012) despite the presence of a considerable amount of clinical interest (Pincus & Lukowitsky, 2010; Ronningstam, 2011-a) and supportive empirical research (Miller, Widiger, & Campbell, 2010; Pincus & Lukowitsky, 2010). In response to objections from colleagues within the personality disorder field, the DSM-5 Personality Disorders Work Group rescinded its proposal for its deletion (Skodol et al., 2013).

Narcissism is associated with a variety of self-enhancement and self-promotional strategies (Miller et al., 2010). Narcissistic persons tend to make a good first impression, but likability diminishes with increased familiarity. Over the course of time, narcissism has a negative impact on relationships, as it is linked to manipulation and infidelity (Campbell & Miller, 2013). Narcissistic individuals' inflated self-esteem may also contribute to an eventual career failure, as they lack an adequate appreciation of the limitations of their proposals, abilities, and plans.

There has been some concern that the DSM-5 Section II criterion set for NPD may place too much emphasis on a grandiose narcissism, which can be associated with actual success in work and career, failing to adequately recognize a vulnerable narcissism indicated by a need for admiration, self-devaluation, and hypersensitive feelings of vulnerability, humiliation, or rage in response to criticism or rebuke (Miller et al., 2010; Pincus & Lukowitsky, 2010). Persons with grandiose narcissistic traits at times experience episodes of self-doubt and vulnerability (Gore & Widiger, 2016). Conflicts and deficits with respect to self-esteem are considered to be central to the pathology of the disorder (Ronningstam, 2005). Narcissism involves a pathological regulation of pride and shame, which serves to protect and enhance the self (Tracy, Cheng, Martens, & Robins, 2011). Narcissistic persons must continually seek and obtain signs and symbols of recognition to compensate for conscious or perhaps even unconscious feelings of inadequacy. Narcissism is not simply arrogant self-confidence, as it is more highly correlated with an instability in self-esteem than with a consistently high self-confidence (Ronningstam, 2011b).

Personality Disorders and Personality

Although a considerable body of research supports the clinical importance of psychopathic, schizotypal, borderline, dependent, and narcissistic personality traits, it is also evident that the DSM personality syndromes are not well understood as distinct diagnostic categories. The many problems with DSM categorical classification have been well documented, including the heterogeneity in the traits among persons sharing the same diagnosis, the absence of a distinct boundary with normal personality, and substantial overlap and diagnostic co-occurrence (Clark, 2007; Livesley, 2007; Skodol, 2012; Widiger & Trull, 2007). The DSM personality disorders describe overlapping and complex syndromes, or constellations of maladaptive personality traits (Lynam & Widiger, 2001). As such, they lack specific etiologies, pathologies, and treatments.

There is also a substantial body of research to support an understanding of the personality disorders as extreme and/or maladaptive variants of the traits included within the well-validated dimensional five-factor model (FFM) of general personality structure (Widiger, Samuel, Mullins-Sweat, Gore, & Crego, 2012), a hypothesis first proposed by Costa and McCrae (1990). The FFM, as traditionally conceptualized, comprises the five broad domains of neuroticism, extraversion (vs. introversion), openness (or unconventionality), agreeableness (vs. antagonism), and conscientiousness (vs. disinhibition) (Widiger, 2017). Collectively, the five domains, each of which includes an array of adaptive and maladaptive personality traits, readily incorporate the DSM-5 Section II personality disorder syndromes (Widiger & Trull, 2007; Widiger et al., 2012).

Table 36.1 provides a description of the antisocial, borderline, schizotypal, dependent, and narcissistic personality disorders from the perspective of the FFM. The extensive empirical support for these FFM conceptualizations has been summarized for the antisocial (Derefinko & Lynam, 2013), borderline (Trull & Brown, 2013), schizotypal (Edmundson & Kwapił, 2013), dependent (Gore & Pincus, 2013), and narcissistic (Campbell & Miller, 2013) personality disorders. Self-report inventories for the as-

TABLE 36.1. Five Personality Disorders from the Perspective of the Five-Factor Model

FFM domains and facets	DSM-5 personality disorder				
	Antisocial (psychopathy)	Borderline	Schizotypal	Dependent	Narcissistic
<u>Neuroticism</u>					
Anxiousness	<i>Unconcern</i>	Anxious uncertainty	Social anxiousness	Separation insecurity	
Angry hostility	Anger	Dysregulated anger			Reactive anger
Depressiveness	<i>Self-content</i>	Despondence		Pessimism	
Self-consciousness	<i>Self-assurance</i>	Self-disturbance	Social discomfort	Shamefulness	Shame and indifference
Impulsiveness	Urgency	Behavioral dysregulation			
Vulnerability	<i>Invulnerability</i>	Affective dysregulation and fragility		Helplessness	Need for admiration
<u>Extraversion</u>					
Warmth	<i>Coldness</i>		<i>Social anhedonia</i>	Intimacy needs	
Gregariousness			<i>Social isolation and withdrawal</i>		Exhibitionism
Assertiveness	Dominance			<i>Unassertive</i>	Authoritative
Excitement seeking	Thrill seeking				Thrill seeking
Positive emotionality			<i>Physical anhedonia</i>		
<u>Openness</u>					
Fantasy		Dissociative tendencies	Aberrant perceptions		
Actions			Odd–eccentric		
Ideas			Aberrant ideas		
<u>Agreeableness</u>					
Trust	<i>Cynicism</i>	<i>Distrustfulness</i>	<i>Interpersonal suspiciousness</i>	Gullibility	<i>Cynicism</i>
Straightforwardness	<i>Manipulative</i>	<i>Manipulative</i>			<i>Manipulative</i>
Altruism	<i>Self-centered</i>			Selflessness	<i>Exploitative and entitlement</i>
Compliance	<i>Opposition</i>	<i>Oppositional</i>		Subservience	
Modesty	<i>Arrogance</i>			Self-effacing	<i>Arrogance and grandiose fantasies</i>
Tender-minded	<i>Callous</i>				<i>Lack of empathy</i>
<u>Conscientiousness</u>					
Competence				<i>Ineptitude</i>	
Dutifulness	<i>Disobliged</i>				
Achievement Striving					Acclaim seeking
Self-Discipline	<i>Impersistence</i>			<i>Negligence</i>	
Deliberation	<i>Rashness</i>	<i>Rashness</i>			

Note. Traits in **boldface** are high variants of the respective FFM facet; traits in *italics* are low variants.

essment from the perspective of the FFM have also been developed for the antisocial (Lynam et al., 2011), borderline (Mullins-Sweatt et al., 2012), schizotypal (Edmundson, Lynam, Miller, Gore, & Widiger, 2011), dependent (Gore, Presnall, Lynam, Miller, & Widiger, 2012), and narcissistic (Glover, Miller, Lynam, Crego, & Widiger, 2012) personality disorders.

Bipolarity of Maladaptive Personality Structure

One noteworthy aspect of the trait list in Table 36.1 is the presence of at least one maladaptive trait at both poles for four of the five domains (both poles of all five domains would be covered if all of the personality disorders were included; Widiger & Crego, 2019a). The benefits of conscientiousness, extraversion, openness, agreeableness, and low neuroticism (i.e., emotional stability) are self-evident, but each can also be associated with some risks and potential costs (Nettle, 2006). Coker, Samuel, and Widiger (2002) coded each of the 1,710 trait terms of the English language with respect to their undesirability, then considered their location within the FFM (Goldberg, 1993). They reported many undesirable, maladaptive trait terms for agreeableness, extraversion, openness, conscientiousness, and even for low neuroticism. For extraversion, terms included *long-winded*, *blustery*, *showy*, *flaunty*, and *exaggerative*; for conscientiousness, terms included *overbookish*, *overcautious*, *leisureless*, *stringent*, and *tight*; and for agreeable, terms included *deceivable*, *dependent*, *soft-shelled*, and *ingratiating*. These traits are quite suggestive of the histrionic, obsessive-compulsive, and dependent personality disorders (respectively), which are defined in large part by the domains of extraversion, conscientiousness, and agreeableness, respectively (Lynam & Widiger, 2001).

Maladaptive Agreeableness

Agreeableness includes traits such as trusting, modest, altruistic, and compliant. It would seem evident though that some persons can be overly compliant, excessively trusting, inordinately modest, and/or excessively altruistic. Oakley, Knafo, Madhavan, and Wilson (2012) edited a text dedicated

to variants of pathological altruism. Leary (1957) devoted a chapter of his seminal interpersonal circumplex (IPC) text to “the dependent personality” (p. 292), located in the lower-right (“docile-dependent”) octant of the IPC, the precise location of FFM agreeableness (Gore & Pincus, 2013; Pincus & Hopwood, 2012). Quite a few studies have indeed confirmed a close relationship of dependency with the IPC and FFM agreeableness octant of the IPC (Gore & Pincus, 2013; Lowe, Edmundson, & Widiger 2009).

Maladaptive Extraversion

Extraversion includes being assertive, excitement seeking, active, and gregarious. Extreme assertiveness, though, can become domineering or pushy, and extreme excitement seeking can be reckless, risky, and foolhardy. These are traits evident within the narcissistic (Glover et al., 2012) and psychopathic (Crego & Widiger, 2014; Stanley, Wygant, & Sellbom, 2013) personality disorders. Maladaptive extraversion also resembles in large part DSM-IV histrionic personality disorder (HPD), including traits such as attention seeking and flirtatiousness. Millon (2011) had referred to HPD as the sociable or gregarious syndrome.

Maladaptive Conscientiousness

The diagnostic criteria for DSM-5 Section II obsessive-compulsive personality disorder (OCPD) include traits such as perfectionism, preoccupation with organization, workaholism, and, quite explicitly, overconscientiousness. There are quite a few studies documenting an association of FFM conscientiousness with OCPD (e.g., O'Connor, 2005; Samuel & Widiger, 2008; Saulsman & Page, 2004). However, the relationship between OCPD and conscientiousness is not always strong, in part because OCPD includes more than just facets of conscientiousness (Lynam & Widiger, 2001). Joint factor analyses of the FFM with the more specific components of OCPD, such as compulsivity, workaholism, and propriety have provided clearer and more consistent evidence for a strong association with conscientiousness (e.g., Markon, Krueger, & Watson, 2005; Samuel & Widiger, 2011).

Maladaptive Openness

Maladaptive openness has typically been understood to be the aberrant, odd, and peculiar thinking and perception of STPD. For instance, many studies have documented an association between open-mindedness and paranormal beliefs (Nettle, 2006). However, the relationship between FFM openness and DSM-IV STPD has been consistently the weakest (Samuel & Widiger, 2008; Saulsman & Page, 2004), and at times questioned (Watson, Clark, & Chmielewski, 2008). Nevertheless, factor-analytic studies have supported an alignment of schizotypal thinking with openness (e.g., Gore & Widiger, 2013; Stepp et al., 2012; Thomas et al., 2012).

Costa and McCrae (1992) conceptualized openness in a manner that is largely equivalent to a disposition for self-actualization and self-realization (Gore & Widiger, 2013). Alternative models (as well as measures) have since been developed for openness, for which a clear relationship with schizotypal thinking is much more readily apparent (Widiger & Crego, 2019b), such as the Big Five Aspects Scale of DeYoung, Grazioplene, and Peterson (2012) and the HEXACO Personality Inventory (HEXACO-PI) of Lee and Ashton (2004). Tellegen (1993) included an unconventionality domain with his dimensional trait model that is aligned explicitly with FFM openness, the scale for which contains items that assess normal openness (e.g., curious, inquisitive, imaginative, and creative), as well as abnormal variants, such as having ideas or beliefs that have little basis within reality, dwelling on fantasies, or engaging in activities that are bizarre, deviant, or aberrant. Tellegen (1993) suggested years ago that with respect to his conceptualization of openness, “markers of this type are clinically suggestive, particularly of schizotypal personality disorder” (p. 126).

Maladaptive Low Neuroticism

Low neuroticism might be considered the sine qua non of mental health, being essentially equivalent to emotional stability (Goldberg, 1993). However, even here one can identify problematic variants, particularly evident in the personality syndrome of

psychopathy. Cleckley (1955) included low anxiousness in his highly influential description of psychopathy: “Within himself he appears as incapable of anxiety as of profound remorse” (p. 384). Low anxiousness is included as well within the more recently developed models of psychopathy, including the TriPM (Patrick et al., 2009), the PPI-R (Lilienfeld & Widows, 2005), and the EPA (Lynam et al., 2011). However, the boldness, fearlessness, and invincibility within these measures is controversial precisely because they refer to socially adaptive strengths rather than deficits (Crego & Widiger, 2015; Marcus, Fulton, & Edens, 2012; Miller & Lynam, 2012). What makes a personality disorder a disorder is the presence of maladjustment, not superior personality strengths (Livesley, 2007). If low anxiousness is included, perhaps it should be problematically low anxiousness, contributing, for example, to a failure to be concerned about negative consequences of risky, dangerous, and/or criminal behavior (Crego & Widiger, 2015).

Advantages of Dimensional Trait Model of Personality Disorder

There are many advantages in reformulating the DSM-5 Section II personality disorders in terms of the domains and facets of FFM. Notably, the problems of heterogeneity within the diagnostic categories and the excessive diagnostic co-occurrence would be largely resolved. Rather than force an individual into a category that includes traits that he or she does not have and fail to recognize additional personality traits that are important for understanding the patient’s adjustment and maladjustment, the FFM would allow the clinician and researcher to provide an individualized profile of precisely the traits that are present (Clark, 2007; Widiger & Trull, 2007). This form of description is considerably more precise and accurate than a diagnostic category and, as a result, would have obvious benefits for treatment planning, research, insurance, and other social-clinical decisions. It is simpler to just apply one diagnostic category to a patient (e.g., “antisocial”), but Verhul (2005) argued compellingly that the problems with the imprecision of diagnostic categories, the lack of adequate coverage, and the confus-

ing diagnostic overlap have contributed to considerable dissatisfaction among clinicians with respect to the DSM categories. Indeed, when clinicians are explicitly surveyed with respect to clinical utility, they typically prefer a dimensional trait model description over the diagnostic categories (Morey, Skodol, & Oldham, 2014; Mullins-Sweatt & Lengel, 2012; Widiger, 2019).

For example, it has been over 20 years since the American Psychiatric Association began developing treatment guidelines for each of the mental disorders included within DSM-5 and, to date, guidelines have been published for only one personality disorder (i.e., BPD). It is understandably difficult to develop a uniform treatment program for persons who share the same personality disorder diagnosis yet do not share many of the defining features (Clark, 2007; Widiger & Trull, 2007). The five domains of the FFM are much better suited for treatment planning, because they are considerably more distinct and homogeneous. Extraversion and agreeableness are the domains of interpersonal relatedness; neuroticism is a domain of emotional instability and dysregulation; conscientiousness is a domain of work-related behavior, constraint, and responsibility; and openness is a domain of cognitive intellect, curiosity, unconventionality, and creativity (Mullins-Sweatt & Widiger, 2006).

Indeed, Presnall (2013) outlined an initial draft of an FFM treatment manual, indicating relatively specific psychotherapeutic and pharmacological treatment recommendations for all 10 poles of all five domains. Presnall suggested that interpersonal models of therapy, marital-family therapy, and group therapy might be particularly suitable for the two FFM interpersonal domains (i.e., extraversion and agreeableness). There is currently no pharmacotherapy for this interpersonal dysfunction, which is not actually a criticism; it is simply an indication of the specificity of the treatment implications. In contrast to agreeableness and extraversion, neuroticism concerns depressive, anxiety, and emotional dyscontrol, often targets for effective pharmacological interventions, as well as cognitive, behavioral, and/or psychodynamic interventions. Maladaptively high openness implies cognitive-perceptual

aberrations, and so would likely have pharmacological implications (i.e., neuroleptics) that are quite different from the anxiolytics, antidepressants, and mood stabilizers that would be used for neuroticism. There might be specific pharmacological treatment implications for low conscientiousness (e.g., methylphenidates; Nigg et al., 2002), although, as yet, there are none for maladaptively high conscientiousness. Perhaps there never will be a pharmacotherapy for high conscientiousness, but the point is that the structure of the FFM is considerably more commensurate with specific treatment implications than the heterogeneous and overlapping DSM-IV-TR personality syndromes.

Barlow, Sauer-Zavala, Carl, Bullis, and Ellard (2014) have developed an empirically-validated Unified Protocol for the treatment of neuroticism (Sauer-Zavala, Wilner, & Barlow, 2017). Given the substantial public health care implications of neuroticism (Lahey, 2009), “the public-health implications of directly treating and even preventing the development of neuroticism would be substantial” (Barlow et al., 2014, p. 344). Widiger and Trull (2007) and Lahey (2009) have indeed suggested mass screening for levels of neuroticism, given its considerable public health care implications. Magidson, Roberts, Collado-Rodriguez, and Lejuez (2014) have made a similar recommendation for improving persons’ levels of conscientiousness, as conscientiousness is a major contributor to a wide array of significant life outcomes, including occupational success, marital stability, academic achievement, and even physical health and longevity (Jackson & Roberts, 2017). “Efforts to change conscientiousness may hold great public health significance in enabling changes across key outcomes related to health, functioning, and quality of life” (Magidson et al., 2014, p. 1443).

In addition, to the extent that DSM-5 Section II personality disorders are maladaptive variants of the domains and facets of the FFM, all that has become known about the etiology, course, assessment, correlates, and outcome of FFM traits (Widiger, 2017) can be applied to an understanding of the American Psychiatric Association personality disorders. Indeed, some of the more problemat-

ic findings for the personality disorders are largely resolved when they are understood as maladaptive variants of the FFM. For instance, diagnostic co-occurrence among the DSM-IV personality disorders has been highly problematic, providing a primary rationale for the deletion of half of the diagnoses in DSM-5 (Skodol, 2012). However, this co-occurrence is largely explained by the extent of shared FFM traits (Lynam & Widiger, 2001; O'Connor, 2005). Gender differences have also been very controversial for the personality disorders (T. Oltmanns & Powers, 2012) but the differential sex prevalence rates are consistent with the sex differences that would be predicted if the personality disorders were understood to be maladaptive variants of the FFM (Lynam & Widiger, 2007b).

There are studies on the childhood and development antecedents of the DSM personality disorders (e.g., Cohen, Crawford, Johnson, & Kasen, 2005; Wetzel & Robins, 2016). However, most would agree that this has been a sorely neglected area of research (Cohen & Crawford, 2005; De Clercq & De Fruyt, 2007). Tyrer (2015), Chair of the WHO ICD-11 Personality Disorders Work Group, lamented the reluctance of childhood clinicians and researchers to recognize childhood antecedents of adult personality disorders. In contrast, there is a considerable body of research on the childhood and development antecedents of general personality traits (Widiger, De Clercq, & De Fruyt, 2009). De Clercq, De Fruyt, Van Leeuwen and Mervielde (2006) have even developed an FFM instrument for the assessment of the maladaptive personality traits in childhood. As indicated by De Fruyt and De Clercq (2014), "An integrative model of personality pathology precipitants for childhood and adolescence is available now" (p. 469).

The FFM provides a reasonably comprehensive lexicon of adaptive and maladaptive personality traits. As such, one can use the FFM lexicon to define and diagnose new constellations of personality traits (i.e., syndromes) of current interest to a particular clinical, social, business, or public health care setting. Miller (2012) indicates how a researcher or a clinician can use an existing measure of the FFM to assess for each of the DSM-IV personality disorders by correlat-

ing the FFM profile of a patient with the FFM profile for a prototypical case of the respective personality disorder (Lynam & Widiger [2001] provide a prototypical FFM profile for each of the DSM-IV personality disorders). This correlation (or simply the sum of the scores on the respective facets that identify a prototypical case) can serve as an index for the presence of that personality disorder. This FFM index can provide as valid an assessment of a particular personality disorder as any existing direct measure of that personality disorder (e.g., Trull, Widiger, Lynam, & Costa, 2003).

One can similarly create FFM profiles for additional personality disorder constructs not currently included in DSM-5 then match individuals' FFM profiles to these prototypes to obtain an index for that respective syndrome. Illustrations of this approach have been provided for constructs such as depressive personality disorder (Bagby, Watson, & Ryder, 2013), pathological narcissism (Glover et al., 2011), alexithymia (Taylor & Bagby, 2013), and successful psychopathy (Mullins-Sweatt, Glover, Derefinko, Miller, & Widiger, 2010).

A currently heavily researched personality disorder construct is the "dark triad," combining key traits from psychopathy, narcissism, and Machiavellianism into one "super" or "meta" evil syndrome (Paulhus & Williams, 2002). The dark triad is intriguing in part because it is considered to be evident in persons who are below threshold for an existing DSM-5 diagnosis, moving under the radar of both psychopathy and narcissism, yet given the combination of traits, they might be as dangerous and problematic, seeking out multiple casual sex partners, manipulating others out of personal self-interest, and acting aggressively to take what they want when they want it. Furnham, Richards, Rangel, and Jones (2014) demonstrated through a meta-analysis of dark triad FFM research that the three dark triad constructs can be largely understood as maladaptive variants of FFM antagonism, albeit they can also be distinguished in terms of other domains of the FFM, with Machiavellianism and psychopathy including aspects of low conscientiousness and low neuroticism, and psychopathy involving facets of extraversion.

ICD-11 and DSM-5 Section III

A major step toward a conceptualization of personality disorders from the perspective of the FFM has occurred with the forthcoming ICD-11 (WHO, 2018; Reed et al., 2019; Tyrer et al., 2019). As noted earlier, ICD-11 is replacing the ICD-10 categorical syndromes (e.g., antisocial, obsessive–compulsive, and dependent) with a five-domain dimensional trait model (only the borderline syndrome is retained). The five domains are negative affectivity, detachment, dissocial, disinhibition, and anankastia (Tyrer et al., 2011, 2019). These five domains are conceptualized as maladaptive variants of the FFM: “Negative Affective with neuroticism, Detachment with low extraversion, Dissocial with low agreeableness, Disinhibited with low conscientiousness and Anankastic with high conscientiousness” (Mulder, Horwood, Tyrer, Carter, & Joyce, 2016, p. 85). The predominant measure for the assessment of the trait model is provided by the Personality Inventory for ICD-11 (PiCD; J. Oltmanns & Widiger, 2018). Research with the PiCD has confirmed that the ICD-11 trait domains are maladaptive variants of the FFM (e.g., Crego & Widiger, 2020; J. Oltmanns & Widiger, 2019; Somma, Galdi, & Fossati, 2020). In summary, once a member country of the WHO has adopted the ICD-11 (and this may not occur until the year 2022 for many countries), clinicians within that country will be diagnosing personality disorders as maladaptive variants of the FFM.

A comparable proposal was made for DSM-5 (Skodol, 2012). Included within this proposal was a five-domain dimensional trait model that comprised the domains of negative affectivity, detachment, psychoticism, antagonism, and disinhibition, assessed by the Personality Inventory for DSM-5 (PID-5; Krueger, Derringer, Markon, Watson, & Skodol, 2012). DSM-5 negative affectivity, detachment, antagonism, and disinhibition align closely with ICD-11 negative affectivity, detachment, dissocial, and disinhibition, respectively (albeit the domains are not defined precisely in the same manner). DSM-5 Section III does not include the anankastia domain, albeit a closely congruent compulsivity domain was part of the original proposal (Krueger et al., 2011, 2012). In turn,

ICD-11 does not include a psychoticism domain, because STPD was not recognized within ICD-10 to be a disorder of personality; it is conceptualized instead as a variant of schizophrenia (WHO, 1992), and DSM-5 psychoticism is largely defined by the cognitive–perceptual aberrations of STPD. More importantly, though, for our purposes in this chapter, the DSM-5 trait model is again aligned with the FFM. As stated in DSM-5, the five domains of the dimensional trait model “are maladaptive variants of the five domains of the extensively validated and replicated personality model known as the ‘Big Five,’ or the Five Factor Model of personality” (American Psychiatric Association, 2013, p. 773), with DSM-5 negative affectivity, detachment, psychoticism, antagonism, and disinhibition aligning with FFM neuroticism, introversion, openness, antagonism, and low conscientiousness, respectively (Krueger & Markon, 2014). A considerable body of research supports this alignment (e.g., Crego, Oltmanns, & Widiger, 2018; Crego & Widiger, 2017; De Fruyt et al., 2013; DeYoung, Carey, Krueger, & Ross, 2016; Gore & Widiger, 2013; Griffin & Samuel, 2014; Moorman & Samuel, 2018; Thomas et al., 2012).

An important difference between ICD-11 and the proposal for DSM-5 is that the latter still includes six of the DSM-IV personality syndromes: borderline, antisocial, obsessive–compulsive, narcissistic, schizotypal, and avoidant. If DSM-5 Section III had been approved, clinicians would still be using these categorical syndromes in clinical practice (albeit with new diagnostic criterion sets). Clinicians will still be using the borderline syndrome in clinical practice when countries shift from ICD-10 to ICD-11, but the DSM-5 proposal was clearly much more conservative than ICD-11.

Finally, another important difference is that the DSM-5 proposal includes a Level of Personality Functioning Scale (LPFS) that is hypothesized to define the core of personality disorder (i.e., common to all personality disorders) and to be distinct from the maladaptive trait domains (American Psychiatric Association, 2013; Skodol, 2012). The LPFS consists of impairments or deficits in the sense of self (identity and self-direction) and interpersonal relatedness (empathy and

intimacy; American Psychiatric Association, 2013). ICD-11 also includes a level of severity, but it was never conceptualized to be distinct from the personality traits. In fact, its official assessment is provided by the Standardized Assessment of Severity of Personality Disorder (SASPD; Olajide et al., 2017), whose items were taken from the trait model. The level of severity was subsequently revised to include a bit of the self-interpersonal deficits of the LPF, but they only constitute a small part of the ICD-11 level of severity.

The LPF deficits were derived from the psychoanalytic literature that does indeed consider them to define the core of all personality disorders (Bender, Morey, & Skodol, 2011; Kernberg, 2012). If the hypotheses that the LPF does identify the core of all personality disorders and is distinct from the maladaptive trait model, then this would render the trait model as largely an ancillary component in the understanding, diagnosis, and treatment of personality disorder (e.g., Hopwood, 2018). There has long been considerable opposition to conceptualizing the personality disorders as maladaptive variants of a dimensional trait model (e.g., Clarkin & Huprich, 2011; Gunderson, 2013; Hopwood, 2011; Shedler et al., 2010). This debate has now largely shifted from coverage of the DSM-IV syndromes to the importance of the LPF and whether it is in fact distinct from the trait model (e.g., Few et al., 2013; J. Oltmanns & Widiger, 2016; see Widiger et al., 2019, for a review of this literature).

Conclusions

Personality is the result of an interaction between genetic dispositions and environmental experiences. Such a process would certainly result in both adaptive and maladaptive personality traits. It then seems only reasonable to have a nomenclature of personality disorders that is aligned with the nomenclature of general personality structure, allowing for a fully integrated dimensional trait model of normal and abnormal personality functioning (Widiger & Costa, 1994). Significant steps toward such a model have been implemented for ICD-11 (Tyrer et

al., 2019) and proposed for DSM-5 (Krueger & Markon, 2014), but there remains substantial opposition to any such paradigm shift.

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CHAPTER 37

Personality and Health

A Lifespan Perspective

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Although some threats to a person's life and health are truly random, many of the risks are a function of biopsychosocial characteristics of the individual. In principle, anyone may contract the flu or suffer a myocardial infarction, but individuals vary greatly in the likelihood that they will achieve good health and longevity; that is, there is astonishing variation in whether one is vulnerable to disease, and whether one is likely to recover quickly from any diseases that take hold. A person does not contract the flu without exposure to an influenza virus, but persons vary tremendously as to whether they are exposed to the virus, whether they are infected after exposure, and how they respond to the illness if infected. In other words, understanding the likelihood of disease for the individual is often as important as knowing the general causes of disease. Much of this variation can be captured by concepts that encapsulate the biopsychosocial nature of the individual across time, namely, contemporary concepts of personality. The most modern concepts from personality psychology help reveal why some individuals are more prone to illness and premature mortality, while others are more likely to thrive across the years.

In developed countries, there is relatively little serious chronic disease or premature mortality from disease between about ages 25 and 45; most individuals remain healthy or recover quickly, so there is relatively little variation. However, an exponential rise in risk across the years (that begins to show itself more clearly in middle age) means that most people will have developed a serious disease by about age 80, and half will be deceased. Contrary to popular belief in genetic determinism of longevity, less than one-third of this variation is genetic; more than half arises from experiential, behavioral, and sociocultural factors (Friedman & Kern, 2014). These interacting factors are the purview of lifespan personality psychology. Bringing a lifespan personality perspective to the field of health is thus a game-changer. It throws down a series of challenges to the old models of individual differences in health. Personality develops across the lifespan (with person–situation interactions through the years), often in concert with health status changes over the lifespan. Most chronic illnesses take years to develop, and although some acute infections can overwhelm the body within days, these also usually depend on the individual's pre-

existing health trajectory and on situational exposures and responses.

A complete understanding of personality and health involves the complex mutual influences of personality change and health change. The associations between personality and health differ at different points in the lifespan (Shanahan, Hill, Roberts, Eccles, & Friedman, 2014), and the underlying mechanisms to explain these associations are likely to involve complicated causal chains operating over time. Exciting progress is being made in the study of personality and health from a biopsychosocial, lifespan perspective.

The Outdated Models

Although the idea of ties between personality and health dates back thousands of years to the bodily humors (blood, black bile, yellow bile, and phlegm) postulated in the writings of Hippocrates and Galen, it was not until the mid-20th century that scientific study of personality and health began in earnest (Friedman, 2007). The work of the psychosomatic theorists and physicians on the ties between specific unconscious emotional conflicts and disease (e.g., Alexander, 1950) grew out of a neoanalytic framework and provided many observations and insights linking psyche and soma, but this approach was impossible to validate in a rigorous manner. For example, it could be documented that an emotionally conflicted and miserably unhappy woman would be ill more often (Dunbar, 1955), but neither the psychological predisposition nor the links to disease could be reliably assessed or explained.

In response to this turbidity of psychosomatic psychiatry, some researcher-clinicians turned to a medically focused tack. The prime early example is the Type A behavior pattern. Proposed by two cardiologists in the 1950s, the Type A pattern appeared predictive of coronary heart disease (Rosenman et al., 1964). The idea was to view Type A as a medical syndrome of coronary disease proneness and avoid ambiguous psychoanalytic concepts. Yet Type A people were defined as those hostile or aggressive individuals involved in a constant struggle to do more and more things in less and less

time (“hurry sickness”), a personality-like definition that invoked vague psychosocial concepts—ambiguously proposed without a multitrait-multimethod assessment of convergent and discriminant validity—even as it sought to avoid them. The eventual (and ironic) result was thousands of studies with seemingly contradictory findings, as researchers began uncoordinated efforts to understand the measurement of Type A, the trait correlates of Type A, the subcomponents of Type A, and the behavioral and developmental aspects of Type A (Houston & Snyder, 1988). Several decades of meandering research revealed the necessity of comprehensive models and rigorous assessment if progress was ever going to be made regarding the relations of individual differences and health. The relevant processes unfold over time and necessitate a longitudinal approach (Friedman & Kern, 2014; Hampson, 2012).

Simple Health–Behavior Models

In health–behavior models, personality traits influence the adoption or maintenance of health-enhancing behaviors and the avoidance of health-damaging behaviors, which in turn affect health status and, ultimately, longevity. For example, a health–behavior model may focus on the influence of personality traits on smoking, drinking, diet, and physical activity (cf. Turiano, Chapman, Gruenewald, & Mroczek, 2015). A subclass of these models speaks of a so-called “addictive personality,” prone to alcoholism, other drug abuse, uncontrolled overeating, or compulsive gambling. However, such approaches often do not address the earlier life influences, the moderators, the intercorrelations, the interactions, the mediating psychophysiological consequences, and the ranges of health outcomes of these behaviors. Unhealthy behavior is not isomorphic with poor health, and there is substantial variation in what behavior patterns are helpful or harmful for different individuals at different times, and why.

Simple Stress-to-Disease Models

Another basic approach to personality and health uses “stress” as the key explanatory

concept. It assumes that stress is bad, that challenging environments produce stress, and that some people are poor at coping with stress. The focus is usually on individual cognitive strategies (e.g., emotion-focused coping, rumination) in response to the life changes (e.g., losing one's job) that are presumably stressful. Sometimes, the effects of social support (generally protective or salutary) are included here (Taylor, 2011). Although it is now very clear that individuals who are well adjusted and well integrated into stable social systems are generally healthier, it is also clear that there are many exceptions to this general rule and that these relations often depend on the unlikely case of other relevant factors remaining constant. In actual fact, many people get married or divorced, move to a new city, and start a challenging new job (thus facing many major life change stressors) but thrive anyway.

Some approaches within this simple stress paradigm focus on psychophysiological models—the mechanisms by which coping traits influence body systems that promote disease. These models typically spotlight the cell-damaging effects of stress, implicating body systems such as the hypothalamic–pituitary–adrenal (HPA) axis, cardiovascular hyperreactivity, and impaired immune functioning. Prolonged states of arousal, disrupting the immune system, can result in disease (Kemeny, 2007). Yet few well-controlled studies document the full process in operation (i.e., life change, poor coping, immune dysfunction, and resultant serious disease), and such straightforward long-term prospective studies are rarely feasible (Kern & Friedman, 2017).

Simple Genetic Models (and Perinatal Biological Models)

Simple genetic and perinatal models of personality and disease propose that underlying third variables, often seen as genetically based, influence certain traits or behavioral patterns and certain diseases. Although this is sometimes the case, for example, with genetic diseases causing mental retardation and personality quirks, as well as various health problems, it is rare that links are so simple. Shared underlying biology can indeed give rise to spurious associations be-

tween personality and health, in which case changing personality traits or personality-driven behavior would have no effect on health. But simple genetic models are limited by the failure to consider the various environmental circumstances relevant to both personality and health.

Overall, previous analyses of personality and health have sketched these basic models and variations (e.g., Carver & Miller, 2006; Contrada, Cather, & O'Leary, 1999; Friedman, 2007; Ouellette & DiPlacido, 2001; Smith & Gallo, 2001; Wiebe & Smith, 1997). These models—behavior, stress, genetics—each have some significant support, which suggests that all have some validity. Yet the overall field lacks a unifying paradigm and sufficient replicability. New efforts need to further elaborate and integrate the basic approaches in terms of new understandings about personality.

Modern Replacements: More Sophisticated Models

Sophisticated models of personality and health develop from two considerations. First, the various causal mechanisms predicted by the simpler models are often simultaneously present, and they interact with each other. Second, personality and health are not static. Personality develops and changes over the lifespan, as does health (Roberts, Walton, & Viechtbauer, 2006; Specht et al., 2014). More sophisticated models of personality and health recognize the interplay among mechanisms and the dynamic nature of variables involved (Hampson & Edmonds, 2018; Kern, Della Porta, & Friedman, 2014; Shanahan et al., 2014).

The idea of transactions is a key mechanism of newer approaches linking personality to health, well exemplified by the selection and evocation of healthful or harmful environments. Personality traits influence situational choices, and they also have evocative effects, provoking typical patterns of responses in others (Bolger & Zuckerman, 1995; Hampson et al., 2016; Hill, Edmonds, & Jackson, 2019; Moffitt et al., 2011; Scarr & McCartney, 1983). Selective exposure to certain types of situations (e.g., riskier ones) and selective evocation of certain patterns of

behavior in others (e.g., hostility) are linked reciprocally to personality and to health through health behaviors and psychophysiology.

Sophisticated models also take into account the fact that biological changes and the experience of disease can influence personality. For example, brain impairment (from injury or disease) can alter an individual's personality. And deteriorating health can affect personality as a result of consequent illness-related unemployment, social isolation, drug use, or depression. Not only are the relations reciprocal, but they also may progress and change across time.

Health behaviors and individual patterns, as well as health indices (e.g., blood pressure, cortisol levels, immune responses, lipid levels, and body mass index [BMI]), are all dynamic variables. When snapshots of the association between personality and such health variables are examined in cross-sectional studies, they do not take into account the rising or falling trajectories of personality or health variables. Cross-sectional designs do not identify reciprocal influences between personality and health, and they do not place these snapshots in the broader context of longer-term trends. Valid models of personality and health need a longitudinal perspective, as personality, health, and the intervening mechanisms are moving targets.

Modern conceptions of personality as an evolving biopsychosocial cluster of traits, motivations, abilities, and behavior patterns are very well suited to this dynamic lifespan approach. Cognitive–motivational, social–emotional, and situational–behavioral influences on clusters of dynamic outcomes are comfortable concepts in modern personality research. Yet the lifespan approach to the study of personality and health is a relatively new development (Friedman, 2000; Smith & Spiro, 2002). In this chapter, we draw inferences about the “dynamisms” and “tropisms” of the mechanisms unfolding over time that explain the observed relations between personality and health (Friedman, 2000).

Dynamic Lifespan Approaches

Developmental psychology was transformed by the adoption of a lifespan perspective

(Baltes & Goulet, 1970; Baltes, Reese, & Lipsitt, 1980), and the study of personality and health is in the midst of a similar revolution. Ultimately, research on personality and health has two core purposes. On the practical side, there is a wish to find interventions that can promote health and longevity. On the conceptual side, there is a desire to understand better what it means to be a healthy person across time. Both involve illuminating the pathways to good health as people age. In particular, life-course epidemiology informs the development of the theoretical underpinnings of lifespan models of personality and health (Kuh & Ben-Shlomo, 1997; Krueger, Caspi, & Moffitt, 2000; Lynch & Davey Smith, 2005; Smith & Spiro, 2002). Two models are particularly relevant to personality and health: critical period models and accumulation models.

Critical Period Models

Critical (or sensitive) period models assert that exposure to risks during critical periods of development have long-lasting effects and more pronounced effects than exposure at other points in the lifespan. For example, young children exposed to the poverty and stress associated with their family's low socioeconomic status (SES) at this time were more likely to succumb to upper respiratory infections in adulthood than those not so exposed (Cohen, Doyle, Turner, Alper, & Skoner, 2003). Some of the earliest work along these lines showed that poor nutrition during the prenatal period or infancy raises the risk of coronary heart disease decades later (Barker, 1995; Barker, Osmond, Forsén, Kajantie, & Eriksson, 2005). This work was a shock to the cardiology community, because it questioned the focus on concurrent and short- to medium-term risk factors. Such models are in striking contrast to the common assumption that one is healthy until afflicted by disease over some relatively short period of time.

Particular levels of a trait at certain periods in life, such as high levels of “difficult temperament” in childhood, might increase the individual's vulnerability to disease processes or to behaviors or environments that will eventually damage body systems. For example, high levels of sensation seeking in adolescence could increase vulnerability to

experimenting with drugs during this critical period (Chambers, Taylor, & Potenza, 2003). The concept of critical periods has evolved from being defined strictly by age to looser phases that occur in a maturational sequence (Michel & Tyler, 2005).

Accumulation Models

Accumulation models emphasize that the effects of risk exposure build progressively over the life course. Insults (e.g., the pollutants in a low-income neighborhood) build and interact with other risks, gradually increasing the threat to health. A pioneering elaboration on this idea was Caspi, Elder, and Bem's (1987) *cumulative continuity* model, in which childhood personality has the effect of channeling the individual into a particular set of environments, which results in an accumulation of consequences. Relatedly, in *interactional continuity*, personality traits influence an individual's interaction style, which in turn evokes a style of responding from others that may serve to perpetuate that style, even if it is ultimately maladaptive.

A type of accumulation model applied to stress is the allostasis model (McEwen, 1998). *Allostasis* is the ability to achieve stability through change. Throughout ongoing challenges, the body uses the autonomic nervous system, the HPA axis, and the cardiovascular, metabolic, and immune systems to respond to threats. Importantly, the "stress response" is a component of resilience and not necessarily negative (Karatsoreos & McEwen, 2013). We cannot live without it, and cortisol levels and immune markers *should* be high at certain times. It is repeated and relentless stress and coping that is ultimately damaging to the integrity of these bodily systems.

Critical periods and accumulation need not be independent. Risk effects may both accumulate over the life course and be greater during critical periods. Combining these epidemiological models with the traditional models of personality and health (described earlier in this chapter) provides a deeper analysis of mechanisms. It encourages us to consider how the intervening mechanisms of health behaviors, or physiological processes or situation selection, have a cumulative influence or are disproportionately influential during particular stages.

Lifespan Research

A striking example of the richness of a lifespan perspective involves the influence of gender on health. One of the most robust findings in epidemiology is that women outlive men. All sorts of distinct explanations for this difference have been proposed and investigated, but none has been definitively confirmed, suggesting the complex interactive effects of biology, personality, and social relations. In addition to physiological, anatomical, and maturational differences relevant to personality and health, there are many constantly changing sociocultural differences in the lives of men and women. Gender is a central variable in any lifespan approach to personality and health, and where feasible, gender differences should always be examined.

Individuals cannot be randomly assigned to a particular personality, gender, culture, or psychosocial environment; that is, personality and health research must, by necessity, use methods common in epidemiology and developmental psychology, with long-term prospective research designs being the most informative. Pieces of the puzzle sometimes can be subjected to experimental analysis, such as in randomized trials of behavior modification, or of stress-relevant pharmaceuticals, or studies involving laboratory animals. However, such experiments rarely capture the full range of interacting influences on subsequent health. So it is important to remain aware of the temptation to overinfer causality. For example, religious people and married people are generally healthier, but this does not imply that we should urge religious observance or marriage to improve health, indiscriminately at the level of the whole population.

Origins in Infancy and Childhood

The brain and the rest of the nervous and neuroendocrine systems are at the center of the relations between personality and health, and their development sets the stage. The most rapid development begins a few weeks after conception and continues at a significant pace until about age 5, at which point a recognizable personality and self-identity has formed. By age 5, most children have a gender identity, and personality and

IQ are at least moderately correlated with what they will be decades later. *Temperament*—individual differences in emotional responsiveness—is heavily influenced by biological differences (genetic, hormonal, and early environment nutrition and toxins) and forms a basis for later personality traits and for health. Approaches typically have included dimensions reflecting negative emotionality (related to later emotional stability), positive emotionality (related to later extraversion and optimism), and impulsivity and effortful control (related to later conscientiousness) (e.g., Ahadi & Rothbart, 1994; Caspi, 1998). However, any one temperament may relate to more than one adult trait, depending on the early environments. There is great potential for further study of the effects of early-life temperament on personality and health over long time intervals.

One intriguing aspect involves transgenerational effects. The life of any one individual begins *in utero*, but the life-course perspective on health should also consider maternal health and behavior, and the mother's social context prior to, during, and after pregnancy. For example, women with high stress prenatally were substantially more likely to have low-birthweight infants and to deliver preterm compared to women with low stress (Lobel, Dunkel-Schetter, & Scrimshaw, 1992). Furthermore, women who were least optimistic delivered infants of significantly lower birthweight, with researchers controlling for a variety of other predictors (Lobel, DeVincent, Kaminer, & Meyer, 2000). In turn, studies in rats and other mammals document long-lasting effects of prenatal exposure to stress hormones and sex hormones. Famine caused by wartime occupation of The Netherlands in 1944 led to significant long-term impacts of intrauterine deprivation, interacting with postwar prosperity that these children met (Schulz, 2010). We foresee great value from multigenerational studies of personality and health that enable the study of how parental characteristics and experience impact the personality and health of their children.

Childhood is also increasingly well documented as important to understanding trajectories to health and longevity decades later, with childhood personality having a surprisingly powerful influence on these trajectories. Longitudinal studies of child-

hood personality were initiated years before the contemporary dominance of the five-factor model of personality (Measelle, John, Ablow, Cowan, & Cowan, 2005; Mervielde & DeFruyt, 2002). Accordingly, it makes sense to group studies according to broader categories of effortful control (conscientiousness), negative emotionality, and positive emotionality.

Conscientiousness

The health significance of childhood levels of restraint and prudence as embodied in the trait of conscientiousness first became apparent in follow-ups to and analyses of archival data collected for the Terman Life Cycle Study. Due to extensive early measurement and lifelong follow-up, these data offer an unprecedented opportunity to examine the influence of childhood personality on longevity. Starting in 1921, 1,528 California schoolchildren, of average age 11 years, were recruited for a prospective study of the growing up of gifted children. Friedman and colleagues were able to track down and generate longevity data and to construct and validate measures of childhood personality from the parent and teacher data available in the archives that were meaningful in contemporary terms of the five-factor model (Friedman et al., 1993; Martin & Friedman, 2000). The most striking finding from these studies was that childhood conscientiousness predicted longevity across the lifespan and emerged as a risk factor for all-cause mortality of the same magnitude as ones that are widely accepted by the medical profession, such as serum cholesterol and elevated resting systolic blood pressure (Friedman et al., 1993; Friedman, Tucker, Schwartz, Tomlinson-Keasy, et al., 1995).

Perhaps because a reliable and valid assessment was being used successfully to predict such a reliable long-term and important outcome (longevity), this finding has since been replicated successfully in a variety of different samples and has helped launch a wide range of research programs investigating conscientiousness and health. The long-term effects of childhood conscientiousness on adult health, as well as its relations to unhealthy habits such as smoking in the Terman sample (Tucker et al., 1995), were con-

firmed in the Hawaii Personality and Health Cohort, a prospective study across more than 40 years. At midlife, men and women who as boys and girls were assessed by their teachers as more conscientious had better self-rated health, smoked less or not at all, and the women (but not the men) had lower BMI. The effect of childhood conscientiousness on self-rated health was found to be mediated by smoking and BMI (Hampson, Goldberg, Vogt, & Dubanoski, 2006). Childhood conscientiousness also contributed to educational attainment, which in turn influenced health behaviors and clinical health status, confirming the wide-reaching effects of conscientiousness on life outcomes (Hampson, Edmonds, Goldberg, Dubanoski, & Hillier, 2015). Although there is a tendency to be skeptical of relationships uncovered in any particular longitudinal sample, much follow-up research confirms the validity of the robust findings that emerged in these lifespan studies. The relevance of conscientiousness to health has been confirmed in meta-analyses of both cross-sectional and longitudinal studies, as well as in a nationally representative samples, demonstrating that low conscientiousness is related to low activity levels, excessive alcohol use, drug use, unhealthy eating, risky driving, risky sex, suicide, tobacco use, violence, impaired biomarkers, illness, likelihood of physical limitations, and premature mortality (Bogg & Roberts, 2004; Chapman, Fiscella, Kawachi, & Duberstein, 2009; Friedman & Kern, 2014; Goodwin & Friedman, 2006; Hagger-Johnson et al., 2012; Kern & Friedman, 2008; Turiano et al., 2015). Why should conscientiousness be such a robust predictor? It is likely that it is relevant to the full range of ongoing biopsychosocial processes described earlier in the sophisticated models of personality and health. The prospective association of conscientiousness with a variety of health behaviors and patterns, and with longevity, suggests that a child with a higher level of conscientiousness initiates and elicits a healthy life-course pathway, revealing what it means to thrive and flourish (Friedman, Tucker, Schwartz, Martin, et al., 1995; Kern et al., 2014).

What about the relative benefits of higher sustained levels of conscientiousness over the lifespan versus higher levels only in adulthood? Conscientiousness, measured

independently in childhood and adulthood, predicts health mortality risk across the full lifespan, and the link from childhood remains when adult conscientiousness and certain behavioral variables are controlled (Martin, Friedman, & Schwartz, 2007; Hampson et al., 2015). The lowest mortality risk is for those with high conscientiousness at both time points.

The beneficial effects of conscientiousness on longevity have now also been documented prospectively in adulthood. In the Edinburgh Artery Study (a prospective study of a community sample of men and women), men who were low in conscientiousness were more likely to die from any cause over a 7-year follow-up (Whiteman, 2006). In a 17-year follow-up in the Whitehall study, low conscientiousness in midlife was a key risk factor for all-cause mortality, partly explained by behavior, SES, and certain other risks (Hagger-Johnson et al., 2012). Studies of disease progression with patient samples also demonstrate the protective effects of being more conscientiousness. For example, renal patients low on conscientiousness were more likely to have died 4 years later (as were those high on neuroticism), after researchers controlled for age and diabetic status (Christensen et al., 2002). A number of studies confirm ties between conscientiousness and a range of health-enhancing behaviors among adult patient and nonpatient groups (Bogg & Roberts, 2004). For example, women with breast problems who were more conscientious were more likely to undergo mammography 2 years later, even when the effects of eight other predictors of mammography were controlled (Siegler, Feaganes, & Rimer, 1995). Adults tend to gain weight at midlife, and a study of over 3,000 participants in the North Carolina Alumni Heart Study showed that midlife weight gain measured at four time points over 14 years was larger among men and women who were less conscientious, implying poorer eating and exercise habits (Brummett et al., 2006). Many of these studies partly support health-behavior models by demonstrating that more conscientious adults have healthier lifestyles and are more adherent to disease treatment and self-management (Molloy, O'Carroll, & Ferguson, 2014), but the studies do not rule out additional underlying biological contributions to both health

and a conscientious trajectory (Caspi, Houri, Holmes, Uher, & Moffitt, 2010), and they often involve social relations and community. It is not the case, however, that SES accounts for conscientiousness effects (e.g., Pluess & Bartley, 2015). Furthermore, the absolute level may be important. Only very low or very high levels of conscientiousness may be dangerous or protective.

Weiss and Costa (2005) evaluated elements of the five-factor personality model as predictors of mortality in a community sample of men and women ages 65–100. They confirmed protective effects of high conscientiousness on mortality over a 5-year follow-up. Longer-term follow-up then confirmed self-discipline as a powerful predictor of survival (Costa, Weiss, Duberstein, Friedman, & Siegler, 2014). Wilson, Mendes de Leon, Bienias, Evans, and Bennett (2004) studied personality predictors of mortality in a group of elderly Catholic clergy members (men and women, no dementia at baseline) followed for 5 years. The risk of mortality was halved for those with high versus low conscientiousness scores, when the effects of the other traits and physical health were controlled.

These results are all the more striking when viewed from a lifespan perspective, because less conscientious individuals are more likely to die at all ages (Friedman & Kern, 2014; Friedman, Tucker, Schwartz, Martin, et al., 1995; Martin et al., 2007); hence, the survivors into old age are likely to be relatively conscientious! That is, when studying the relation between personality and health in older samples, an important caveat is the issue of the “survival elite”—these are individuals who have survived the other predictors of mortality (Korten et al., 1999). The relations can be weaker (or different) in old age, in part because of selective earlier mortality or successful treatment (Swan & Carmelli, 1996). Moreover, simple health-behavior or physiological models are less applicable in old age when insults have accumulated, physical limitations place restrictions on activities, and body chemistry has changed. Other issues for research with older samples include the distinction between normal aging and terminal decline preceding death; the presence of illness and disability; social disruptions; and stronger influence of genetic factors in extreme old age.

Negative Emotionality/Neuroticism (Emotional Instability)

The discovery of replicable associations between child and young adult traits and life-long mortality risk has been a major development in health psychology in the past 25 years, and has contributed to the revitalization of the study of individual differences as predictors of consequential outcomes (Ozer & Benet-Martínez, 2006). Not only traits associated with more rational processes—especially conscientiousness—but also traits associated with affective processes—especially negative emotionality—are important influences on later adult morbidity and mortality.

In the study of Cardiovascular Risk in Young Finns (CRYF), a representative cohort study, negative emotionality and hyperactivity (restlessness and impatience) in both boys and girls ages 9–15, assessed by mothers’ ratings, predicted adverse changes on indicators of the metabolic syndrome 3 years later (Ravaja & Keltikangas-Järvinen, 1995). Expanding on this study, Pulkki-Råback, Elovainio, Kivimäki, Raitakari, and Keltikangas-Järvinen (2005) examined the younger CRYF cohorts. They related maternal ratings of temperament (negative emotionality and aggression, activity, and sociability) at ages 6–12 to BMI assessed in young adulthood (ages 24–30), finding that negative emotionality had the strongest association with adult BMI, after controlling for childhood BMI and several other well-established risk factors, such as parents’ obesity. Consistent with transactional and interactional models, these children may evoke more stress in their lives and be more responsive to stress. Consistent with psychophysiological models, psychosocial stress in childhood is associated with weight gain in adulthood (e.g., Williamson, Thompson, Anda, Dietz, & Felitti, 2002). Support for a psychosocial stress model of negative emotionality and obesity also comes from the Dunedin study, which found a link between lower childhood SES and higher BMI at age 26, independent of adult SES (Poulton et al., 2002).

Many studies have shown a prospective association between aspects of difficult temperament (e.g., hostility) in childhood and subsequent unhealthy behavior, includ-

ing alcohol and tobacco use (e.g., Caspi et al., 1997; Gerrard, Gibbons, Stock, Houlihan, & Dykstra, 2006; Jessor & Jessor, 1977). Working with data from the longitudinal Oregon Youth Substance Use Project, Hampson and colleagues identified a mechanism by which more hostile children adopt a pathway leading to adolescent substance use: the development of cognitive susceptibility. Children who were rated by their teachers as exhibiting more hostile behavior at the beginning of the study believed increasingly over the next 4 years that more of their friends and peers were smoking or drinking, and these beliefs predicted stronger intentions to smoke and drink (Hampson, Andrews, & Barckley, 2007; Hampson, Andrews, Barckley, & Severson, 2006). The children's intentions were correlated with subsequent experimentation with smoking and drinking. The effects of hostility were mediated by these normative beliefs. Hostility in childhood is a relatively stable trait, which may serve to strengthen its effects through accumulation (Hampson, Andrews, Barckley, & Peterson, 2007; Woodall & Matthews, 1993).

Negative emotionality in childhood can both heighten a child's responsiveness to stress and evoke negative emotions in others. Over time, these children may face a life path of adversity and lower SES, thus creating a downward spiral. Yet stress, such as parental divorce in childhood, need not necessarily lead to negative later-life outcomes. In the Terman study, the higher mortality risk associated with parental divorce was ameliorated among individuals (especially men) who achieved a sense of personal satisfaction by midlife (Martin, Friedman, Clark, & Tucker, 2005). Clearly, potentially harmful trajectories can be deflected, and lifespan models need to accommodate twists and turns in the paths from personality to health outcomes. Adolescence and early adulthood may be a critical period to incur or mitigate adverse effects, because of experimentation with behaviors such as substance abuse, as well as high frequencies of potentially health-damaging risky activities (e.g., risky sex, dangerous driving, violence).

One of the earliest longitudinal studies of adult temperament and health followed medical students at Johns Hopkins University in the late 1940s. They were categorized

as slow and solid (wary, self-reliant), rapid and facile (cool, clever), or irregular and uneven (moody, demanding). During a 30-year follow-up, about half developed some serious health problem. Most (77%) of the previously labeled "irregular and uneven" types developed a serious disorder during these 30 years, but only about one-fourth of the rest suffered a major health setback. In further follow-ups, the "irregular and uneven" temperament types, as well as those physicians who seemed to have social and emotional problems (were repressed loners) and held "tension in," were more likely to have developed cancer or to have died (Betz & Thomas, 1979; Graves, Mead, Wang, Liang, & Klag, 1994; Shaffer, Graves, Swank, & Pearson, 1987). This study, as well as a study of Harvard students also begun in the 1940s, illustrated the value of long-term studies of personality and health in adulthood, as well as the power of biopsychosocial assessments of individual differences to predict key long-term outcomes (Friedman, 1991; Friedman & Martin, 2011; Peterson, Seligman, & Vaillant, 1988; Vaillant, 2012).

Over three decades ago, Friedman and Booth-Kewley (1987) proposed a generic "disease-prone personality" characterized by negative emotionality, in particular anger/hostility and depression. This construct was contrasted with the then-popular focus on narrow trait-to-disease links, such as Type A behavior and coronary heart disease. The idea of a clustering of negative emotionality traits associated with poor health has been most clearly confirmed with cardiovascular disease (see the review by Suls & Bunde, 2005; see also Brummett et al., 2006; Smith & Gallo, 2001; Whiteman, 2006). Suls and Bunde (2005) concluded that anger, anxiety, and depression are overlapping constructs that together predict cardiovascular disease among initially healthy populations. However, investigators typically examine the effects of only one aspect of negative emotionality (e.g., just hostility or just depression) and one disease; needed are studies in which the various components are all measured, so that their combined influence on cardiovascular health *and* general health and mortality risk can be assessed.

The Healthy Women Study (HWS), a prospective study of changes in behavioral and biological characteristics of a population-

based cohort of middle-age women during the peri- and postmenopausal years, showed prospective relations between negative emotionality and clinical measures of health status. Women in the HWS who were more depressed, tense, and angry at baseline were at increased risk of developing the metabolic syndrome during the 7–8 years of follow-up (Räikkönen, Matthews, & Kuller, 2002). Importantly, though, this study also found reciprocal effects: Metabolic syndrome at baseline predicted increasing anger and anxiety over the follow-up period. Relatedly, after menopause, the odds of heart disease increase significantly, and so do the odds of depression (Bromberger et al., 2011); depression is not causing disease.

In many studies, neuroticism predicts the reporting of symptoms but not the onset of actual disease (Costa & McCrae, 1985; Feldman et al., 1999; Watson & Pennebaker, 1989). This goes beyond the artifact introduced when self-report measures of health (negatively biased by neurotics) are used. Overall, trait neuroticism (low emotional stability) has not demonstrated consistent relations with health outcomes, including mortality. For example, the Western Electric Study of middle-age men (Almada et al., 1991) did not show a relation between neuroticism and mortality. In the Million Women Study, a longitudinal investigation of a huge sample (Liu et al., 2016), middle-age women were asked about their levels of relaxation, happiness, and “stress.” A decade of follow-up, with many statistical adjustments possible due to the large number of participants, found no evidence that feeling stressed or unhappy itself increases cardiac risk, cancer risk, or overall mortality across the key years of middle age, despite an observed correlation between happiness and health.

A promising explanation for these conflicting results is that there are two quite different life paths involving neuroticism (Friedman, 2000). In one case, adults who were resentful and anxious failed to adhere to treatment regimens, engaged in an unhealthy lifestyle, and had disturbed sleep, and/or evinced a lack of social support, all of which increase the risk of poor health. The other pathway—“healthy neuroticism” (Friedman 2000)—led to better health as

a consequence of neurotic vigilance, caution, and treatment adherence (Gardner & Oswald, 2004; Korten et al., 1999; Weston & Jackson, 2015; see Friedman, 2019, for an overview). As noted earlier, the effects of neuroticism are further complicated by evocative effects, with neurotics tending to experience more negative events and reacting more strongly to them (Bolger & Zuckerman, 1995). Depression interventions for patients who have experienced a heart attack often have had no impact on the likelihood of subsequent heart attacks or mortality risk (Writing Committee for the ENRICHD Investigators, 2003; see also McCaffery et al., 2006; Whalley et al., 2011).

The effects of neuroticism may take time to build up (the cumulative model), in which case these effects should be strongest in old age (Wilson et al., 2004). Mroczek, Spiro, Griffin, and Neupert (2006) proposed that people who experience high levels of neuroticism throughout their lives develop a hair-trigger response to negative emotion. According to this “kindling hypothesis,” people with a life history of high levels of neuroticism have consistently reacted strongly and negatively to stress, and, over the years, this has had a cumulative, detrimental effect on the HPA axis. Using data from the Normative Aging Study, Mroczek and Spiro (2007) showed that increasing neuroticism was associated with increased mortality risk over a 10-year period (mean age 63 for the personality assessments). Sometimes, relative change on a particular trait, rather than absolute level, is the parameter with the most predictive power.

Positive Emotionality and Optimism

Positive emotionality in childhood is associated with both beneficial and detrimental long-term consequences for health. The negative consequences of positive emotionality are most starkly demonstrated in survival analyses for participants in the Terman Life Cycle Study. Contrary to popular wisdom, the Terman study indicated that childhood cheerfulness (a combination of cheerfulness/optimism and sense of humor) increased mortality risk (Friedman et al., 1993). No simple explanation for this association was

supported empirically, although risk-taking may be a factor; cheerfulness may be a complex blend of traits associated with both health costs and benefits (Martin et al., 2002). For example, sensation seeking can accompany extraverted disinhibition (Depue & Collins, 1999), described by Zuckerman (1994) as impulsive unsocialized sensation seeking. Outgoing and sociable children and adults are more likely to enjoy not only the benefits of friendship and popularity but also the costs associated with peer-initiated problem behaviors. For example, extraverted sociability predicts smoking and drinking. In the Hawaii study and the Terman study, children who were assessed as more extraverted reported drinking more alcohol at midlife (Hampson, Goldberg, et al., 2006; Tucker et al., 1995).

It has been hypothesized that to the extent that adults tend to experience positive emotions, they will not be exposed to the accumulation of adverse physiological stress reactions, and hence should be more likely to have long, healthy lives. Some evidence to support this assertion was found in a prospective study of 185 Catholic nuns, in which Danner, Snowdon, and Friesen (2001) reported an association between positive emotional content of written autobiographies at age 22 and longevity six decades later, after controlling for age and education. Whether emotional expression in these autobiographies reflected a coping style in response to stress, a pervasive disposition to experience more positive emotion, an ability to resolve negative emotions, or indeed, some other mechanism could not be determined from these data, and various studies relating positive emotionality to mortality have not found it to be simply protective (e.g., Janoff-Bulman & Marshall, 1982; see Friedman & Kern, 2014, for an analysis of happiness, subjective well-being, and health). Causal links remain murky (Cohen & Pressman, 2006; Pressman & Cohen, 2005; see also Cohen et al., 2003; Hudson, Lucas, & Donnellan, 2019). Postulated mechanisms include health practices, physiological responses, and a stress-buffering effect in which positive affect modulates the stress response (Pressman & Cohen, 2005), but it is probably the case that sense of meaning, optimism, and persistence are

generally much more relevant to causal pathways than is positive affect. For example, in one community study, dispositional optimism was associated with prudent health *behavior* (i.e., less smoking and alcohol use, and more physical activity; Steptoe, Wright, Kunz-Ebrecht, & Iliffe, 2006). It is important to avoid the popular misconception that positive affect directly causes good health or that optimism will mobilize the immune system and cause tumors to shrink (Coyne & Tennen, 2010; Sloan, 2011).

Consistent with a focus on short-term motivation, optimists recover better from medical interventions than do pessimists. For example, patients who were more optimistic were less likely to be rehospitalized after coronary artery bypass graft surgery (Scheier et al., 1999); more optimistic women demonstrate better adjustment to breast cancer (Carver et al., 1993); and more optimistic patients with head and neck cancer had a greater chance of 1-year survival, when researchers controlled for sociodemographic and clinical variables (Allison, Guichard, Fung, & Gilain, 2003). Women in the HWS who were more optimistic showed less progression of carotid artery disease than did those who were chronically pessimistic (Matthews, Räikkönen, Sutton-Tyrrell, & Kuller, 2004). Overall, a diversity of evidence supports the benefits of optimism in the short term (Boehm & Kubzansky, 2012; Scheier & Carver, 2003), likely because optimism captures motivation and perseverance. Again, however, because some measures of positive affect and optimism may reflect how a person feels, and self-reports of health often capture affect, it is necessary to (1) institute a number of corrections, including objective health outcomes (or using longevity as the outcome); (2) control for concurrent self-rated health; (3) control for conscientiousness; and (4) use a prospective design. More correlational studies of self-reported affect and self-reported health (or minor health fluctuations or temporary biomarker changes) are not needed.

Intelligence

Intelligence, including intelligence in youth, is associated with health and longevity (Cal-

vin et al., 2011; Deary, Whiteman, Starr, Whalley, & Fox, 2004; Gottfredson & Deary, 2004; Hart et al., 2003; Pavlik et al., 2003). Although not usually conceived to be an element of personality, intelligence is certainly a key individual difference with long-term stability, and with influences on many life key outcomes. Some of the same factors that produce an association between conscientiousness and health also lead to an association between intelligence and health. Lower childhood IQ is a risk factor for health-damaging behavior in adolescence and adulthood. Cognitive impairment predicts and is predicted by psychophysiological disruptions such as hypertension, obesity, diabetes, brain integrity, and incipient cardiovascular disease. Lower intelligence is correlated with and predicts less educational achievement, lower SES, less adherence to medical treatment, and less stable social relationships. On the other hand, the Terman cohort indicated that a large percentage of highly intelligent individuals succumb to unhealthy behaviors and diseases in patterns that are not substantially different from those of many persons of average intelligence, indicating the importance of personality traits and other factors in addition to intelligence for health outcomes (Friedman & Markey, 2003). Thus, it remains to be examined just how personality and intelligence interact in the prediction of health outcomes at various stages of the life course (Iveson & Deary, 2019).

Conclusions and Future Directions

Because understanding the likelihood of disease for the individual is often as important as knowing the general causes of disease, personality psychology is a necessary complement to biology in understanding and promoting health and longevity. Modern conceptions of personality are addressing many of the limitations of static conceptions of health, although these new developments are underappreciated in medical research and treatment. Personality concepts and theories are comfortable with interacting biological, psychological, and social contributions, as well as changes as a function of maturation, environmental press, situ-

ation selection, and cultural influence. For example, whereas personality psychologists are comfortable with describing a worrying, impulsive, working-class boy with biologically based hyperreactivity, who grows up exposed to a high-carbohydrate diet reinforced by certain social gatherings that are part of his cultural environment, and who sets himself, during adolescence, on a social-behavioral pathway toward diabetes, a physician might struggle to identify which “medical condition” condition to “treat.” Thus, although there is no pill to treat this progression (and no pill to change personality), there are many positive steps that can be taken to head off serious chronic illness.

To illustrate the lifespan approach, we have examined the relations between personality and health in terms of three domains: (1) effortful control and conscientiousness, (2) negative emotionality, and (3) positive emotionality and optimism. All three domains are proving fruitful in the search for links between personality and health, but these do not necessarily represent an optimal categorization. Although health-behavior models tend to be invoked as mechanisms to account for the effects of the conscientiousness, and stress-related psychoneuroimmunological models historically tend to be used to explain the effects of emotionality, more complete models will integrate the various interacting forces, while considering changes across time (Friedman, Kern, Hampson, & Duckworth, 2014).

To test lifespan models, we need to employ statistical techniques that can optimally analyze trajectories such as latent-growth models and latent-transition analysis. This methodology requires multiple, reliable assessments over the longitudinal period under study. Relatedly, survival analysis is standard in epidemiology but only slowly is making its way into personality psychology. These methods allow for personality change, as well as changes in health status. As noted, it also should prove valuable to identify life stages—the critical periods—when both personality and health are more likely to change with regard to particular habits, behaviors, social ties, reactions, and health status.

Because the relations are dynamic and complex, there may always be limits on the

size of the relations between personality and health, just as there are limits on the ability of personality alone to predict behavior. These limitations and complexity do not mean that personality is unimportant or of minor significance in predicting or improving health. On the contrary, because modern notions of personality are well suited to capturing complex and ongoing biopsychosocial processes relevant to health, personality may prove more valuable than traditional but relatively static measures, including traditional biological measures (e.g., serum cholesterol), demographic measures (e.g., ethnicity), social measures (e.g., marriage status), or psychopathology measures (e.g., depression).

All in all, the field of personality and health is thriving, with striking conceptual and methodological development guided by the significant progress already made by personality psychology. Our own research has involved interdisciplinary teams, which are often key to solid progress.

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PART VIII

EMERGING ISSUES AND NEW DIRECTIONS

CHAPTER 38

Personality Interventions

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Personality traits are prospectively associated with a number of important life outcomes, at all ages of the lifespan, sometimes decades in advance (Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007). A common response to these associations is to ask why they occur, prompting a hunt for mechanisms that relate personality with outcomes such as health, divorce, educational attainment, and job success (e.g., Solomon & Jackson, 2014). An alternative response to the predictive validity of personality is ask whether one can modify personality in order to improve individual outcomes. At present, there is crosscutting, global interest in changing personality (Bleidorn et al., 2019). The sheer magnitude of the self-help literature, as well as self-reported desires to change personality (Hudson & Roberts, 2014), indicate that many people are unhappy with their current personality. Furthermore, the potential for impacting many life domains has generated public policy interests (e.g., as universal preschool) that hinge on the ability to cultivate personality (Heckman, 2006). Despite the interest and potential payoff of personality interventions, little is known about what makes an effective personality intervention.

Should We Intervene to Change Personality?

Personality traits have a number of characteristics that make them appealing targets of intervention. First, personality traits are associated with life outcomes in almost all domains, even after accounting for background characteristics. Many of these outcomes take years to accumulate (e.g., health), so an intervention that targets processes early in the causal chain, like personality, would be optimal (Chapman, Hampson, & Clarkin, 2014). Second, a considerable body of research has demonstrated that personality traits are open to change across the lifespan. These changes likely occur due to experiences rather than to aging processes alone, implying that personality interventions are possible (Roberts & Jackson, 2008). Third, personality is relatively consistent across the lifespan, suggesting that if personality is modified through intervention, the effects of the intervention will be longer lasting. Unlike more ephemeral constructs, such as mood, and more stable constructs, such as fluid cognitive ability, personality represents a middle ground of being both open to change and relatively stable.

Despite the promise and the potential importance, it is not clear whether interventions on personality are feasible. First, there are the ethical challenges to changing aspects of personality, as personality often gets equated with a person's identity and individuality. Interventions would thus reduce the variability in personality, leading to reductions in individuality, echoing the dystopian world of Vonnegut's novella *Harrison Bergeron*, in which the constitution outlaws individual differences, such as cognitive ability. Proponents for personality interventions could argue that interventions are usually targeted to single characteristics, thus mitigating Harrison Bergeron's concern. Anecdotally, people have fewer problems with intervening on cognitive ability (on which schooling presumably intervenes; Ritchie & Tucker-Drob, 2018) and to a lesser extent self-esteem (which was introduced into select schools; see Baumeister, Campbell, Krueger, & Vohs, 2003; Robins, Trzesniewski, & Donellan, 2012), presumably because the poles of these dimensions are almost universally regarded as positive. In contrast, the benefits of high levels of personality characteristics may not be so apparent. Although being high in conscientiousness is associated with a number of positive outcomes, there are still downsides to the trait that may prove undesirable (Jackson & Hill, 2019). Many people will likely be left uncomfortable with someone dictating what pole of a characteristic is considered positive, especially given evidence that each side has both positive and negative characteristics (Nettle, 2006).

The second barrier to feasible personality interventions is that processes underlying naturally occurring personality changes are mostly unknown. Despite a relative acceptance that experiences can shift personality, there are few life events that are consistently associated with changes in personality (e.g., Van Scheppingen et al., 2016). It is useful to note this lack of progress toward identifying major events that are responsible for changes in personality before attempting to intervene on personality, because the mechanisms responsible for change in passive longitudinal studies and interventions are likely shared.

There are at least four issues to consider that complicate designing effective

interventions. First, there are psychological mechanisms that promote stability in self-concept, presumably leading to greater personality consistency (Roberts, Wood, & Caspi, 2008). A strictly environmental view on changing personality may not actively change one's self-concept. Second, each environment is perceived subjectively. In terms of changing personality, it will be difficult to create subjective equivalence from the same objective intervention. Third, as seen in decades of work on interventions for cognitive ability, the extent to which an experience impacts someone is likely to be domain specific (Hertzog et al., 2008). This domain specificity would suggest that narrow changes in behaviors, thoughts, or feelings due to an intervention would not lead to broad personality change (see Jackson & Hill, 2019). In other words, it is easier to change some narrow behaviors but more difficult to change the broad thoughts, feelings, and behaviors that comprise one's personality. Finally, when discussing changes in personality, it is possible that both personality structure and change occurs idiographically, at the individual level (Beck & Jackson, 2020). If true, then the mechanisms responsible for change are person specific, resulting in the need for personalized interventions to find effects.

Despite these roadblocks and an unclear road map of how to change personality, a number of existing interventions provide an indication of the features of an effective personality intervention. These studies mostly originate outside the field of personality and attempt to change consistent behaviors, thoughts, and/or feelings that could be considered "personality." It is worth noting, however, that in most cases, changes in personality could be considered a side effect, separate from the original intent of the intervention. Below we describe the evidence that various interventions have had on broad behaviors, thoughts, and feelings that, in turn, may help identify what an intervention for changing personality would look like.

Types of Personality Interventions

Parent and School Programs

Many high-quality interventions occur in early childhood, predicated on the idea

that if existing habits and tendencies exist, they can more easily be overwritten due to the “newness” of a child’s personality relative to that of an adult. These interventions take advantage of the fact that a child’s life is almost completely dictated by his or her guardians, thus allowing for interventions that target multiple aspects of a child’s life, from the family environment to the school environment. In addition to being presumed to be more malleable, childhood interventions are also sold as cost-effective: Early intervention provides more long-term effects due to the cumulative nature of most life outcomes (Heckman, 2006).

Several series of studies have focused on improving childhood mental and physical health. For example, the Nurse–Family Partnership program provides low-income, first-time mothers with pre- and postnatal education and home visits from nurses until the child reaches 2 years of age. Follow-ups indicate potential impact on personality in adolescence, with program participants being less likely to engage in risky smoking, alcohol, or sexual behavior and to have been arrested (Olds et al., 1998). Similarly, the Chicago Child–Parent Centers (CPC) program creates a stable environment so as to promote optimal academic and behavioral development (Reynolds, Temple, Robertson, & Mann, 2002) and is associated with better graduation rates and reduced arrest rates (Reynolds, Ou, & Topitzes, 2004). Studies such as these indicate that early interventions can have later life influences, potentially via personality, but the mechanisms responsible could operate through pathways other than personality. The Carolina Abecedarian Project (Campbell et al., 2014) found that the intervention effects are partially, but not entirely, due to socioeconomic status (SES), education, IQ (Conti, Heckman, & Pinto, 2016), leaving the door open to changes in personality mediating some of these childhood intervention effects. However, few early-life interventions include measures of personality.

One of the only long-term intervention studies to include a measure of personality is the Perry Preschool Project (Heckman, Pinto & Savelyev, 2013). A broad behavioral measure assessed during adolescence suggests that this intervention led to childhood

differences in personality, which influenced later life health and labor-market outcomes (Heckman, Pinto, & Savelyev, 2013). The Perry Preschool Project was based on a Vygotskian approach that utilized active participatory learning. The program emphasized organizational skills, such as the ability to plan and execute tasks, as well as social skills, such as conflict management and cooperation. Although this is a promising study that provides a framework for the early life interventions that influence later personality, the Perry Project is limited in generalizability by being a single, small sample study of a relatively disadvantaged population.

The Perry Project was a prototype version of what effective early interventions could be and, as such, has since been emulated. A great number of Head Start programs, for example, employ a modified version of the Perry curriculum (Head Start Impact Study, 2010). Like the Perry Project, Head Start also shows later life benefits that are not attributable to the effects of cognitive ability (Carneiro & Ginja, 2014; Deming, 2009; Feller, Grindal, Miratrix, & Page, 2016). However, a recent study found no personality differences during adolescence between those that were in Head Start versus a matched sample that either received a different type of daycare or no daycare at all (Jackson, Beck, & Weston, 2020). Altogether, childhood programs appear to be effective later in life, there is limited evidence that their effectiveness is due to changes in personality.

Antisocial Behavior and Juvenile Delinquent Programs

Another common type of intervention is centered around antisocial behavior. Preventive awareness programs, such as Scared Straight, are based on the idea that youth can be deterred or scared away from deviant behavior by familiarizing them with the consequences. In Scared Straight, children are taken to visit prisons to deter them from engaging in misconduct. Such juvenile awareness programs quickly gained popularity, despite evidence that they are largely ineffective. Indeed, a meta-analysis of randomized clinical tests of juvenile awareness programs

found that such programs had detrimental effects on postvisit criminal behavior (Petrosino, Turpin-Petrosino, & Buehler, 2003).

A more extreme form of preventive awareness programs are boot camps modeled after military programs. These boot camps hinge on Gottfredson and Hirschi's (1990) general theory of crime, which proposes that deviancy is a consequence of inadequate constraints on an individual's behavior. The discipline that is integral to boot camps should improve juveniles' self-control and decrease future delinquency and recidivism. However, similar to awareness programs, a meta-analysis suggests that boot camps have been largely ineffective in reducing markers of antisocial behavior such as recidivism (MacKenzie, Wilson, & Kider, 2001).

Another type of intervention for antisocial behavior, social-cognitive skills training, emphasizes changing the cognitive and information processing mechanisms that presumably underlie delinquent behavior. It draws on research suggesting that aggressive people tend to attribute others' actions to hostile intentions and to attend to hostile cues more than do less aggressive people (e.g., Crick & Dodge, 1996; Dodge, 1993). Thus, by changing these maladaptive cognitions, one can reduce aggressive behaviors. Programs in this family target these cognitions by changing attention and response to social cues, updating goals and contingent responses to cues, and training those responses as habits (Crick & Dodge, 1994).

The prototypical example of this approach is the GREAT program (Guiding Responsibility and Expectations in Adolescents Today and Tomorrow; Meyer, Allison, Reese, Gay, & Multisite Violence Prevention Program, 2004). Although the program has been successful in changing social-cognitive information processing, it is less clear whether this results in behavioral change and whether the changes are long-lasting. A series of reviews and meta-analyses of the GREAT program suggests that the program may have detrimental effects: Participants in the program reported increased aggression and support for proaggression norms relative to controls. However, for the children at highest risk, the results suggest that the program is behaviorally effective (Simon, Ikida, & Smith, 2008).

Although many of the juvenile awareness, boot camp, and social-cognitive interventions are largely ineffective and potentially harmful, there is considerable heterogeneity in the effectiveness of programs within categories. A recent meta-analysis of the effectiveness of preventive and treatment-based interventions on adolescents' antisocial behavior found that prevention-based interventions were less effective than therapy-based interventions in reducing antisocial behavior (Sawyer, Borduin, & Dopp, 2015). The effectiveness of more therapeutic approaches relative to other approaches suggests that notable change likely takes time to occur. Several key moderators indicate that including peer group members in the intervention protocol was effective for younger boys but not adolescent boys, and that parent involvement was more effective in samples that included a higher proportion of minorities. Another meta-analysis that focused specifically on which program features were associated with positive intervention effects identified intervention quality as a key factor (Lipsey, 2009). Overall, these mixed results suggest that therapeutic approaches for high-risk youth may be effective for antisocial tendencies, but despite considerable time and effort, it is unclear whether aspects of personality changed, or whether situations were changed such that opportunities for antisocial behaviors were reduced.

Clinical Interventions

Within the clinical domain, a number of studies incorporate personality trait measures as one way to assess the pre- and posttreatment effects of therapeutic interventions on individuals' functioning (e.g., Bagby, Joffe, Parker, Kalembe, & Harkness, 1995; Piedmont, 2001; M. Smith, Glass, & Miller, 1980; Trull, Useda, Costa, & McCrae, 1995). Therapy can be considered a direct intervention on personality, with the goal to change an aspect of a person's maladaptive behaviors and/or thought process (Allemand & Flückiger, 2017). A recent, large-scale meta-analysis found broad evidence for positive changes in personality as a response to therapy. Compared to controls, personality evidenced large magnitudes of change ($d \approx 0.47$), across different therapy

types and multiple assessment methods, was lasting after therapy ended (2+ months), and was effective regardless of age. Furthermore, both clinical and nonclinical samples, using quasi- and truly experimental designs found evidence for a robust effect (Roberts et al., 2017).

Emotional stability and extraversion showed the most marked change in response to intervention. Agreeableness and conscientiousness changed more modestly, and openness appeared not to change. The findings for these traits are to be expected given that emotional stability includes components of anxiety and depression, often explicit targets of therapy. Because reducing components of neuroticism is often an objective of therapy, it is possible that the observed changes are due to short-term elevations brought on by what lead people into therapy to begin with, the onset of a depressive episode, for example. In other words, therapy may merely bring people back to a baseline levels of traits rather than meaningfully alter personality.

Much like therapy, eating disorders and substance use disorder (SUD) treatment can be seen as an intervention to change personality, though with a more explicit focus to modify health behaviors. In their meta-analysis, Roberts et al. (2017) found that treatment for both eating disorders and substance use was modestly effective for changing personality, but that, in general, these effects were smaller compared to other types of treatment. Moreover, when accounting for small study effects, they found no changes in personality for eating disorder treatment.

For SUDs, changes in impulsivity are thought to be an important mechanism toward effective SUD treatment, as substance use behaviors are strongly linked to impulsivity-related constructs (Littlefield & Sher, 2014) such as conscientiousness, neuroticism, and extraversion. Consistent with this idea, participation in Alcoholics Anonymous (AA), is associated with decreases in impulsivity across a 16-year time period, with longer participation associated with greater declines in impulsivity (Blonigen, Timko, Moos, & Moos, 2009). Similarly, impulsivity facets assessed via behavioral measures and traditional questionnaires

showed changes in response to SUD treatment over a 4-week time span (Littlefield et al., 2015). Passive longitudinal designs also draw a link between decreases in alcohol use and decreases in impulsivity (Littlefield, Sher, & Wood, 2009).

Interventions for SUDs may end up changing personality by creating a positive psychosocial support network, coping skills, increased structure, and a framework for tackling negative patterns of thoughts and behaviors (Blonigen, Timko, & Moos, 2013). Consistent with this, decreases in impulsivity following AA predict fewer legal problems, fewer drinking problems, more social support, and more frequent use of adaptive coping skills (Blonigen et al., 2013).

Psychopharmacological Interventions

Therapeutic interventions can also take the form of a pill rather than, or in addition to, therapy. Little work has systematically examined whether psychopharmacological interventions need to be paired with therapy or which drugs are effective, but meta-analytic findings suggest that psychopharmacological interventions are associated with changes in personality (Roberts et al., 2017). For example, DeFruyt, Van Leeuwen, Bagby, Rolland, and Rouillon (2006) found that individuals treated with a combination of either tianeptine or fluoxetine, along with therapy, showed greater extraversion, openness to experience, agreeableness, and conscientiousness following treatment. Similarly, in a sample of depressed individuals, use of cognitive therapy and medication (selective serotonin reuptake inhibitors [SSRIs]) were associated with changes in neuroticism and extraversion compared to a control group (Tang et al., 2009). Most interestingly, changes in depression were shown to be the result of changes in neuroticism, and long-term relapse in depression was explained by changes in neuroticism, such that people who decreased the most on neuroticism were the least likely to experience a relapse. In a similar study, both pharmacological intervention (antidepressant) and therapy (cognitive-behavioral) were associated with declines in neuroticism and increases in conscientiousness in a large sample of depressed patients (Spittlehouse et al., 2010).

The existing literature points to changes mainly in neuroticism due to pharmacological intervention, most likely a result of the effectiveness of drugs to treat depression and anxiety, which are facets of neuroticism. Yet there is a rich oral history on the effect of lysergic acid diethylamide (LSD), mescaline, and psilocybin (magic mushrooms), affecting one in a deep spiritual and transcendent level, potentially altering the personality (Unger, 1963). Most of the reported changes were retrospective, and without any systematic assessment of personality, mirroring the take-it-with-a-grain-of-salt statements some may make after seeing a “life-altering” concert or when someone finds religion. An exception is a nearly 60-year-old study on the effects of a large single dose of LSD. Changes in Minnesota Multiphasic Personality Inventory (MMPI)-assessed personality were found after 2 months for most participants. However, these changes tended to not persist, as only some participants evidenced change at a 6-month follow-up. A more recent, small sample study also found evidence of short-term change in a group that took LSD displayed increased openness over 2 weeks compared to a control group (Lebedev et al., 2016). Some evidence suggest changes are not just short term. A study in which participants took a high dose of psilocybin found increases in openness after a 1-year follow-up, with no changes for the any of the remaining Big Five traits. These changes were mainly driven by those who had greater mystical experiences during their mushroom trip (MacLean, Johnson, & Griffiths, 2011). Another study found changes in all Big Five traits except for agreeableness after 3 months (Erritzoe et al., 2018). The potential for meaningful change and shifting attitudes about psychedelics have prompted more researchers to study the effects of psychedelics on changing thoughts, feelings, and behaviors (Pollan, 2019).

Strengthening Self-Control

Low levels of self-control are blamed for a number of societal ills, from eating an extra piece of cake to missing important work meetings (Baumeister & Tierney, 2011). The ego control model of self-control states the

self-control can be conceived as a muscle, and much like a muscle, self-control can be strengthened through sustained practice. Numerous researchers have attempted to intervene and train self-control (e.g., Gailiot et al. 2007; Muraven, 2010; Oaten & Cheng, 2007). In each of these studies, participants are asked to do various activities that typically deplete self-control, such as regulating speech or diet, using one’s non-dominant hand, or practicing with a hand-grip for periods ranging from 2 weeks to 4 months. Gains in self-control were found in a recent meta-analysis of self-control training interventions in which people were randomly assigned to practice at activities thought to deplete self-control (Friese, Frankenbach, Job, & Loschelder, 2017). However, there are concerns of small-study bias driving these results, calling into question the efficacy of these types of interventions. Furthermore, a replication study using traditional ego depletion, as well as standard questionnaires as measures of self-control that used a larger sample size and completed training and follow-up assessments over a longer period of time, found no evidence for the effectiveness of these interventions (Jackson, Kube, & Mike, 2020; Lee & Kemmelmeier, 2017).

Health Interventions

One difficulty in parsing the health intervention literature (e.g., Glanz & Bishop, 2010) is that many health interventions focus on changing health behaviors (e.g., exercise, diet) that conceptually overlap with assessment of personality traits such as extraversion and conscientiousness (Jackson, Weston, & Schultz, 2017). Outside of the measurement overlap issues, the few interventions that assess personality pre- and postintervention find limited change. For example, a meta-analysis of interventions to improve the health of those with coronary heart disease (behavior modification and health education) found no subsequent changes in anxiety or depression, the only personality variables assessed (Dusseldorp, van Elderen, Maes, Meulman, & Kraaij, 1999). In contrast, a 2-month hostility intervention led to changes in both hostility and

blood pressure compared to a control group (Gidron, Davidson, & Bata, 1999).

Exercise interventions are some of the most frequent and effective health interventions. In terms of psychological benefits, exercise impacts phenomena related to personality, including positive and negative affect (Trost, Owen, Bauman, Sallis, & Brown, 2002; Reed & Ones, 2006), depression (Carek, Laibstain, & Carek, 2011), anxiety (De Moor, Beem, Stubbe, Boomsma, & De Geus, 2006), and psychological well-being (Netz, Wu, Becker, & Tenenbaum, 2005). Several meta-analyses and reviews have concluded that exercise reduces the symptoms of depression at levels comparable to those achieved by antidepressant medications (Bridle, Spanjers, Patel, Atherton, & Lamb, 2012). Together these findings indicate that extraversion and neuroticism could be impacted by an exercise intervention.

Exercise also affects cognitive functioning. Compared to older adults who are sedentary, active older adults exhibit better executive control (Colcombe & Kramer, 2003), processing speed (Smith et al., 2010), and memory (Hindin & Zelinski, 2012; P. Smith et al., 2010). Cognitive control has been linked to conscientiousness (Bogg & Finn, 2010), while processing speed (Bates & Shieles, 2003) and memory (Kaufman, 2013) have been linked to openness, suggesting that cognitive improvements may be associated with concomitant personality changes.

Cognitive Training

There are many attempts at interventions to thwart the seemingly inevitable decline in cognitive ability as one ages. These interventions usually involve training in one particular cognitive domain or task, usually for a period of weeks or months. Training interventions are found to be effective inasmuch as people are able to increase the cognitive domain for which they have trained, but there is little evidence for widespread transfer to other domains (Hertzog et al., 2008). While cognitive training does not have widespread effects for all cognitive abilities, there are some indications that the changes within a domain are associated with changes in

personality. Jackson, Hill, Payne, Roberts, and Stine-Morrow (2012) found that older adults who performed inductive reasoning training over 16 sessions, along with crossword and Sudoku puzzles in which difficulty level matched with skill level, increased in openness to experiences compared to an active control group. Presumably, participants valued the accomplishment of working through the puzzles week after week, thus feeling more capable and comfortable with cognitively challenging tasks. It is unclear however, whether these self-reported changes lead to observable behavior changes.

Following up on this work, Sander, Schmiedek, Brose, Wagner, and Specht (2017) conducted an extensive cognitive training intervention (memory and perceptual speed) over the course of 100 days with more than 1 hour per day devoted to cognitive training. In contrast to Jackson et al. (2012), no changes in openness due to cognitive training were found. It is unclear whether changes in openness did occur but only changed temporarily, as personality was only assessed at a 2-year follow-up. While the intervention was not associated with openness, it was associated with increases in memory and perceptual speed and decreases in conscientiousness.

Coaching

A response to the success of clinical interventions, paired with overwhelming desire for many people to change nonclinical features, is the development of coaching programs to change personality. Coaching programs identify aspects of personality that a person wants to change, then guides them through the change process based on principles of therapy (Allemand & Flückiger, 2017). Some success has been achieved using short-term interventions. For example, over 15 weeks, people changed their personality via weekly challenges, in which participants were coached to act in accordance with the trait pole they wanted to change (Hudson, Briley, Chopik, & Derringer, 2019). Similarly, a 10-week coaching program extended the idea of behaving in accordance with trait manifestations by working with a coach to identify roadblocks of behaving in

a trait-consistent manner, as well as developing a more elaborate strategy that targeted specific traits (Allan, Leeson, De Fruyt, & Martin, 2018). Such targeted strategies that are specific to the individual can be easily delivered via instant messages or through apps. For example, the recently developed PEACH (PErsonality coACH) app assists with coaching via an artificial intelligence (AI)-assisted chat-bot to increase motivation and involvement (Stieger et al., 2018). Preliminary results suggest that the training app is effective in increasing openness and self-discipline over a 6-week period (Stieger et al., 2020).

Unanswered Questions and Future Directions

The studies we have reviewed cover many different approaches to change personality. From early childhood-based home interventions to ingesting mushrooms, the strategies used to impart change range from changing the surrounding environment to changing behavior directly or indirectly related to personality, to changing thought processes, all the way to changing neurotransmitters. A sober conclusion relative to the reviewed studies suggests no clear way to change one's personality. Of those interventions that found evidence of change, each has limitations. For example, most studies lacked a representative sample or were selected because of some characteristic (e.g., disadvantaged or experiencing anxiety). Beyond selection bias, few studies looked systematically at how intervention length and follow-up period influenced findings, or whether personality assessed via different modalities also evidenced change. As a result, it is difficult to say there is a known method to change personality. The lack of progress in identifying how to intervene on personality should not be too surprising, as few studies have explicitly attempted to change personality. Moreover, intervening on any aspect of one's psychology is difficult, as seen in related literatures (e.g., Kreplin, Farias, & Brazil, 2018; Sisk, Burgoyne, Sun, Butler, & Macnamara, 2018). Below we highlight three important questions that should guide future work.

Which Experiences Are Needed to Change Personality?

One difficulty in identifying which interventions are effective is knowing the processes involved in personality change. It would be easier to create an effective intervention if one knew the reasons that drive personality change. Current thought is that changes in personality come via an environment stimulus, which directly impacts state-level manifestations of personality, not trait levels (Roberts & Jackson, 2008; Wrusz & Roberts, 2017). Thus, for the environment to engender lasting changes in personality, shifts in states beyond what is typical in everyday life are necessary (Chapman et al., 2014; Magidson, Roberts, Collado-Rodriguez, & Lejuez, 2014). Shifts in personality states then work through a "bottom-up" process that eventually leads to lasting changes in the trait, in which the shifts in states feel natural and occur automatically. Shifts in states can come from expectations and contingencies in the environment, either through naturally occurring environments such as one's workplace or one that is purposely imposed, such as an intervention. This "fake it until you make it" view in which personality states are shifted beyond typical levels can be seen as the motivating theory behind the self-control, cognitive, and coaching training interventions.

Given the lack of success in many of these training interventions, shifting states may be necessary but not sufficient to alter personality. Will any shift in a state related to a trait over a period of time lead to change, or does some form of active participation need to occur? For how long does this need to occur? Factors such as being motivated to change, conscious awareness of shifting states, valuing the potential change, and having a set of skills to continue enacting state changes may also be necessary. An example of taking some of these considerations into account can be seen in behavioral activation therapy (see Magidson et al., 2014, to see what this would look like in the context of a personality intervention). The focus of behavioral activation therapy is to identify which behaviors are consistent with one's values or goals, identify the daily activities consistent with those values, and create a

plan to engage in those activities (Lejuez, Hopko, & Hopko, 2001). The goal of behavioral activation therapy is similar to the proposed mechanisms of personality change in which the immediate aim is to alter personality states, but importantly, these states are made explicit and necessitate acknowledging the value in changing states, going so far as creating a plan to continue the shifts in states.

How Long Should Interventions Be?

Most dominant personality theories do little to explain continuity and change in personality during the time course typically found in interventions, as these theories are framed in terms of years and decades rather than the weeks to months time frame typical of interventions. Just how fast can personality change? Short-term interventions are likely to be more effective for prompting effortful processes such as cognitive reframing or situation manipulation, but perhaps not lasting personality change. Personality interventions attempt to provide the means or skills for people to change their behavior, thoughts, and feelings, but the changes most likely are not natural and effortless, instead taking energy and awareness to implement. As a result, prolonged behavioral changes are likely to take time. Similar to learning a second language but not practicing it for years, it is also likely that interventions need follow-up or booster interventions to keep learned skills sharp. Ideally, an intervention should provide a long-term skill, similar to riding a bike, so that once that skill is acquired, it is always there, with no additional training or booster sessions necessary. But it currently is not clear what length of intervention would accomplish this goal, as dose effects have not been systematically examined.

Contrasting the notion of lengthy interventions is the effectiveness of short therapeutic interventions (Roberts et al., 2017). Notably, there was a nonlinear relationship between the length of intervention and its impact on personality, with intervention effectiveness leveling off at approximately 2 months (Roberts et al., 2017). However, there is a possibility that the effectiveness of a short-term intervention is due to patho-

plastic effects, whereby elevated levels of the trait are due to the circumstances that lead someone to enter into therapy in the first place (Noordhof, Kamphuis, Sellbom, Eijgenhuis, & Bagby, 2018). Reverting back to one's "set point" or ridding oneself of external factors that led to temporary changes in personality would not constitute a successful personality intervention.

What Age Is Most Effective for Interventions?

Early interventions are often priorities, because children are thought to be more malleable (due to fewer environmental constraints and other factors), and because their life paths have not yet congealed toward a particular direction, which tends to happen after education, occupation, and family choices are made. As a result, many advocate that early childhood interventions should be prioritized (Heckman, 2006). Overall, early school, family, and antisocial interventions suggest that interventions could be effective for personality-related outcomes. However, a number of the processes thought to drive personality trait change rely on changes to the self-concept, and an ability to be motivated towards an end goal. These proposed prerequisites may be difficult to accomplish for children, especially preschool-age children. In contrast, adults and older adults have a more set identity and a lifestyle that is entrenched by decades of familiarity.

Conclusion

If a person is unhappy with his or her personality, it is currently not possible to provide a solution with a well-validated intervention. Although there is promise across a diverse range of interventions, lacking is any preregistered randomized controlled trial (RCT) that adheres to Consolidated Standards of Reporting Trials (CONSORT) guidelines, which currently serve as the gold standard for intervention evaluation. The multiple types of interventions we have reviewed indicate that future editions of this handbook will likely provide clearer guidelines for the person who is unhappy with his or her personality. To make this a reality, more research attempting to change person-

ality is needed. Despite the obvious benefits for the individual and society, there are few direct efforts outside of therapy that attempt to change general aspects of one's personality.

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CHAPTER 39

Ecological Sampling Methods for Studying Personality in Daily Life

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Cornelia Wrzus

Traditionally, personality is assessed via self-report questionnaires that tap into how individuals generally see themselves with respect to their thoughts, feelings, and behaviors. For example, when participants are asked to rate the degree to which they worry or keep things neat and tidy, they search their memories for relevant experiences and behaviors in their lives, and integrate them into a rating of what they deem characteristic of them. This approach to measuring personality is very efficient and has been highly useful in predicting real-world outcomes. However, when possible, it seems informative to (also) assess personality directly in daily life; that is, researchers should measure directly how much people worry and how they organize their belongings *in vivo* and *in situ*. In this chapter, we argue that such ecological assessments are fundamentally important for the field of personality psychology. Over the last two decades, the development of modern methods for accomplishing this has been spurred by society-changing developments in mobile technologies and the diffusion of smartphones and wearables into every pore of our lives.

In line with current theorizing around the measurement of personality, in this chapter

we review ecological approaches for studying experiences, behaviors, and situations in daily life (Figure 39.1). Assessment of situations is included, because understanding situational characteristics is critical for understanding the effects of personality (Furr & Funder, Chapter 31, this volume). The reviewed methods are referred to as *ambulatory assessment* (Carpenter, Wycoff, & Trull, 2016; Trull & Ebner-Priemer, 2014), *ecological momentary assessment* (Smyth & Heron, 2014), *experience sampling* (Hektner, Schmidt, & Csikszentmihalyi, 2007), and *diary methods* (Bolger, Davis, & Rafaeli, 2003). At their core, they allow researchers to study individuals (1) in their natural settings, (2) in (close to) real time, and (3) on repeated occasions (i.e., “real-world,” “real-time,” “within-person”).¹

Rationale for Studying Personality in Its Natural Habitat

Research methods for studying daily life derive their rationale from their three unique measurement characteristics: studying individuals (1) in everyday settings, (2) in (close to) real time, and (3) on multiple occasions

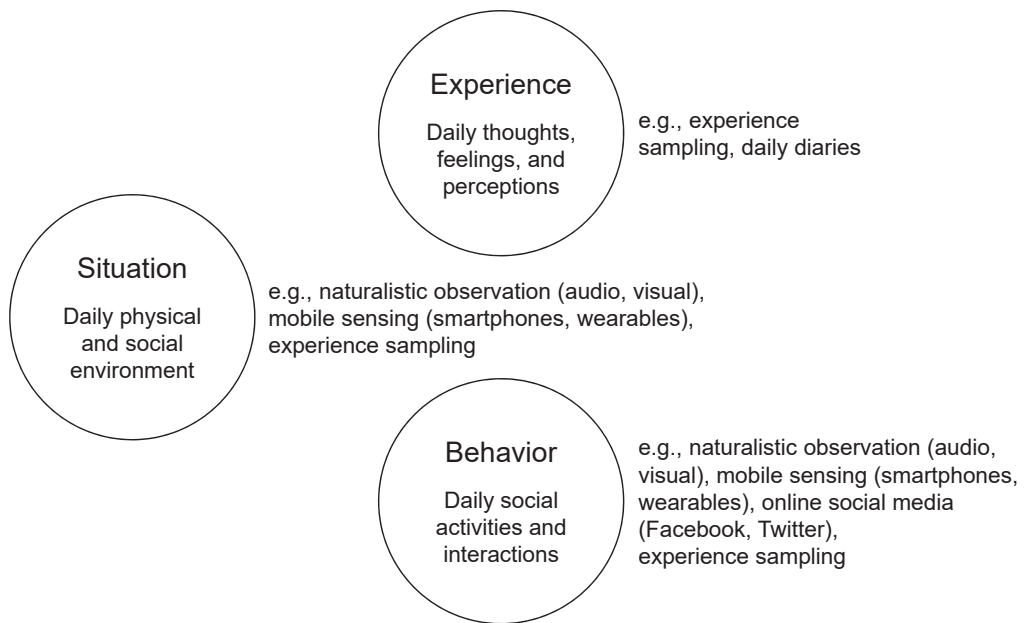


FIGURE 39.1. Ecological sampling methods for studying personality in daily life.

(Mehl & Conner, 2013). In the field of personality, these characteristics resonate with calls for studying “actual behavior” (Baumeister, Vohs, & Funder, 2007), consequential outcomes (Ozer & Benet-Martinez, 2006), ordinary conduct or “quotidian personalities” (Craik, 1993), and temporal dynamics and personality processes (Fleeson, 2001, 2007; Kuppens & Verduyn, 2017; Vazire & Sherman, 2017; van Zalk, Nestler, Geukes, Hutteman, & Back, 2020; Wrzus & Roberts, 2017).

Real-World Behavior

Research methods for studying daily life aim at capturing—as closely, noninvasively, and contextually naturally as possible—what actually happens in people’s lives (Reis, 2012). The methodological momentum comes from the insight that in prioritizing internal validity and experimental control, laboratory studies run the risk of producing causally isolated but contextually insulated results that can be of limited generalizability and applicability (Cialdini, 2009; Funder, 2009). Reis and Gosling (2010) argued that research methods outside the laboratory advance the

field through their emphasis on the “three R’s” of external validity (Brewer, 2000): robustness (i.e., Does it replicate across settings, populations, and circumstances?), representativeness (i.e., Is it typical for what actually happens in life?), and relevance (i.e., Does it matter for people’s lives?). And Brunswik (1956) pointed out that psychology operates under a “double standard” when it applies sampling theory to participants but not to environmental conditions (Judd, Westfall, & Kenny, 2012). He argued that there is a need for representative research designs that sample participants randomly from underlying populations and situations from underlying ecologies to ensure the generalizability and applicability of findings. Ambulatory assessment methods employ such representative designs through their intermittent ecological response sampling.

The importance of measuring real-world behavior is evident in the phenomenon of *white coat hypertension*, or the tendency for patients to have higher blood pressure readings at the doctor’s office than in their homes (Pickering et al., 1988). Moreover, in some cases, blood pressure readings at the doctor’s office can also underestimate daily

blood pressure and mask hypertension (J. Schwartz et al., 2016). Both scenarios highlight the need for ambulatory blood pressure monitoring, which is what the American Heart Association now recommends to confirm a diagnosis of hypertension. Another example, closer to the field of personality psychology, is that women and men may differ in how talkative they are in different laboratory contexts (Leaper & Ayres, 2007) but, when unobtrusively monitored over the day, counter to the prevalent stereotype, they use a similar number of words (~ 16,000; Mehl, Vazire, Ramirez-Esparza, Slatcher, & Pennebaker, 2007).

Real-Time Behavior

Research methods for studying daily life allow researchers to understand phenomena the way they naturally occur, such as feelings when in specific situations (Bakolis et al., 2018), rather than how they are remembered. This aspect is particularly important for experiences, behavior, and situations that are fleeting in nature and thus difficult to remember accurately. A wide range of factors influence people's responses to the question of how happy, sad, or worried they generally are, including recent experiences, salient memories, personal beliefs, and general expectations (N. Schwarz, 2012). In fact, immediate momentary, retrospectively recalled and generalized typical experiences appear to be represented differently in memory (e.g., working, episodic, and semantic memory, respectively) and can differentially relate to behavior (Conner & Barrett, 2012; Robinson & Clore, 2002). For example, in a trial with an antidepressant medication, daily symptom reports detected improvements significantly faster than did weekly clinical assessments (Lenderking et al., 2008). On the other hand, Wirtz, Kruger, Scollon, and Diener (2003) found that students' remembered Spring Break experiences predicted their desire to go back better than their actual momentary ones—despite being overly positive. Together, the conceptual differences among global, retrospective, and momentary assessments, and their divergent empirical ramifications, suggest that personality research would benefit from complementing traditional trait assess-

ments with (close to) real-time state measurements.

Within-Person Effects

Research methods for studying daily life can help identify behavioral patterns within individuals (i.e., idiographic assessment; Hamaker, 2012). This approach differs from the field's traditional focus on between-person associations (i.e., nomothetic approach). Molenaar and Campbell (2009) have argued that between- and within-person effects are conceptually and empirically independent, and that psychology has an unfortunate tradition of trying to answer within-person questions with between-person (i.e., cross-sectional) data. With their repeated, high-frequency sampling of experiences, behaviors, and situations over time, ecological sampling methods yield "intensive longitudinal data" that can be used to uncover contextual and temporal within-person processes, as well as between-person variability around them (Bolger & Laurenceau, 2013; Wright & Zimmerman, 2019). For example, using 6 weeks of daily diary data, Bolger and Schilling (1991) found an association between the experience of a stressor and anxiety that day. This within-person effect, though, was moderated by personality, with neurotic individuals experiencing a heightened emotional reactivity. Also focusing on within-person dynamics, Wrzus, Wagner, and Riediger (2016), assessed person-situation transactions in an experience sampling study. They showed that personality traits predict change and maintenance of situations over time: For example, extraversion predicted that participants who were alone at a measurement occasion were more likely to be with friends at the next, 2 hours later (i.e., situation change). In contrast, extraversion was not predictive when participants already were with friends at a measurement occasion and were still with them at the next one (i.e., maintenance of situation). Intensive-longitudinal, within-person data can uniquely contribute to understanding temporal and contextual personality processes (Fleeson & Law, 2015; Wrzus & Roberts, 2017).

Taken together, these advantages provide a strong, multifaceted rationale for why it is

important to study personality directly in everyday life.

Ecological Assessment of Daily Experiences

The long history of ecological assessment of daily experiences started with unsystematic daily diaries of people's leisure activities or money management (Bevans, 1913; for an overview see Lewin, 1951). The first systematic daily self-report questionnaires on emotional experiences or social interactions emerged in the late 1970s (Csikszentmihalyi, Larson, & Prescott, 1977; Wheeler & Nezlek, 1977). Researchers used electronic paging devices as a reminder to collect paper-pencil questionnaires at random time points during the day (Csikszentmihalyi et al., 1977). In the following decades, more advanced computer-based assessments via handheld-computers and smartphones replaced the classic paper-and-pencil questionnaire (Bolger & Schilling, 1991; Pawlik & Buse, 1982). Conceptually, repeated daily life assessments comprise both *experience sampling* and *daily diary methods*.

Experience Sampling and Daily Diary Methods

Experience sampling methods (ESM) refer to assessment of people's experiences multiple times per day over several days or weeks and typically focus on not only self-reports of emotion and thoughts, but also perceived behavior and situation (Hektner et al., 2007). In contrast, *daily diary methods* require participants to answer a questionnaire only once a day, typically at the end of the day, and to provide information on events and experiences during the day (Bolger et al., 2003). Since participants answer questions only once a day, total assessment periods can be longer compared to experience sampling studies. Most daily diary studies last between 7 and 30 days, with the majority of them lasting 2 weeks (Gunthert & Wenzel, 2012). Similar to experience sampling, daily diary assessments aim at minimizing recall biases, but experiences are not immediately reported; rather, they are reported with a few hours' delay. Recall biases likely differ between psychological phenomena; for example, whether or

not an argument occurred may be reported accurately both immediately and at the end of the day, but the recall of the intensity of the emotional experience may vary between immediate and delayed reports (Robinson & Clore, 2002). Both experience sampling and daily diary studies require very short questionnaires (<5 minutes) to motivate immediate responses.

Computerized assessments are preferred over paper-and-pencil questionnaires for several reasons: (1) Data are directly electronically saved—and even immediately accessible, if the entries are uploaded directly onto a server—so there are no data entry errors; (2) responses can be time-stamped to control whether participants answered the questions at the specified times instead of all at once at the end of the day or the study; (3) participants can receive reminders to respond to unanswered prompts; (4) randomized assessment times are possible to minimize expectancies and measurement reactivity (e.g., people cannot adjust their behavior if they do not know that an assessment is coming up); and (5) multimedia and randomized content can be presented. One potential disadvantage of computer-based assessments is that specific populations might not be able or willing to participate in a computer-based study due to lack of technical equipment and/or skills. With the increasing dissemination of mobile technology and skills to use it, this disadvantage will diminish.

Assessment Schedules

For assessing experiences in daily life, researchers can choose between different assessment schedules: Assessments can occur multiple times a day (1) at fixed times, for example, every 2 hours (i.e., *interval-contingent sampling*); (2) at (pseudo-) random times, for example, every 2 hours $\pm$ a random number of minutes; (3) in response to specific events such as social interactions (i.e., *event-contingent sampling*); or (4) based on combinations of these schedules (Hektner et al., 2007; Moskowitz & Sadikaj, 2012; Wheeler & Reis, 1991). The design choice depends on the (assumed) frequency and continuity of the target phenomenon. For example, conflicts tend to be an infre-

quent experience for most people, whereas emotional states are thought to be continuous. To capture infrequent experiences (e.g., conflicts), either more frequent assessments or event-contingent sampling is advisable. Furthermore, such studies need to last longer (i.e., cover more days or weeks) to increase the chances of capturing rare phenomena compared to studies on frequent or continuous phenomena (e.g., positive mood). In general, assessments should be frequent enough to catch the target phenomenon, yet sparse and short enough to limit response burden. Break days with no assessments within a study enable longer total monitoring periods by reducing participants' burden. Still, the sampled situations and days should represent the situations that researchers seek to generalize to, for example, weekdays and/or weekends and times when people are typically at work or not (e.g., Wrzus, Wagner, & Riediger, 2014).

Technical Implementation

Currently, most experience sampling and daily diary assessments are implemented on mobile platforms (Bolger & Laurenceau, 2013; Pejovic, Lathia, Mascolo, & Musolesi, 2016; Thai & Page-Gould, 2018). Often dedicated experience sampling programs or apps (e.g., ExperienceSampler, Expimetrics, mEMA, mobileQ, movisensXS, PocketLab) are installed on mobile devices that control the assessment schedule, deliver the questions to participants, and store the data on the device or upload them to an external server. Alternatively, participants may use commercial or free online-survey software (e.g., LimeSurvey; SoSciSurvey; see www.websm.org for a broad overview of software solutions), so that participants repeatedly receive e-mails with links to the Web-based questionnaire. The drawback is that participants must always have an active Internet connection to answer the questionnaire.

Researchers can either rely on participants' own devices or provide participants with dedicated research devices. Purchasing the same device for all participants ensures that the questionnaire looks and functions identically for all participants. In addition, further applications may be blocked (e.g., calls), which is not possible with participants' devices. The disadvantages of pur-

chasing devices are financial costs and the quick obsolescence of technical standards. Using participants' devices, such as smartphones, is a low-cost and flexible solution, but it has at least two caveats: The appearance and perhaps functionality may vary between devices, which possibly affects the comparability of the study conditions, and samples may be selective if the smartphone owners differ by sociodemographic characteristics, socioeconomic status, or even personality (Lane & Manner, 2011). Yet the increasing prevalence of smartphones worldwide will gradually minimize these methodological concerns. For further information on technical solutions, see Wrzus and Mehl (2015) or www.ambulatory-assessment.org.

State Variability as Contribution to Personality Research

Experience sampling studies have contributed greatly to the understanding of personality processes. For example, in their seminal work, Fleeson (2001; Fleeson & Gallagher, 2009) examined how self-reported personality states vary in daily life. They assessed personality states up to five times a day, generally for 2 or 3 weeks with handheld computers or sometimes paper-and-pencil questionnaires. Despite the considerable variability of personality states in daily life, the mean personality state correlated highly with general trait self-perceptions (Fleeson, 2001; Fleeson & Gallagher, 2009). In addition, both the mean and the variability of personality states showed considerable stability across 2 or 3 weeks, which indicates that how people experience themselves on average and how much they vary in their experiences can be seen as individual characteristics with at least some temporal stability (Fleeson, 2001). In 2017, the *Journal of Research in Personality* dedicated a special issue on personality state variability as a unique phenomenon that can be explained by situational and trait factors (Vazire & Sherman, 2017).

Traits and Situation Perceptions as Predictors of States

Sherman and colleagues (2015) examined how personality traits predict the perception of situations, and how both traits and

situation perceptions relate to personality states in daily life. They assessed situation perceptions and self-reported personality states up to eight times a day between 9:00 A.M. and 11:00 P.M. on 7 consecutive days among 210 undergraduate students. In this study, participants received text messages containing a personalized link to the Web-based questionnaire that they answered on their own smartphones. This study restricted participation to people who owned an appropriate smartphone with mobile Internet access. The results showed that personality traits and perceived situational characteristics predict personality states; for example, trait emotionality and perceived adversity and negativity of the situation predicted that people reported behaving more nervously. In contrast, results did not support the hypothesis that traits and situation perceptions dynamically interact in shaping (self-reported) behavioral states (Sherman et al., 2015).

In summary, repeated self-reports of emotions, thoughts, perceived behavior, and experienced situations in daily life have been successfully used in personality research over the last decades and have contributed greatly to understanding how personality manifests and matters in the real world. These studies showed considerable consistency of personality states across diverse situations and also meaningful covariation of situations and states, which are partly moderated by personality traits. Thus, the studies meet the criteria of assessing experiences *in vivo* across a range of naturally occurring settings and in (close to) real time. At the same time, they rely on participants' self-perceptions, which can be considered the "gold standard" for assessing "inner" thoughts and experience but might be suboptimal, relative to direct behavioral observation, for assessing "outer" behavior (Vazire, 2010; Robins, Chapter 26, this volume).

Ecological Assessment of Daily Behavior

Several methods allow for the real-world assessment of daily behavior (Wrzus & Mehl, 2015). On the one hand, experience sampling can be used to study self-reported momentary behavior. As mentioned, this approach has proven successful, for example, in studying personality stability and variability from

the perspective of traits as density distributions of states (Fleeson & Gallagher, 2009; McCabe & Fleeson, 2016; Nofhle & Fleeson, 2010). On the other hand, studying momentary personality-related behaviors through the lens of participants' self-perceptions still renders their responses subject to self-report limitations such as impression management, self-deception, and lack of awareness (e.g., verbal mannerisms, automatic expressive behaviors). Observational methods can help bypass these limitations (Furr, 2009). Whereas behavioral observation in the laboratory is relatively straightforward, assessing behavior in daily life is more challenging (Wrzus & Mehl, 2015). Two decades ago, the comprehensive observational assessment of a person's daily behavior was close to impossible (Craig, 2000). Since then, the mobile device revolution unfolded and has rendered the collection of comprehensive, real-world behavioral data more feasible (Harari, Müller, et al., 2017; Harari et al., 2020; Kosinski & Behrend, 2017).

The scientific desire to capture humans directly in the pursuit of their lives is not new. Webb, Campbell, Schwartz, Sechrest, and Grove (1981) reviewed early creative attempts to study behavior nonreactively through both direct observation and indirect trace measures. The field of ecological psychology set out to study "human behavior and its environment *in situ*" through "specimens" collected from the "continuous stream of a person's behavior" (Barker, 1968, p. 1), with its most prominent product being Barker and Wright's (1951) unique, book-length observational record of 1 day in the life of 7-year-old Raymond Birch. Craig (2000) later built on this seminal study with his Lived Day Analysis, in which he followed a participant for 1 day with a handheld video camera to describe and analyze her lived day.

The challenge for naturalistic observation research has been to translate the rich ideas that ecological psychology developed within case studies into larger, empirical research realities. In pioneering studies on behavioral residues, observers rated people's personal spaces to draw conclusions on the personality of the inhabitants (Gosling, Jin Ko, Mannarelli, & Morris, 2002; Gosling, Craig, Martin, & Pryor, 2005). Several new methods facilitate the intermittent or (nearly) continuous sampling of everyday behavior.

Electronically Activated Recorder (EAR)

Mehl and his colleagues have developed a naturalistic observation methodology that unobtrusively samples thin slices of auditory behavior in vivo (Mehl, Pennebaker, Crow, Dabbs, & Price, 2001). The electronically activated recorder (EAR), an audio recorder, intermittently records snippets of ambient sounds (e.g., 30 seconds, five times per hour). Participants carry the EAR device (initially an analog microcassette recorder, then a digital voice recorder, now a smartphone app) on them as they go about their days. The recorder yields a series of sound bites that, together, form an acoustic diary of participants' days as they unfolded. The ambient sound recordings are then coded for their momentary location (e.g., at home, at work, at a bar), activities (e.g., eating, socializing, watching TV), and interactions (e.g., alone, with one person, in a group) (Kaplan et al., 2020).

The EAR method has been successfully used in age groups ranging from childhood to old age and with different healthy and clinical populations (Alisic, Barrett, Bowles, Conroy, & Mehl, 2015; Mehl, Robbins, & Deters, 2012). Practical recommendations for how to use the EAR, including information on the ethics of unobtrusive audio recording and practices for protecting the privacy of participants and their interaction partners, are available at an Open Science Framework (OSF) EAR Repository curated by Megan Robbins: <https://osf.io/n2ufd>. The power of the EAR lies in collecting authentic, real-life observational data relatively unobtrusively. In preserving a high degree of naturalism at the level of the raw data, it resembles ethnographic methods; through its sampling, it protects privacy and enables large(r) empirical studies (Mehl, 2017).

In a series of studies, Mehl and colleagues have shown that (1) a broad spectrum of behaviors can be assessed reliably and with low levels of reactivity from the sampled ambient sounds (Mehl & Holleran, 2007); (2) these behaviors show large temporal stability (Mehl & Pennebaker, 2003); and (3) they have good convergent validity with measures of theoretically related constructs such as the Big Five (Mehl, Gosling, & Pennebaker, 2006),

subclinical depression (Mehl, 2006), narcissism (Holtzman, Vazire, & Mehl, 2010), and well-being (Mehl, Vazire, Holleran, & Clark, 2010).

A few studies speak directly to the method's added measurement value. For example, in a binational EAR study, American participants reported being *more* talkative than their Mexican counterparts, but they actually spent considerably *less* time talking (Ramírez-Esparza, Mehl, Álvarez-Bermúdez, & Pennebaker, 2009). In another study, Mehl and colleagues (2007) estimated that, counter to the pervasive idea that women are more talkative than men, both sexes speak on average about 16,000 words per day. Furthermore, Vazire and Mehl (2008) used the objective time-use estimates that the EAR provides (e.g., percentage of time spent alone or laughing) to show that self- and informant reports predict actual behavior with comparable precision, but that each one has unique predictive validity. Finally, Tenney, Vazire, and Mehl (2013), showed that self-knowledge, operationalized as the congruence between participants' beliefs about how they behave and their actual EAR-assessed behavior, was positively related to how friends rated their relationship with them.

In summary, the strength of the EAR lies in its ability to (1) provide ecological, behavioral criteria independent of self-report, (2) assess subtle and habitual behaviors that easily escape awareness (e.g., automatic word use, subtle expressive behaviors; e.g., Mehl, Raison, Pace, Arevalo, & Cole, 2017), and (3) limit response bias around the measurement of evaluative (i.e., prosocial or moral) behavior (Bollich et al., 2016). An important next step is to combine the EAR's "outside" observer's perspective with the person's "inside" experiential (i.e., cognition, emotion) perspective through coupled EAR and experience sampling. Simine Vazire's PAIRS study provides unique data in this regard (Finnigan & Vazire, 2018; Wilson, Thompson, & Vazire, 2017).

Smartphone Sensing

The diffusion of smartphones into all areas of our lives has opened up powerful ways of measuring behavior passively and objec-

tively. *Mobile sensing*—the use of mobile phone data for making scientific inferences about human behavior—can produce comprehensive, real-world observational data by downloading a smartphone’s sensor and interaction logs. For example, location and mobility are tracked with high resolution via WiFi and Global Positioning System (GPS) information. In addition, a person’s social interaction behavior is increasingly encoded in the phone’s communication metadata (e.g., call, text, and social media logs; Chittaranjan, Blom, & Gatica-Perez, 2013; Harari et al., 2020; Montag et al., 2015).

In many ways, it appears that the predicted smartphone revolution (Miller, 2012) has arrived (Harari et al., 2016, 2020; Sandstrom, Lathia, Mascolo, & Rentfrow, 2016; Schmid Mast, Gatica-Perez, Fraundorfer, Nguyen, & Choudhury, 2015; Stachl et al., 2017). Yet researchers’ excitement about what smartphones can do may currently exceed what is practical for even an experienced, interdisciplinary research group—any smartphone sensing study currently needs computer science or engineering experts on the team. Until recently, most mobile sensing applications were proof-of-concept apps developed to show technical feasibility.

For example, Lu et al. (2012) developed a smartphone application for stress detection. StressSense detects the user’s voice, extracts stress-relevant parameters (e.g., speech rate, pitch variability, jitter), and integrates them into a stress estimate using algorithms that are trained against skin conductance as stress “ground truth.” Lane et al. (2014) developed BeWell as an app to provide feedback on three health behaviors: physical activity (via the embedded accelerometer), sleep activity (via accelerometer), and social activity (via privacy-sensitive ambient sound monitoring). And Wang et al. (2014) developed *StudentLife*, an app that “senses” social and activity behaviors to predict mental health and academic performance over the course of a term (Harari, Gosling, et al., 2017; Harari et al., 2020). Importantly, these were all proof-of-concept apps, not designed for broad implementation, and validated only in small pilot studies, often with “internal” participants (e.g., staff members of a laboratory; students in a programming class).

In one of the first studies aimed at collecting a large, mobile sensing dataset, Gatica-Perez and his colleagues provided mobile phones to more than 100 participants. The participants completed a set of questionnaires and used the phones for 17 months (October 2009 to February 2011). A custom-built sensing application extracted usage data (e.g., text, call, Bluetooth logs, app usage). The data were then anonymized and made available for open analysis (Laurila et al., 2013). Similar to a small study by de Montjoye, Quoidbach, Robic, and Pentland (2013), the researchers found links between smartphone usage and personality. For example, extraversion was positively related to the number and length of received calls and conscientiousness was negatively related to the use of video, audio, and music apps such as YouTube (Chittaranjan et al., 2013; see also Stachl et al., 2017).

An example of a research smartphone app that was explicitly designed for broad dissemination and at-scale use is EmotionSense (Rachuri et al., 2010). The Android app tracked emotion and behavior through combined experience sampling (e.g., emotional experience, self-reported activity) and mobile sensing (e.g., accelerometer, GPS, interaction metadata). Over the course of its life on the Google Play store (2011–2016), more than 13,000 individuals downloaded the app and used it for varying amounts of time. Because the sensing part of the app ran in the background (until the app was closed out), the researchers gathered a very large database that, for the first time, really allowed realization of some of the promised potentials of mobile sensing. For example, using longitudinal EmotionSense data from more than 10,000 individuals, Lathia, Sandstrom, Mascolo, and Rentfrow (2017) found that participants who were objectively more physically active (determined via accelerometry) were subjectively happier (determined via experience sampling). Furthermore, this effect also held at the within-person level; participants were happier in (or shortly after) the moments when they were more physically active. Importantly, in addition to their empirical studies, the EmotionSense team has also conducted psychometric validations of their sensor data collected “in the wild” (Rachuri, Efstratiou, Leontiadis, Mascolo,

& Rentfrow, 2014)—a sorely needed building block for this nascent field.

Online Social Media Tracking

An ecological assessment method that is still relatively new is the tracking of online or “virtual” behavior through social media sites such as Facebook, Twitter, and YouTube (Gosling & Mason, 2015; Kosinski, Matz, Gosling, Popov, & Stillwell, 2015; Kulkarni et al., 2018; Kosinski, Wang, Lakkaraju, & Leskovec, 2016; H. Schwartz & Ungar, 2015). For example, Biel and Gatica-Perez (2014) studied online self-expressions through YouTube video blogs, or vlogs, a popular form of one-to-many communication in which individuals post short personal (amateur) videos to a community of followers. Specifically, they investigated how viewers form personality impressions about vloggers based on audiovisual cues such as facial expressions, body postures, and verbal content. As a critical methodological innovation, all vocal and behavioral cues were extracted from the videos via automatic signal processing, and the personality impressions were crowdsourced via Mechanical Turk (MTurk), resulting in a dataset that is uniquely large for this area of research.

More recently, Youyou, Kosinski, and Stillwell (2015) studied Facebook Likes as one specific type of behavior. They demonstrated that computer-based judgments of personality, based entirely on patterns of Facebook Likes (often not more than 100) were more accurate in predicting life outcomes than informant reports and, in some cases, even more accurate than self-reports (e.g., participants’ social network activity). Park et al. (2015) found a similar advantage of computer-based personality models over human personality judgments when the computer-based models were derived from text analyses of participants’ word use in their Facebook status updates. Together these studies suggest that it is feasible to accurately gauge a person’s personality (as well as other personal characteristics, including highly private ones; Kosinski, Stillwell, & Graepel, 2013), merely based on digital social media behavior and without ever asking the person or anyone who knows the person. It does not take visionary imagination to re-

alize both the scientific potential (e.g., for studying personality consequences, processes, and development) and the societal risks (e.g., “The Data That Turned the World Upside Down”; Grassegger & Krogerus, 2017) posed by this novel way of assessing personality from daily online behavior.

In summary, once the Achilles’ heel of daily life research, the *in vivo* assessment of behavior is now rapidly progressing, fueled by the immense advancements in mobile (e.g., smartphones, wearables) and online (e.g., social media, search engines) technologies. It is clear that we will see many more, maybe even groundbreaking, developments in this domain in the near to midrange future. Given the double-edged nature of the consequences of these developments, it is important that any technological progress be closely accompanied by efforts to understand their societal impact, and to resolve central questions around personal privacy and data confidentiality, access, and ownership (de Montjoye et al., 2018; Pentland, 2014).

Ecological Assessment of Daily Situations

The field of personality has recently made great progress in the conceptualization and measurement of situations as the third element in the personality triad (Funder, 2016; Rauthmann et al., 2014). From the ecological perspective highlighted in this chapter, it becomes important then *not only* to study experiences and behavior *in vivo* but to also assess situations directly in daily life (Wrzus & Mehl, 2017). As the momentary environment, situations are defined by objective cues, the observable elements such as objects, locations, people, and actions that surround a person at a given time, and by their “inner reflections,” the situation experiences and perceptions that interpret and integrate the objective reality and imbue it with subjective meaning (Magnusson, 1981; Rauthmann, Sherman, & Funder, 2015; Wagerman & Funder, 2009). From a measurement perspective, the former calls primarily for a third-person, observational and the latter primarily for a first-person, self-report approach to real-world situation assessment.

Observational Assessment of Objective Situation Cues

The growing number of methods that have recently become available for the observational assessment of daily behavior, which we have reviewed in detail, also allow for capturing situation cues or objective aspects of the daily physical and social environment. For example, Holtzman et al. (2010) used the EAR method to study narcissism in daily life. Consistent with the idea that narcissists gravitate toward situations that afford self-presentation, narcissistic participants spent more time in group settings and in informal social settings that afforded socializing relative to their less narcissistic peers. Tobin et al. (2015) examined how real-world conflict situations relate to the experience of asthma symptoms. Objectively assessed conflict situations, coded from the EAR recordings, predicted adolescents' asthma symptoms even when their subjective conflict reports were statistically controlled.

In a similar way, mobile sensing methods allow for the unobtrusive assessment of objective aspects of situations. For example, mobile sensing data offer insights into relations among locations, mobility, and smartphone usage (Mehrotra et al., 2017). Recognizing the limited scientific value of raw GPS coordinates, Do and Gatica-Perez (2014) developed a way to convert geographic location information into semantic location information by combining automatic place recognition, with participants manually labeling frequently visited places. This allowed the researchers to conduct a place-use analysis at the level of psychologically meaningful locations (e.g., home, work, a friend's home). An interesting finding was that highly mobile individuals, in terms of the number of places they visit per day, also spent more time at friends' places, which provides objective, real-world situational support for the known association between activity and sociability (Soto & John, 2017). Finally, most smartphones come "out of the box" with temperature, barometer, and luminosity sensors that can further characterize a person's momentary physical environment. For example, temperature and luminosity sensors might jointly allow distinguishing indoor from outdoor environments, and

barometer information could allow for a real-world and real-time test of the idea that introverts indeed gravitate toward hills and mountains (Oishi, Talhelm, & Lee, 2015).

Arguably, though, the most important source of information for the objective assessment of situations is visual cues. With progress in the development of miniature cameras, solutions for visual event sampling, or "life logging," have become readily available and have already been employed in numerous studies. A driver in this field was Microsoft Research's SenseCam, a wearable camera that is worn around the neck and that, every 30 seconds, takes a picture of the momentary environment a person is facing. Initially designed to study memory processes, SenseCam has since been applied to a range of topics, including the study of human activity classification, dietary analysis, and sedentary behavior (Doherty et al., 2013). Unobtrusive image capture with a device such as SenseCam faces important ethical challenges around participant privacy and third-party consent. Many of these challenges overlap with those in unobtrusive ambient sound recording, but some are unique to or accentuated with image capture (e.g., identifiability of bystanders; Kelly et al., 2013; Robbins, 2017). After Microsoft Research stopped developing SenseCam, it was briefly marketed as Vicon Revue Camera, but ultimately was taken off the market in 2013.

Around the time the SenseCam became unavailable, a new, technologically enhanced life-logging camera was launched. The Narrative Clip is a tiny, lightweight, high-quality, WiFi-, Bluetooth-, and GPS-enabled wearable camera that takes periodic (every 30 seconds), geo-tagged pictures. It operates when upright and clipped to clothing and goes into standby when put down on a flat surface. It synchronizes the recorded pictures with a mobile device and works in tandem with an app for efficient storing, sorting, and searching of the images. Brown, Blake, and Sherman (2017) introduced the Narrative Clip as a research tool for social and personality psychologists. In a large study on subjective and objective aspects of situations, participants completed both personality and situation measures, and wore the Narrative Clip for an entire day.

To protect their own privacy and the privacy of people around them, participants had full discretion to take the life logger off as desired and, at the end of the study, they had the opportunity to review their pictures and delete any they did not want to go into the study. The streams of pictures of everyday situations were then segmented into meaningful units and rated on situational features and dimensions.

Finally, with the launch of Google's Glass in 2013, the technology market saw a first foray into commercial smart glasses. Only a few years later, companies are now routinely developing smart glasses and including them into their product lineups. Smart glasses have the scientific appeal that they are minimally obtrusive, obviate the need for a separate wearable camera, and reveal as closely as possible how a person sees the world. Over the next years, wearable cameras, as clip-on cameras or smart glasses, are bound to become increasingly mainstream, which would facilitate image-based research on everyday situations.

In a pioneering series of studies in Switzerland, Wettstein and his colleagues used camera-glasses to investigate how situations elicit aggressive behavior among adolescents (Wettstein & Jakob, 2010; Wettstein & Scherzinger, 2015). The studies showed that the physical (e.g., in the school yard, at the gym) and social (e.g., alone, in group) environment of adolescents can be studied using camera-glasses with limited reactivity. Furthermore, they showed that the method can provide insights into context under which direct and indirect forms of aggression arise. The manual coding of image content limited the feasible sample size. However, in the future, automatic image-based object and person recognition (i.e., posture, gesture, and facial expression) might be able to assist in this task (Schmid Mast et al., 2015).

Subjective Assessment of Situation Experiences and Perceptions

Most experience sampling studies (e.g., on emotions or interpersonal perceptions and interactions) also assess subjective perceptions of momentary situations (for technical and design issues, see "Ecological Assessment of Daily Experiences"). For example,

studies examining emotional responses to stressful situations showed that the subjective content, importance, predictability, and controllability of stressors moderate emotional responses (Dickerson & Kemeny, 2004; Lazarus, 1999). In addition, studies often statistically control for situational characteristics that potentially affect emotional experiences, such as time of day or location.

Most previous studies used study-specific lists of perceived situation characteristics—often focusing on present persons, location, activity, and valence (for review see Rauthmann, 2015; Saucier, Bel-Bahar, & Fernandez, 2007; Ten Berge & De Raad, 1999). Approaches to systematize situational information generally distinguish between objectively available cues (see "Observational Assessment of Objective Situation Cues") and subjectively perceived characteristics and classes of situations (Magnusson, 1981; Rauthmann et al., 2015; Rauthmann, Sherman, Nave, & Funder, 2015; Wagerman & Funder, 2009). While there is not yet an agreed-upon taxonomy of situation classes in personality psychology, there are applicable approaches regarding the assessment of situation characteristics, including the Riverside Situation Q-Sort (RSQ; Funder, 2016; Wagerman & Funder, 2009), the related eight-dimensional DIAMONDS model (Rauthman et al., 2014; Rauthman & Sherman, 2016), and a seven-dimensional model based on identified situational dimensions based on Kenrick, Giskevicius, Neuberg, and Schaller's (2010) fundamental motives theory (Morse, Neel, Todd, & Funder, 2014).

Serfass and Sherman (2015) coded the eight DIAMONDS dimensions (Duty, Intellect, Adversity, Mating, pOsitivity, Negativity, Deception, and Sociality) in over 20 million Tweets using computerized, word-count-based algorithms and provided evidence for the validity of their approach through theory-consistent temporal patterns and gender differences. For example, on weekdays *Duty* peaked midmorning and declined steadily thereafter, whereas *Sociality* increased after typical wake-up time, remained high over the day, and peaked in the evening (Serfass & Sherman, 2015).

In summary, great progress has been made in theorizing and assessing daily situations.

Ideally, empirical links will emerge between automatically sensed situation cues and the theorized situational characteristics. Yet the overreliance on samples of college-educated young adults bears the risks of capitalizing on situations that are unique to some groups at the expense of failing to study situations that other sociodemographic groups tend to encounter. This becomes apparent from low frequencies of deceptive, adverse, or mating-relevant situations among middle-aged and older adults (Brown & Rauthmann, 2016; Rauthmann et al., 2014), but it can be resolved by examining diverse samples in diverse environments. Still, the mobile device revolution has served as a catalyst for real-world situation research—regarding both objective and subjective information—as it did for real-world behavior research (Harari, Gosling, Wang, & Campbell, 2015). The ethical and legal challenges around sampling direct and online conversations, as well as pictures from the participant's point of view, are delicate, but solutions are becoming available, including voice distortion, automatic extraction of content to be able to discard the raw data, and blurring faces (Robbins, 2017). Conceptually, these methods offer powerful ways to study real-world person–situation interactions. From a historical perspective, they are 21st-century, high-tech realizations of 20th-century scientific visions (Barker & Wright, 1951; Craik, 2000).

Conclusion

Our purpose in this chapter has been to provide (1) a rationale for why researchers should and (2) a road map for how researchers can study personality directly in everyday life. In capturing psychological phenomena in (nearly) real time, in addressing research questions that directly concern everyday life, and in studying how personality processes unfold within a person, the field is now infusing Craik's (2000) memorable credo with rich empirical reality: "Lives are lived day by day, one day at a time, from day to day, day after day, day in day out. Lives as we experience and observe them are inherently quotidian" (Craik, 2000, p. 234).

It is clear, though, that what we are seeing now is ultimately only the beginning.

Whether or not the field will indeed replace the traditional research model with a mobile research model by 2025 (Miller, 2012), there can be no doubt that research methods for studying daily life are here to stay and are bound to become more and more powerful, user-friendly, and affordable as our digital society continues its path of new, emerging mobile technologies and wearables, and the Internet of things. As a consequence, it is incredibly exciting for the field of personality psychology that building a deep and rich knowledge base of how personality plays out in our everyday lives is now no longer a vision but, rather, a reality well within reach.

NOTE

1. More comprehensive information on these methods is provided by Allemand and Mehl, (2017), Mehl and Conner (2013), Reis and Gosling (2010), and Wrzus and Mehl (2015).

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CHAPTER 40

Putting Personality in Its Place

A Geographical Perspective on Personality Traits

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What can a geographical perspective add to our understanding of personality? All psychological processes occur somewhere. So, if we are to develop a thorough understanding of personality processes, we must consider the broader environments in which those processes unfold. Typically, social and personality psychologists conceptualize the environment in terms of proximal factors (e.g., situations, significant others) as opposed to distal factors (e.g., geographical regions, cities). However, such distal factors vary in important respects—from temperature and topography, to demographics and wealth—that have been linked to personality traits. Therefore, a geographical perspective has the potential to shed light on both the broad societal factors that moderate the expression of personality traits and the ways traits become expressed at broad population levels. Geographical analyses of personality effectively elevate psychological phenomena to a level that connects them to historical, economic, political, and social factors, which have received little attention in psychological research. In this way, a geographical perspective can function as a bridge for con-

necting our understanding of the thoughts, feelings, and behaviors of individuals to the histories, values, and actions of populations.

A growing body of research in *geographical psychology* seeks to expand psychology's focus on individuals and environments by promoting a broad conceptualization of the environment that considers multiple levels of geographical analysis. As such, much of the work in geographical psychology aims to (1) map the spatial topography of personality traits, (2) identify the mechanisms that shape and maintain their spatial arrangement, and (3) examine the ways in which the spatial arrangement of traits relate to macrolevel phenomena. In this chapter, we organize our review around these three aims. Although there has been important research on cultural or national differences in personality and psychological well-being, our focus in this chapter is on intranational variation in the Big Five personality domains.

Like cultural psychology, geographical psychology is concerned with links between psychological phenomena and the broader environment. However, cultural approaches rarely pay attention to the spatial arrange-

ment of such links (Oishi & Graham, 2010; Rozin, 2003), whereas spatial arrangement is a primary focus of geographical psychology (Rentfrow, 2014). More specifically, cultural approaches typically treat location as a proxy for culture and interpret psychological differences between locations as cultural differences, whereas geographical psychology is concerned with the spatial clustering of psychological traits and how they relate to various cultural, societal, political, economic, and population-level factors. Thus, geographical psychology arguably offers a more thorough approach to understanding the nature of psychological differences between geographic regions.

What Is the Evidence for Geographical Variation in Personality?

The systematic study of geographical personality differences dates back over a half century. In the 1940s, psychologists and anthropologists began studying “national character” to understand the atrocities of World War II. But it was not for another 50 years, with the establishment of the empirically based Big Five framework, that interest in geographical personality differences began to attract considerable attention (Rentfrow et al., 2013). Initially, research focused on the universality of the five factors (e.g., McCrae & Costa, 1997; John, Chapter 2, this volume), and with evidence suggesting that the five factors provide a suitable framework for conceptualizing personality in many countries, attention began to focus on national personality differences. Comparisons of nation-level mean personality scores have revealed systematic variability in each of the Big Five traits (Allik & McCrae, 2004; McCrae, 2001; McCrae, Terracciano, & 79 Members of the Personality Profiles of Cultures Project, 2005; Schmitt, Allik, McCrae, & Benet-Martínez, 2007). Research on national personality differences provides support for the applicability of the Big Five in different countries and informs our understanding of the possible causes and consequences of geographical differences in personality. But nations comprise smaller regions in which the population

characteristics, topography, and institutions vary, which raises the question of whether personality traits vary across regions just as they do across nations.

Over the past decade, researchers have begun to examine how personality traits are distributed within countries (e.g., Allik et al., 2009; Elleman, Condon, Russin, & Revelle, 2018; Ebert, Götz, Obschonka, Zmigrod, & Rentfrow, 2019; Fritsch et al., 2018; Götz, Ebert, & Rentfrow, 2018; Jokela, Bleidorn, Lamb, Gosling, & Rentfrow, 2015; Plaut, Markus, & Lachman, 2002; Rentfrow et al., 2013; Rentfrow, Gosling, & Potter, 2008; Rentfrow, Jokela, & Lamb, 2015). The results provide clear evidence for the geographical clustering of personality within nations. For example, within the United States, levels of neuroticism are high from the Mid-Atlantic down through the Midwest and Southern states, and gradually decline in the Mountain and West Coast states. Levels of openness appear highest in the New England, Mid-Atlantic, and West Coast states, and comparatively low across states in the Great Plains and South. The patterns of geographical personality clustering in the United States appear robust, because similar patterns have emerged across multiple independent samples collected between 1999 and 2015 (Elleman et al., 2018; Rentfrow et al., 2013).

The majority of research on regional variation in personality has examined state-level differences in the United States. And just like nations, many states have diverse populations and topographies. Consider, for instance, California, which is home to roughly 40 million people and has six cities with more than 500,000 residents and 286 towns with fewer than 1,000 residents. With such diversity, it is reasonable to consider whether there is meaningful variation in personality within states. One study, which compared the Big Five personality traits of 860 cities across the United States, permitted comparisons of the cities from within a single state (Bleidorn et al., 2016). The results revealed great variation within states, with cities having more in common with similar size cities from other states than with other smaller cities in their own state. Openness, for example, differentiated large metropolitan areas

from small towns, with Los Angeles and San Francisco, California, New York City, Cambridge, Massachusetts, and Miami, Florida, showing significantly higher levels of Openness compared to small rural towns in the South and Midwest, including Andalusia, Alabama, Vidalia, Georgia, Shippensburg, Pennsylvania, and Andover, Minnesota. Furthermore, several city-level differences were observed within states. For instance, five cities in Texas ranked in the top 10% of all cities in openness, and three cities in the state ranked in the bottom 10%. These findings point to the value of considering regional personality variation across multiple geographical levels.

Most of the research concerned with regional personality variation has been conducted in the U.S.; it is perhaps not surprising that geographic differences emerge here because residential mobility is high, allowing people to move to areas that suit their needs. But would such variation emerge in countries with less residential mobility? To evaluate that possibility, Rentfrow and colleagues (2015) examined regional personality differences across 380 Local Authority Districts (LADs) in Great Britain. The LAD unit of analysis is significantly smaller physically and has fewer residents on average compared to U.S. states, which allows for a more nuanced analysis of geographical variation. The results revealed variation in personality across LADs, with comparatively high levels of neuroticism throughout many of the Welsh districts and several districts throughout the English Midlands, and high levels of openness in most of the metropolitan areas in Great Britain, including many London boroughs, Brighton, Bristol, Manchester, and Glasgow.

Several conclusions can be drawn from research that has mapped geographical variation in personality. First, there is meaningful variation in personality across nations and across regions within nations. Second, to a certain extent, personality–trait levels tend to be concentrated in neighboring areas, such that geographical proximity is associated with psychological similarity. Third, regional personality variation occurs in countries with not only high residential mobility but also those with relatively low levels of mobility (e.g., Great Britain).

What Are the Mechanisms Responsible for Geographical Variation in Personality?

The available research provides compelling evidence that personality traits differ across geographical regions. But how do those differences emerge? Drawing on previous work on person–environment interactions, there appear to be at least three key mechanisms that could drive and maintain geographical variation in personality: social influence, ecological influence, and selective migration (Jokela, 2009; Jokela, Elovainio, Kivimäki, & Keltikangas-Järvinen, 2008; Obschonka, Stuetzer, Rentfrow, Potter, & Gosling, 2017; Rentfrow et al., 2008).

Social Influence

Decades of research in the social sciences demonstrate that people's thoughts, feelings, and behaviors are influenced by others. Conceptual and empirical work in cross-cultural psychology makes a compelling case that socialization creates opportunities and reward structures that encourage certain personality traits, which in turn influences the prevalence of those traits (e.g., Oishi, Kushlev, & Benet-Martínez, Chapter 32, this volume; Bond et al., 2012; Hofstede, 2001; Hofstede & McCrae, 2004; Triandis & Suh, 2002). The idea is that the social and cultural histories within regions establish social norms that encourage certain attitudes, values, and behaviors and discourage others. Over time, these norms become internalized and elicit traits that are socially valued and advantageous, which can lead to regional differences in those traits. For example, there is considerable historical and empirical evidence that cultures of honor emerged in regions that were settled by herding societies (Nisbett & Cohen, 1996). Specifically, the harsh and lawless existence experienced in such remote regions meant that people had no option but to resort to aggression to protect themselves from threats to their reputations or property. Eventually, social norms emerged that made physical violence an acceptable form of self-defense and, consequently, greater proportions of people in those areas have committed violent crimes (Brown, Osterman, & Barnes, 2009; Vandello & Cohen, 2003).

One example of how geographical differences in social norms could contribute to personality differences comes from research on cross-national differences in personality development. Specifically, using a very large age-diversified sample, Bleidorn and colleagues investigated age trends in personality to determine whether the trajectories of personality development vary across countries as a function of certain societal norms, such as the timing of marriage, parenthood, and joining the labor force (Bleidorn et al., 2013). The results revealed different age trends per country and suggested that social norms influenced personality development. More specifically, in countries where financial independence and family formation began during late adolescence, levels of extraversion, agreeableness, conscientiousness and openness increased and levels of neuroticism decreased at an earlier stage compared to countries where the normative timing occurred later. These results not only reveal the impact that social norms can have on personality development, but they also indirectly support the claim that geographical variation in social norms can contribute to differences in personality traits.

Ecological Influence

Features of the physical environment, such as temperature, precipitation, green space, pathogen prevalence, and population density, have direct effects on many aspects of people's lives, which could affect the prevalence of certain personality traits. For example, there is evidence that regional variation in personality is linked to average temperature (Wei et al., 2017). More specifically, data from two large samples in China and the United States indicated that agreeableness, extraversion, and emotional stability were higher in regions where the ambient temperature was pleasant (i.e., 22°C) compared to regions with colder or hotter ambient temperatures. These findings demonstrate how features of the environment can influence social behavior and thence personality. Evidence from several studies in cultural and environmental psychology indicate that specific features of the natural and built environments have consequential outcomes for personality (Cutrona, Wallace,

& Wesner, 2006; Fincher, Thornhill, Murray, & Schaller, 2008; Van de Vliert, 2013).

One example that demonstrates ecological influence comes from work by Talhelm and colleagues (2014) on the impact of subsistence strategies on personality. Results from a large-scale study across China indicated that people from areas that have historically depended on rice farming were more perceptually interdependent and holistic thinking compared to people from areas that depended on wheat farming. The explanation is that different subsistence strategies encourage different styles of social interaction, with more cooperation and interdependence for rice farming compared to wheat farming. Research on regional variation in pathogen prevalence and personality provides another example of ecological influence (Schaller, 2006; Schaller & Duncan, 2007; Schaller & Murray, 2008; van Leeuwen, Park, Koenig, & Graham, 2012). The results from a number of investigations strongly suggest that pathogen prevalence affects population-level conscientiousness, extraversion, and openness. The explanation is that survival in areas with large numbers of disease-causing microorganisms required caution, prudence, and limited social contact with strangers.

Selective Migration

Whereas social and ecological influences focus on how environmental factors can contribute to geographical personality differences, selective migration focuses on the impact that people's decisions about where to live can have on them. The idea comes from research on person–environment interactions, which indicates that individuals seek and create environments that satisfy and reinforce their needs (Buss, 1987; Sandstrom, Lathia, Mascolo, & Rentfrow, 2017). Most of the research that supports such interactionist theories defines environments in terms of living spaces, social relationships, or occupations. But what is the evidence that people choose places to live with the aim of satisfying their needs?

When choosing a place to live, there are several factors to consider: budget, size, distance to work, safety, proximity to family, schools, amenities, and a range of others. But not everyone applies the same weight

to each factor. For some people, proximity to work and local shops is very important, whereas other people prefer a long commute if it means having a large house and back yard. What might account for the variance in place preferences? Demographics certainly explain some of it, but there is also evidence that personality accounts for a significant proportion, too. For instance, individual differences in agreeableness are related to desires to move to places regarded as friendly and welcoming, differences in neuroticism are related to desires to move to safe and friendly areas, and differences in openness are related to desires to move closer to work (Jokela, 2014b).

Personality also appears to be associated with preferences for particular types of environments. Results from small and large-scale studies suggest that preferences for mountainous environments are greater for people low in extraversion, because such environments foster feelings of solitude and reflection, and that preferences for beaches are greater among people high in extraversion, because such environments encourage affiliation and social interaction. The explanation for these findings is that individuals are drawn to environments that satisfy their psychological needs (Oishi, Talhelm, & Lee, 2015). There is also evidence that people who have settled in frontier regions, which are rugged, undeveloped, and have limited social order, possess a greater sense of freedom, independence, autonomy, and novelty seeking compared to residents of more developed regions (Kitayama, Ishii, Imada, Take-mura, & Ramaswamy, 2006).

Personality is not only related to preferences for particular place characteristics, it is also linked to residential mobility. Results from a few longitudinal cohort studies indicate that people high in openness and extraversion are more likely to move to urban and cosmopolitan areas compared to people low on those traits (Camperio Ciani et al., 2007; Jokela, 2009, 2014a; Jokela et al., 2008; Murray et al., 2005). The explanation is that people high in openness and extraversion are drawn to large cities, because they are vibrant and culturally diverse, which satisfies their needs for intellectual and social stimulation (Jokela et al., 2008; Murray et al., 2005). There is also evidence that people

high in agreeableness are likely to settle near extended family and remain in their hometown, presumably because people high on this trait place considerable importance on personal relationships (Boneva et al., 1998; Jokela, 2009). Fitting in with others is another important factor that contributes to residential mobility. For instance, Motyl, Iyer, Oishi, Trawalter, and Nosek (2014) investigated the consequences of ideological fit within regional contexts and observed that people who live in areas where their social and political values are shared by their neighbors report greater feelings of belonging, place satisfaction, and desires to stay in the area, whereas people who do not share the values of their neighbors are more likely to want to move and to actually move to another location. Taken together, there is considerable evidence that personality traits and other psychological characteristics are linked to people's decisions about whether to move and where to settle. However, more attention needs to be given to the factors that affect whether or not people do move and what happens next.

Summary

Social influence (e.g., social institutions, cultural norms), ecological influence (e.g., climate, pathogen prevalence), and selective migration (e.g., residential mobility, place preferences) are three mechanisms hypothesized to contribute to geographical variation in personality. There is limited direct evidence that conclusively shows the impact that each mechanism has on geographical differences, but the wealth of indirect evidence makes it reasonable to suppose that all three mechanisms are important. Furthermore, with limited direct empirical evidence, it is not possible to evaluate the relative impact that each mechanism has on geographical personality variation. However, it is likely that the mechanisms do not work independently but in combination, and that the relative role of each mechanism varies across traits.

One example of how all three mechanisms collectively contribute to geographical variation in personality comes from research on frontier regions. Kitayama and colleagues (2006) investigated the hypothesis

that frontier regions (e.g., American West, Japanese North) were originally settled by people with traits associated with independence and novelty seeking. The idea is that people with such traits are likely to seek out new and challenging experiences, and the rugged landscape and undeveloped nature of the frontier offered an opportunity to satisfy those needs. Over time, the settlers had children, communities emerged, and norms and institutions were gradually established that effectively reinforced the psychological characteristics common to the founders. As a result, descendants and others who were socialized in frontier regions should display high levels of independence and novelty seeking. Consistent with this logic, results from the United States and Japan suggested that people who were born and raised in frontier regions display more independence, autonomy, and openness compared to residents of nonfrontier regions (Kitayama et al., 2006).

Psychological research concerned with the impact of the Industrial Revolution provides another example of how social influence, ecological influence, and selective migration may jointly contribute to geographical personality differences. Without question, the Industrial Revolution had tremendous economic and social effects throughout much of the Western World, but its impact was felt perhaps most strongly in the coal regions of Britain, which provided both the physical labor and the fuel that powered the factories. But as technologies advanced, coal reserves diminished, and as other sources of fuel took over, the economic value of the coal regions diminished, leaving large numbers of people in these regions without work. To understand the impact of those changes on the psychological health of people living in coal regions, Obschonka et al. (2018) investigated the associations between the historical employment share in large-scale coal-based industries during the Industrial Revolution and current regional variation in personality and well-being. In line with expectations, the results indicated that the local dominance of large-scale coal-based industries predicted high levels of neuroticism, and low levels of well-being, and extraversion. Furthermore, the current psychological profiles of coal regions appear to be driven by a combina-

tion of selective migration, whereby people with resilient profiles moved away from coal regions, and social influence, such that persisting economic hardship in coal regions has restricted educational and professional opportunities.

In short, research suggests that social influence, ecological influence, and selective migration can all play a role in shaping the psychological landscapes of regions. And research on frontier regions and the psychological effects of the Industrial Revolution provide illustrative examples of how these mechanisms may work together to bring about geographical differences. But are geographical differences in personality important?

Are Geographical Differences in Personality Linked to Consequential Outcomes?

Decades of research in political science, economics, sociology, and epidemiology have revealed geographical variation in voting behavior, rates of unemployment, criminal behavior, and disease prevalence. Such population-level indicators serve as important metrics of the collective health and well-being of groups of individuals and are used by governments, industries, and other institutions to make important decisions that have implications for millions of people. We know a fair amount about the social, economic, and political factors that are associated with these types of population metrics, but we know very little about how such metrics relate to psychological factors. This gap in our knowledge is puzzling, considering that many of the processes by which social, economic, and political factors become expressed in population metrics are likely to be psychological in nature. Indeed, it seems likely that the phenomena studied by psychologists (e.g., personality, identity, subjective well-being, prejudice) play a role in mediating the links between such predictive factors as ethnic diversity, socioeconomic status (SES), and education, and outcomes such as regional prosperity, voting patterns, and disease rates. Geographical psychology is well-suited for filling this knowledge gap and informing our understanding of the ways in which psycho-

logical characteristics relate to important population-level outcomes. However, caution is needed when working with variables that can be measured at the levels of individuals and geographical regions, because the different levels are logically independent. Failure to acknowledge this can lead researchers to make incorrect inferences about individuals from aggregate-level data or about geographical regions on the basis of individual-level data (Inglehart & Welzel, 2003; Robinson, 1950).

Most research in geographical psychology aggregates data from groups of people within geographical regions (e.g., cities, counties, states, countries), so it can take advantage of the large quantities of secondary data that are already collected and aggregated at these regional levels. As a result, researchers can connect regional differences in psychological traits to a broad variety of existing macro-level indicators. Such analyses are useful, because they can shed light on the degree to which psychological processes generalize across multiple levels of geographic analysis. Thus far, most of the research concerning geographical personality differences has focused on how regional personality levels relate to political, economic, social, or health indicators.

Political Indicators

Given evidence for regional variation in personality, it is reasonable to consider whether variation in political opinion is linked to variation in personality. Rentfrow, Jost, Gosling, and Potter (2009) examined links between regional personality differences and voting behavior in the United States. Using state-level personality data, the results revealed associations between state-level personality traits and percentages of votes cast in the 1996, 2000, and 2004 U.S. Presidential elections. The findings suggested that states with high openness and low conscientiousness cast significantly more votes for Democrats, whereas states low in openness and high in conscientiousness supported Republicans (Rentfrow et al., 2009).

The links between regional variation in voting behavior and personality are not unique to American politics. In their investigation of personality variation across Great

Britain, Rentfrow et al. (2015) examined associations between the aggregate personality traits of political constituencies and proportions of votes cast for the Labour, Conservative, and Liberal Democrat parties in the 2005 and 2010 British General Elections. Consistent with the patterns observed in the United States, the results indicated that conscientiousness was positively related to votes for the Conservative party and negatively related to votes for Labour, and that openness was positively correlated with votes for the Liberal Democrats. These patterns of associations remained even after researchers controlled for the economic and population characteristics of regions.

Regional differences in openness and conscientiousness appear to be the primary personality traits that are associated with regional variation in political orientation. However, the political events of 2016, particularly the European Union (EU) referendum in the United Kingdom and the election of President Trump, cast light on what appears to be a sense of anxiety and fear in certain regions of Great Britain and the United States, where citizens are concerned with threats to national identity. To understand these events and determine whether personality may have contributed to the political outcomes, Obschonka and colleagues (2018) examined whether regional variation in neuroticism was related to support for leaving the EU and for Trump. The results indicated that regional levels of neuroticism, and the anxiety and depression facets were indeed linked to support for leaving the EU and for Trump. These results reveal a “sleeping” effect, such that the effects of anxiety and depression become influential in large-scale political behavior under certain conditions. More generally, the research demonstrates an important way in which psychological characteristics can contribute to understanding the drivers behind large-scale social and political events.

Economic Indicators

Research in macroeconomics focuses on the spatial organization of wealth, industries, and employment. Typically, researchers focus on factors such as gross domestic product (GDP), labor statistics, and unem-

ployment rates to understand the structure of economies. However, growing interest in economics is focusing on the impact that “intangible factors,” such as creativity and trust, can have on regional economics. For example, Florida (2002, 2008) conducted a considerable amount of work concerned with regional variation in creative innovation, with the goal of understanding why certain regions are more economically prosperous than others. The key finding to emerge is that diversity within regions fuels creative innovation and economic growth; part of the explanation for this effect is that creative people are attracted to regions that are diverse and vibrant, because such places are stimulating. Another part of the explanation is that individuals who live in diverse regions are more likely to have regular contact with people from different cultures, ethnicities, sexual orientations, and backgrounds, which broadens individuals’ worldviews and promotes divergent thinking. As a result, diverse areas accrue creative capital by way of selective migration and social influence, which contributes to innovation, creates jobs, and generates wealth.

In many ways, creative capital is psychological in nature, because it is based on concepts of imagination, curiosity, and tolerance, which are core aspects of openness. It thus seems reasonable to expect creative capital to be linked to regional variation in openness. Consistent with this expectation, state- and city-level analyses suggest that regions high in openness have large proportions of high-tech firms, patents, artists, entertainers, foreign-born residents, and same-sex couples (Rentfrow, 2011; Rentfrow et al., 2008). For example, regions that have large shares of creative industries (e.g., San Francisco, California; Cambridge, Massachusetts; Austin, TX) also rank at the top on openness. As a check on the robustness of such state-level findings, Rentfrow et al. (2013) analyzed the links between economic innovation and state-level personality assessed in five different samples. Openness emerged as a positive predictor of innovation in all five samples. Overall, the findings suggest that openness in regions is associated with social tolerance, self-expression, and creativity, which might foster innovation and prosperity.

In a related line of research, Obschonka, Schmitt-Rodermund, Silbereisen, Gosling, and Potter (2013) investigated whether the prevalence of individuals with an entrepreneurial psychological profile (defined by high openness, conscientiousness, and extraversion, and low neuroticism and agreeableness) is associated with regional economic prosperity. Results from the United States, the United Kingdom, and Germany converged, indicating that rates of innovation were greater in regions with large proportions of people with the entrepreneurial personality profile. In a subsequent study, Obschonka and colleagues (2015) examined whether the prevalence of certain personality traits interacts with knowledge resources (e.g., human capital, industry structure) to impact economic innovation; regions with a high prevalence of people with entrepreneurial psychological profiles and high levels of knowledge resources displayed significantly greater innovation compared to other regions. Collectively, such studies make a compelling case for integrating psychological and economic theories to understanding economic innovation.

The psychological profiles of regions are important not just for creative capital and innovation. Research by Garretsen, Stoker, Soudis, Martin, and Rentfrow (2019) shows that personality differences can add to our understanding of local differences in economic structure and performance. By examining the personalities and economic structures of 63 British cities, they found that regional variation in personality traits add explanatory power over and above more standard determinants of city-level economic outcomes. More specifically, the results indicated that (1) economic structure, in terms of the relative importance of manufacturing or services employment, was associated with many of the Big Five traits, (2) measures of economic resilience were strongly associated with city-level openness, and (3) city-level neuroticism has had long-term effects on regional economic performance.

Taken together, research on regional personality variation has the potential to combine with research on economic geography to broaden our understanding of the determinants of economic activity and performance across regions.

Health Indicators

One particularly rich area for research in geographical psychology concerns the links between regional personality and health. An impressive amount of research at the individual level has examined the social and psychological determinants of health and well-being. There is compelling evidence that individual differences in personality are linked to health and life expectancy (Jokela et al., 2013; Jokela, Pulkki-Råback, Elovainio, & Kivimäki, 2014; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007). For example, extraversion is positively associated with having large social support networks and some evidence suggests people high in extraversion have long life expectancies (Ozer & Benet-Martínez, 2006). There is evidence that conscientiousness is positively related to health-promoting behaviors, such as exercising, and negatively related to health-damaging behaviors, including heavy drinking and drug use (Atherton, Robins, Rentfrow, & Lamb, 2014; Hakulinen et al., 2015; Jokela et al., 2013). And neuroticism is associated with shorter life expectancy and higher disease death rates. Results from meta-analyses indicate that effects of personality on mortality are comparable to the effects of SES on mortality (Jokela et al., 2013; Roberts et al., 2007).

Given the links between personality and health at the individual level, it is reasonable to ask whether regional differences in personality are linked to health and mortality. Rentfrow et al. (2008) computed correlations between state-level personality and a number of health indicators. The most consistent pattern of associations emerged for state levels of neuroticism. Specifically, states high in neuroticism had more deaths due to all forms of cancer and heart disease, and shorter life expectancies. The links between neuroticism and the health indicators remained even after researchers controlled for the standard indicators (e.g., SES, population density) typically thought to predict health outcomes. To determine whether the patterns of associations were reliable, Rentfrow et al. (2013) examined links between state-level neuroticism in five samples and a well-being index that comprised markers of life expectancy and deaths due to cancer,

stroke, and heart disease. The results indicated that high levels of neuroticism were linked to low well-being in every sample.

The links between regional personality and health outcomes are not restricted to the United States. Rentfrow et al. (2015) observed similar patterns of associations in Great Britain. District-level neuroticism was positively related to the proportion of residents with long-term health problems, deaths due to cancer and heart disease, and negatively related to life-expectancy. Furthermore, these effects remained after they controlled for population characteristics (e.g., median income, proportion of residents with college education, proportion of non-White residents).

Research on the psychological correlates of regional health indicators strongly suggests that the associations between physical health and neuroticism generalize to the levels of geographical regions. These geographical associations might help reveal some of the broader factors (e.g., climate, social structure, political history) that contribute to health and well-being and could potentially be valuable for implementing large-scale interventions. Moreover, these findings open up new analyses where data are not available at individual level. Thus, research on geographical variation in personality further supports the importance of psychology for understanding and promoting public health.

Person–Environment Interactions

Research on person–environment interactions is based on the assumption that people are happier and more satisfied with life when in environments that satisfy their needs. This seems to be a reasonable assumption given that individuals have reported greater satisfaction and more positive affect when in situations that “fit” with their personalities (Ickes, Snyder, & Garcia, 1997). Moreover, being in a social environment in which one’s needs are met can foster feelings of belongingness and enhance self-esteem (Fulmer et al., 2010; Leary & Baumeister, 2000). But is there evidence that people are more satisfied and confident when there is a psychological fit between their personal traits and characteristics of their geographical environment?

Using a large sample with data from 860 U. S. cities, Bleidorn et al. (2016) set out to address the question of whether a match between people's personalities and the personalities of their cities is associated with higher levels of self-esteem. The results suggested that instead of an overall fit pattern across the Big Five personality traits, openness, agreeableness, and conscientiousness showed small but statistically significant fit effects on self-esteem. In other words, people experience comparatively high self-esteem when their levels of curiosity, friendliness, and self-discipline are similar to those of their neighbors. Similarity on such traits may foster a sense of belonging and connection to one's neighbors that could enhance feelings of self-worth.

Living in an environment that offers opportunities and amenities that complement one's personality might also appear to contribute to well-being. For example, people with children who are family oriented might be more content living in places that reinforce domestic life, whereas people who enjoy attending museums, art galleries, and the theater might be happier in areas rich with cultural opportunities. There is some empirical evidence to support this line of reasoning. Specifically, in their study of geographical personality differences in London, Jokela, Bleidorn, Lamb, Gosling, and Rentfrow (2015) examined whether people are more satisfied with their lives when they live in neighborhoods that have characteristics that complement their personalities. The results indicated that people high in agreeableness were more satisfied with life when they lived in neighborhoods with large shares of family-occupied households, green space, and low crime. One explanation for these associations is that people high in agreeableness place considerable importance on close relationships (Graziano, & Tobin, 2009) and are therefore happiest living in places where they can raise families safely. Another noteworthy finding was that people high in openness were happier living in densely populated and culturally diverse neighborhoods. The explanation for this result may be that people high in openness seek stimulation and are thus satisfied living in active and vibrant places. These results indicate that not all places are liked equally by ev-

eryone, and suggest that cities with a wide range of residential options increase choice and may promote greater well-being among residents.

Conclusion

Geographical psychology offers a rich new direction for developing and testing hypotheses about the macrolevel causes and consequences of individual differences in personality traits. Over the past two decades, advancements in the field have helped to overcome the limitations that plagued research on national character. Now we have empirically based models of personality structure that are conceptually coherent, psychometrically sound assessment methods, and powerful platforms for gathering personality data from very large samples around the world.

Drawing on the achievements of theory and research in personality psychology, research in geographical psychology offers compelling evidence that (1) there are robust and meaningful personality differences across geographical regions; (2) these differences are driven by a combination of social, environmental, and personal factors; and (3) these differences have consequential outcomes at the levels of individuals and populations. It is still early for this emerging branch of psychology, but the discoveries made so far are promising and have the potential to expand our understanding of personality, the myriad forces that shape it, and the ways in which it impacts the world.

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CHAPTER 41

What Do We Know When We Know Ourselves?

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Self-knowledge is an ancient question, featuring prominently in ancient Greek culture and philosophy. The Oracle at Delphi famously proclaimed, “Know thyself,” and Socrates was known for emphasizing his awareness of his own ignorance. Self-knowledge is also the topic of many self-help books, and the goal of many clients seeking therapy. Even when psychotherapy clients do not seek self-knowledge, therapists commonly evaluate clients’ mental health based on their insight¹ into their own personality or dysfunction. But philosophers and therapists are not the only ones who care (or should care) about self-knowledge. Lack of self-insight underlies many of the obstacles we face in daily life. It is an individual problem that leads to poor decisions, an interpersonal problem that affects close relationships and organizations, and a societal problem with implications for economic and social policy (Anderson, Ames, & Gosling, 2008; Brett & Atwater, 2001; Carlson, 2016a, 2016b; Dunning, Heath, & Suls, 2004). Thus, understanding the strengths and limits of self-insight could shed light on both the challenges people face in their personal lives and those faced by couples, groups, and nations.

Why should personality psychologists, in particular, care about self-knowledge? First, people are likely to vary in self-knowledge, and these individual differences may be related in interesting ways to other important constructs (e.g., intelligence, interpersonal accuracy, narcissism, wisdom). For example, self-knowledge likely requires the ability to notice one’s own behavior and others’ reactions in distracting social situations, and as such, might be related to higher cognitive functioning abilities such as working memory. Second, testing whether people have self-knowledge of their personalities informs theories about traits and the self. With respect to traits, learning which traits are (not) accessible to the self can help us understand how traits differ from each other. With respect to theories about the self, identifying the blind spots in self-knowledge might shed light on the cognitive and motivational processes that shape the self. Third, the accuracy of self-reports of personality has vast methodological implications for both personality research and applied fields that rely on personality measures. In particular, learning when self-reports are suspect will help us develop better assessment methods.

Much of our interest in self-knowledge

began as a methodological interest. As a young graduate student, my (S. V.) first paper received a review criticizing my use of peer reports to measure personality. "The best measure of a person's personality is the person's self-report," the reviewer wrote. "Otherwise, the whole enterprise of personality assessment seriously needs to rethink itself." As a naive and idealistic graduate student, this struck me as a bold statement. Given the dearth of research on the topic, the accuracy of self- versus peer-reports was (and is) an empirical question. Indeed, it seemed like the reviewer was arguing that self-reports are the best measure of personality because concluding otherwise would have grave implications for researchers. Perhaps this was a sign of my irreverence, but it seemed entirely plausible to me that personality researchers had been relying mainly on self-reports due to convenience rather than strong empirical evidence of their superiority.

This is, of course, a fundamental methodological question: What is the best way to measure personality? The early days of personality psychology provided a good deal of fodder for investigating this question: thousands of self- and peer-reports on personality trait items that could be examined for their factor structure, agreement, halo effects, and so forth. However, the investigation of the accuracy of self- and peer reports of personality did not become a major topic of research until a few decades later, when accuracy research became popular (Funder, 1995). Evaluating the accuracy of self-reports of personality, in particular, presented new methodological challenges, which we describe in the next section. These methodological challenges likely account for the dearth of studies examining the accuracy of self-reports: The amount of effort required to obtain a valid criterion measure is daunting. Some have recommended avoiding the question altogether due to the difficulty and inherent murkiness of identifying a valid non-self-report criterion measure for personality, but it is hard to argue that this question is not worthy of gargantuan efforts. Indeed, the stakes could not be higher for personality research. Identifying the circumstances under which self-reports are (not) valid could impact most uses of person-

ality measures in both scientific and applied contexts.

As important as the methodological implications of self-knowledge are, however, it would be a mistake to think of the accuracy of self-reports as a purely methodological matter. As we mentioned earlier, many theoretical insights can be gleaned from studying self-knowledge. Indeed, because the capacity for self-awareness is so fundamental to the human experience (Robins, Chapter 26, this volume), understanding when people excel at this and when they fail is necessary for understanding the human mind. In this chapter, we review the evidence concerning how good we are at self-reflection, individual differences in self-insight, the correlates and consequences of self-insight, and potential ways to improve self-insight. Although this topic is as old as recorded history, there is surprisingly little empirical research on it. Thus, we also discuss unresolved questions and future directions in the study of self-knowledge.

What Do We Know When We Know Ourselves?

There are entire sections of this handbook dedicated to delineating the different units of personality. In his classic article, McAdams (1995; see also, McAdams, Chapter 5, this volume) famously classified some of these units into three levels: *Traits* (Level 1); *goals, motives, and contextualized patterns* (Level 2); and *life stories* (Level 3). However, when one considers the various units of personality, there are interesting questions to be asked about self-knowledge for each of these units.

Perhaps the cheapest form of self-knowledge is knowing one's *traits*, or one's general tendencies with respect to behavior, thoughts, and feelings. Are you the kind of person who complains a lot, who cannot resist temptation, who prefers to have a routine, who ruminates? Knowing these things about oneself is not trivial, but as McAdams argued, it barely skims the surface. We would not think of someone who can accurately describe their typical level of the Big Five traits and facets, but nothing else about themselves,

as someone who has deep self-insight. On the other hand, it is unlikely that any of us have an accurate view of each of our dozens of traits. In other words, even though this kind of self-knowledge may be shallow, it is also potentially broad and could be useful in many situations (e.g., selecting a roommate or a job, deciding whether to get a pet, choosing where to live, making promises to others).

On a deeper level, a self-aware person should be aware of their *goals and motives*. To some extent, this requires an understanding of human nature—goals and motives shared by all humans. For example, many people might mistakenly believe they are not affected by basic human needs, such as the need to belong (Baumeister & Leary, 1995). In addition, self-knowledge requires knowing one's own idiosyncratic goals and motives—what uniquely drives one. Goals and motives can explain a person's traits; therefore, understanding one's own goals and motives can help explain why one is, say, disagreeable (McCabe & Fleeson, 2016). Related to this second level, we can also ask whether a person is self-aware of the causes of their fluctuations in behavior, thoughts, or feelings (Robins, Mendelsohn, Connell, & Kwan, 2004). This may be explained by goals, motives, and social roles, or by other causes (e.g., biological states). Knowing the triggers of one's own fluctuations can be thought of, in the language of the cognitive-affective personality system (CAPS; Mischel & Shoda, 1998), as knowing one's own cognitive-affective architecture, that is, knowing which external stimuli trigger which thoughts and feelings, and which thoughts and feelings reinforce or impede one other. This kind of self-knowledge is incredibly useful. For example, a person who knows that they are generally introverted but acts extraverted when they have a drink or two could use this information strategically to reduce friction in social interactions. Or, a person who knows that they are generally emotionally stable but prone to strong emotions when they have not eaten much can make sure to fuel up before engaging in potentially stressful interactions.

Finally, we can also ask whether a person has self-knowledge of their *life story*. The

narrative approach to personality does not typically examine the accuracy of people's life stories and instead focuses on the way they make sense of their own lives (cf. Adler, 2012). However, there could be interesting questions that come out of a self-knowledge perspective on life stories. At a basic level, we could ask to what extent a person's life story matches the historical record or close others' accounts of the person's life. A growing body of work suggests that false memories are not as uncommon as we might believe (Loftus, 2005), suggesting that self-knowledge of life stories is likely imperfect. Perhaps more interestingly, understanding the discrepancies between the self's and others' versions of one's life could shed light on the filter through which a person sees his or her life, as well as the consequences of these discrepancies. For example, having a life story that matches external criteria might hamper a person's ability to make more positive meaning out of his or her life, especially if life is not inherently meaningful or positive.

Recently, Will Fleeson integrated these various levels of personality into the whole trait theory (WTT; Fleeson & Jayawickreme, 2015). WTT has several components and is based on Fleeson's earlier work conceptualizing personality traits as density distributions of personality states (Fleeson, 2001). According to this model, people's traits (i.e., their typical level of a personality construct) and their fluctuations around that trait (i.e., their state levels of that construct) can be modeled together as a density distribution that reflects the frequency with which a person experiences each level of a construct. The central tendency of a person's density distribution is their typical, or trait, level. The spread around that central tendency reflects within-person fluctuations. WTT goes on to address the causes of those fluctuations, which is also an important aspect of self-knowledge (e.g., understanding *when and why* one is likely to act more or less extraverted than average). Thus, to really know oneself, it is important to know one's average state (e.g., how extraverted one typically is), as well as how often and why one deviates from that average state (e.g., how often one acts more or less extraverted than one's trait level).

Methodological Issues with Assessing Accuracy

The Criterion Problem

Studying accuracy in any context is challenging. For the enterprise to make sense, accuracy research entails comparing some judgment (e.g., Keiko's perception of Amar) to a criterion measure that is more valid than the judgment or that at least captures aspects of the truth not captured by the judgment. This is challenging enough when the judgment is from a nonexpert—if Keiko does not know Amar very well, then there are a number of possible criterion measures available against which to evaluate the accuracy of Keiko's judgment, including Amar's self-rating, ratings of Amar by his friends, and so forth. However, when the judgment is already likely to be quite valid, such as a self-judgment (i.e., when we want to know the accuracy of Amar's self-view), it becomes extraordinarily hard to identify a good criterion measure.

There are several approaches researchers can take when attempting to evaluate the accuracy of self-views. The first is to use the aggregated judgments of close others as the criterion, relying on the notion that close others know things about us that we don't know about ourselves and their consensual judgments reflect some kind of social reality. This approach is better for external aspects of personality (e.g., moral behavior) and attributes that are inherently reputational in nature (e.g., being funny) than for internal attributes (e.g., thoughts, feelings, or aspirations). Some of our own research, described in greater detail below, suggests that close others are likely quite accurate and sometimes more accurate than the self (Vazire, 2010; Vazire & Carlson, 2010, 2011; Vazire & Mehl, 2008).

Another approach is to use behavioral tests as a criterion measure. Researchers can create situations, typically in a laboratory setting, designed to elicit individual differences in behavior that reflects people's personality in a given domain. For example, the leaderless group discussion task (Bass, 1954) has been used to observe people's dominance and talkativeness, the Trier Social Stress Test (TSST; Kirschbaum, Pirke, & Hellhammer, 1993) has been used to observe people's social anxiety, and the Brick Creativity Test

(Friedman & Förster, 2002) has been used to observe creativity. These behavioral tests are meant to capture manifestations of underlying traits by putting people in a situation in which their reaction likely depends on their trait level (e.g., a socially anxious person should react very differently to the TSST than someone low on social anxiety). These tests can be quite powerful if designed well and can elicit diagnostic behavior that is unlikely to occur in the normal course of a person's day or week. Moreover, by exposing everyone to the same situation, we can be more confident that differences in behavior are due to differences in personality. However, a major downside to behavioral tests is that they are typically single-shot measures of behavior. As we have learned from the person-situation debate (Epstein, 1979), behavioral measures are notoriously unreliable, and like most personality measures, a valid behavioral measure of personality typically requires aggregating across many instances of behaviors (i.e., a multiple-item measure).

A third approach is to capture naturally occurring behavior in people's daily lives; that is, rather than observe someone in a contrived setting in the laboratory, researchers record momentary assessments of behavior as it naturally occurs in daily life. This approach has several advantages. First, this criterion likely matches what people have in mind when they describe their own personalities—they are trying to describe what they are typically like in their actual lives, not in hypothetical situations in which they may never find themselves. For example, Julia may describe herself as relatively agreeable, even though she knows she is disagreeable toward people outside her inner circle of friends. Knowing this about herself, Julia is careful to interact mostly with people close to her; thus, her behavior is mostly agreeable. When Julia describes herself as very agreeable, she is thinking of her actual day-to-day life, which involves interacting mostly with her close friends. By observing Julia's behavior in her natural environments rather than placing her in a new environment she would not have selected (e.g., interacting with strangers), we can more directly test whether Julia's description of herself is accurate. Second, naturalistic behavior is

practical for researchers and participants. We typically cannot observe people's behavior in the laboratory for more than a few hours for ethical and practical reasons (e.g., expensive and labor-intensive). Naturalistic observation, on the other hand, is easier on the participants and researchers, because participants give consent to be observed and can go about their everyday lives. This enables researchers to observe participants for longer periods of time across a wider range of situations. Third, rather than relying on one instance of laboratory-based behavior, naturalistic observations provide many observations across situations per participant, making the criterion measures more valid.

The downsides of naturalistic behavior observation are not trivial. We cannot unobtrusively track people in their natural environments for days on end. Recording a person's every move is impossible and often unethical. Instead, researchers typically sample thin slices of people's everyday behavior. One way to do so unobtrusively and to protect the privacy of participants' interlocutors is to record only the acoustic channel—to sample audio snippets of people's daily lives. The electronically activated recorder (EAR; Mehl, Pennebaker, Crow, Dabbs, & Price, 2001) allows the researcher to do this. The EAR is a free application that runs on Apple devices (e.g., iPod Touch) and can be programmed to turn the audio recording function on and off at regular intervals, although the participant does not know when the recorder is on. In typical EAR research, participants are given a locked iPod Touch in a case with a clip, which can be attached to the outside of participants' clothing or handbag (e.g., backpack, purse, or briefcase). Past work suggests that even 2–3 days of recording can provide rich, valid data about relatively common and acoustically detectable behavior (e.g., talking, moral behaviors; Bollich et al., 2016). Mehl and his colleagues (2001) have written extensively about the legal, ethical and practical issues involved with EAR research (e.g., Manson & Robbins, 2017; Robbins, 2017), and these vary quite a bit by jurisdiction, population under study, and goals of the study.

The greatest downside to naturalistic behavioral observation is the time and personnel it takes to code the large amounts of

behavioral data. These data are incredibly rich, which means dozens of behaviors can be coded at different levels of specificity. Going further, “macro” behaviors (e.g., sarcasm, humor, arrogance) require some interpretation on the part of coders, and other sources of error also reduce the “objectivity” of behavior coding (Rentfrow & Gosling, Chapter 40, this volume). Thus, it is advisable to have each recording coded by least two and preferably three or more coders to yield reliable ratings. A study using the EAR might yield 600 files of 30 seconds for each participant, and as such, requires hundreds of hours of coding by each coder.

A final downside to observational behavioral data is that these data can only tell us how the participant was acting and not what the participant was thinking or feeling. For example, if Jane was coded as gossiping, it is unclear whether her intent was to protect others from an immoral person or to hurt someone's reputation. In order to evaluate the accuracy of self-reports of typical patterns of thinking or feeling (e.g., self-reports of anxiety, optimism, self-esteem), other criterion measures are necessary. For these internal attributes, it may be impossible to avoid the circularity of evaluating the accuracy of self-reports with other self-reports. For example, if we want to know whether a person is aware of her typical levels of positive affect, we might have to compare her global self-view to her momentary self-reports of state affect assessed repeatedly using the experience sampling method (ESM; e.g., Spain, Eaton, & Funder, 2000).

A third type of behavioral criterion is an objective life outcome, such as grade point average (GPA), health, or divorce. These outcomes are believed to represent the consequences of many aggregated behaviors over time that stem from personality (Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007). For example, conscientiousness should predict a wide range of health behaviors (e.g., wearing sunscreen) that in turn, lead to fewer health problems. As such, the degree to which self-reports of personality (e.g., conscientiousness) predict these outcomes (e.g., skin cancer) might indicate the degree to which people have self-knowledge.

In short, the criterion problem is a thorny one. The best solution is often triangulation.

tion: To evaluate whether a person's self-view of his or her personality is accurate, the best approach is to compare his or her self-view to (1) how others who know her well describe him or her (peer reports); (2) how the person behaves in a controlled, diagnostic, laboratory-based behavioral test; (3) how the person behaves in his or her everyday life; and (4) objective life outcomes that represent the consequence of many behaviors over time. However, another solution to the criterion problem is to shift the target: Instead of asking whether people know what they are *really* like and trying to compare their beliefs to what they are *really* like, we can ask whether people know how others see them (meta-accuracy; Kenny & DePaulo, 1993). By changing the target to a person's reputation, the criterion problem becomes much easier to solve—simply test whether someone's metaperception (how the person thinks others see him or her) lines up with how others actually see him or her. The criterion (how others see him or her) is clear and relatively easy to measure, but it also likely reflects what that person is actually like. We return to this topic (meta-perceptions and meta-accuracy) later in this chapter.

The Glass-Half-Empty Problem

Another challenge in accuracy research is that asking whether people have self-knowledge is not a “yes” or “no” question. Surely people's self-views are not completely out of touch with reality (i.e., the correlation with criterion measures will not be zero), but neither are they perfect (i.e., the correlation will not be 1.0). This raises the question of how much accuracy is a lot. This depends in part on a person's intuition or expectations about how much insight would be an impressive amount. To a cynical person, even low levels of self-insight might be surprising, whereas to an optimist, small blind spots would be disappointing.

It is even harder to quantify the accuracy of people's self-views because, typically, accuracy is measured using arbitrary metrics; that is, we do not usually ask people to estimate the absolute levels of their behavior (e.g., “How many funny things do you say per day?”), but rather to rate themselves on

abstract, Likert-type questions (e.g., “How much do you agree with the statement ‘I see myself as someone who is funny?’”). Thus, we cannot express people's level of self-knowledge in absolute terms when the criterion is actual behavior. The summary statistic for self-knowledge will typically be a correlation describing the degree of correspondence between people's abstract self-judgments and the criterion measure.

So how do we decide what counts as a large correlation (high accuracy)? One way to solve this problem is to use an informative benchmark. We have proposed that others' knowledge is a good benchmark to determine whether the accuracy of self-views is high or low; that is, we compare the accuracy of self-views to the accuracy of close others' views (Vazire & Carlson, 2010, 2011). This essentially answers the question; do people know themselves better than others know them? When self-views are less accurate than close others' views, people fail to see things that others can see, which suggests that there are serious blind spots in self-knowledge. This pattern also raises interesting theoretical questions about what motivational or informational processes account for these blind spots. If self-views are more accurate than close others' views, there are bright spots in self-knowledge, which suggests people have privileged access to valuable information about themselves. Notably, one major limitation of using others' knowledge as a benchmark is that close others' views cannot be used as the criterion for accuracy.

Evaluating Self-Knowledge: Theoretical Considerations

Why might people have bright spots and blind spots in self-knowledge? Vazire's 2010 paper outlines the “self–other knowledge asymmetry” (SOKA) model, which presents two core factors that influence the accuracy of self- and others' perceptions: informational processes and motivational processes. This model builds on previous work showing that self- and others' perceptions differ both in the information that is available and in how information is processed (e.g., Andersen, 1984; Andersen & Ross, 1984). The actor–observer literature from the 1970s

and 1980s provides much fodder for this model, as do models of personality judgment (especially Funder's [1995] realistic accuracy model).

What are the informational limits on self-knowledge? One important piece of information that the self lacks is the visual perspective from which to observe one's own behavior (Robins & John, 1997a, 1997b). Although we have access to our own facial expressions, posture, and so forth, from our kinesthetic sense, we have to infer how these facial and body movements look to an observer. Our lack of familiarity with how our own behavior looks from the outside can be painfully clear when we watch videos of ourselves or see ourselves in photographs.

Another informational obstacle is the salience of our thoughts and feelings. Combined with our lack of objective information about our overt behavior, the salience of our own thoughts and feelings may detract from the accuracy of our self-views, because we are overwhelmed with internal information, with little external information to counterbalance it. Specifically, when trying to take stock of our own behavior, it may be difficult to discount how we felt and what we were thinking, and focus only on what we did. For example, imagine that Claudia is anxious but feels very warm toward Leo. She intends to act warmly toward him, and is thinking and feeling warmth, but her anxiety prevents her from manifesting that warmth behaviorally. If we asked Claudia how warmly she acted toward Leo, she might be unduly swayed by her thoughts, feelings, and intentions, and not place enough weight on her actual behavior.

Many motivational forces are likely to play as well; after all, humans are subject to all kinds of motivations, perhaps especially when they are thinking and reasoning about themselves (Robins & John, 1997a). Indeed, self–other agreement tends to be lower for evaluative traits than for neutral traits (John & Robins, 1993), arguably because people are motivated to process evaluative information about themselves in desirable ways. There is also some evidence that people process potentially negative information about themselves in shallow ways (Sedikides & Greene, 2009). Perhaps the most famous bias we attribute to self-perceptions is the

self-enhancement bias. As many introductory social psychology textbooks will tell you, self-enhancement is an almost-universal bias. Taylor and Brown's (1988) highly cited paper argues that self-enhancement is typical and adaptive for people. Since then, controversy has erupted over whether self-enhancement dominates other self-related motives (Swann, 2012), whether it is constant across cultures (Heine, Lehman, Markus, & Kitayama, 1999), and to what extent there are individual differences within cultures (Chung, Schriber, & Robins, 2016; John & Robins, 1994; Robins & Beer, 2001).

Do People Know Their Personality?

Knowing Our Traits

What do people know about themselves? Our fairly recent summary of the literature revealed that the links between self-perceptions of personality traits and people's reputations, their behavior in and outside of the laboratory, and their life outcomes tended to yield moderate correlations, ranging from .20 to .40 (Vazire & Carlson, 2010; see also Back & Vazire, 2012; Vazire & Solomon, 2015; Vazire & Wilson, 2012; Wilson & Vazire, 2015). The strongest effects tend to be observed when a person's reputation is the accuracy criterion. For example, across all levels of acquaintanceship, meta-analyses have found that people's self-reports strongly converge with their reputations on Big Five traits (mean correlation of .55; e.g., Connolly, Kavanagh, & Viswesvaran, 2007) and moderately converge with their reputation on personality disorder traits, which are inherently more evaluative (mean correlation of .39; Klonsky, Oltmanns, & Turkheimer, 2002). Effects are somewhat weaker when behavior is the accuracy criterion (mean correlation of .25; Vazire & Carlson, 2010). For example, in one study, there was an average correlation of .34 between self-reports of the Big Five and laboratory behavior (e.g., body language, tone; Back, Schmukle, & Egloff, 2009), while another study using the EAR to record audible behavior in daily life (e.g., time spent socializing, swearing) revealed an average correlation of .27 among significant effects (an estimate that is biased from the selection of effects based on statistical sig-

nificance, but may nevertheless be useful for future research; Mehl, Gosling, & Pennebaker, 2006). Finally, self-reports of Big Five traits also tend to predict life outcomes such as work performance, criminality, divorce, and mortality (e.g., Fiedler, Oltmanns, & Turkheimer, 2004; Ozer & Benet-Martínez, 2006; Roberts et al., 2007), but these effects are weaker than those observed in laboratory and daily life behaviors. For example, self-reports are weakly to moderately associated with occupational success and divorce (r 's = .23 and .18, respectively; Roberts et al., 2007).

Self-reports are associated with a wide range of accuracy criteria that suggest people have some insight into themselves, but are these effects impressive or important? As discussed earlier, rather than focus on statistical significance or effect size, we can compare self-knowledge to others' knowledge to better understand what the upper and lower limits of self-knowledge might be. If others' reports are more strongly linked to behavior than are self-reports, we know that higher levels of accuracy are possible. When the self and others do not accurately report on personality traits, then perhaps expecting self-knowledge in these domains is asking too much.

The SOKA model (Vazire, 2010) explicitly tested whether and when the self knows more or as much as others. Specifically, this study compared self- and friends' ratings of personality to how people behaved in videotaped laboratory exercises (e.g., leaderless group discussion, stress tests) and how they performed on intelligence and creativity tests. Consistent with the SOKA model, self-ratings of internal, neutral traits (e.g., anxiety, self-esteem) were better than friends' ratings at predicting behavior, but friends' ratings of evaluative traits (e.g., intelligence, creativity) were better than self-ratings. Other research has shown similar effects. Close others are often better than the self at predicting very desirable or undesirable outcomes, such as college GPA (Wagerman & Funder, 2007), relationship dissolution (Agnew, Loving, & Drigotas, 2001), psychopathology (Carlson et al., 2013), and coronary disease (Smith et al., 2008).

A very important caveat to self- and others' knowledge findings is that, on average,

self- and others' perceptions are roughly equally good at predicting behavior in a laboratory (e.g., behavior in a group discussion; Kolar, Funder, & Colvin, 1996; Vazire, 2010, but see John & Robins, 1994), predicting real-world behavior (e.g., behavior when out with friends; Vazire & Mehl, 2008), predicting outcomes (e.g., discharge from the military; Fiedler et al., 2004), and predicting psychopathology (Carlson et al., 2013). Taken together, it is likely that we experience ourselves somewhat differently than others experience us, and that personality psychologists probably need to assess both self- and others' reports to fully capture what a person is really like.

Knowing How Others See Us: Metaperception and Meta-Accuracy

Given that we seem to experience ourselves somewhat differently than others do, an important question is whether we are aware of how others see us. Our beliefs about how others see us are called *metaperceptions*, and a growing body of work suggests that metaperceptions of the Big Five moderately correlate with the impressions we make on others (mean correlation of .38; Carlson & Kenny, 2012). Going further, we realize the different impressions we make across social contexts (e.g., how our friends see us differently from how our parents see us; Carlson & Furr, 2009), and we have some insight into how others see us differently from how we see ourselves (meta-insight; Carlson, Vazire, & Furr, 2011; Oltmanns, Gleason, Klonsky, & Turkheimer, 2005). Indeed, self- and metaperceptions are uniquely associated with the impressions we make, which suggests that while we can see ourselves through the eyes of others to some degree, we do not always adopt their perspective as our own. Yet our perceptions of ourselves and of our reputation do not completely match our reputations. When self- and metaperceptions are entered as predictors of a person's reputation, there are still significant aspects of personality that the self does not see or report on (Gallrein, Carlson, Holstein, & Leising, 2013). Thus, while we have knowledge about how others experience us, we are still blind to some aspects of our reputations.

Knowing Our Personality States

Do people know when their thoughts, feelings, and behavior deviate from how they typically are? In addition to asking whether people know what they typically are like (self-knowledge of traits) and how others see them (meta-accuracy), we can also ask whether people know how their personalities fluctuate from situation to situation or moment to moment.

There is very little research on this topic, likely to due to the extreme methodological challenges associated with testing it. In addition to collecting intensive within-person measures of how people perceive their own personality states, we would also need to collect corresponding intensive within-person measures of how people's personalities are actually fluctuating, independent of self-reports. This would allow us to compare how within-person fluctuations in self-perceptions of personality states correspond (or don't correspond) with within-person fluctuations in actual behavior.

Fortunately, new developments in research methods and technology have opened the door to this kind of research. To measure self-reports, researchers use ESMS. In the past, people might have received notifications from a beeper to complete pencil-and-paper reports, but recent innovations with smartphones allow researchers to collect intensive self-perceptions with ease. For example, people complete self-report measures of their current states several times a day when prompted via text. More recently, tools for tracking people's objective behavior in everyday life have also been developed. These include the EAR, Global Positioning System (GPS) tracking, and automatic assessments of social behavior using applications that can be downloaded on smartphones.

Preliminary research on the accuracy of self-reports of personality states suggests that they may be quite biased. Specifically, Finnigan and Vazire (2018) found that aggregates of self-reported state personality are less valid than global self-reports of corresponding personality traits when validity is defined as correspondence with knowledgeable informants' ratings. One possible explanation for this finding is that self-reports of states contain self-bias, just

as self-reports of traits do, but this bias is compounded when state measures are aggregated within the person. Regardless of the explanation for this finding, it points to the importance of directly testing the accuracy of self-reports of within-person fluctuations.

A more comprehensive test of the question of whether people know what they are like in the moment was recently published by Sun and Vazire (2019). In this study, participants were asked to self-report on their personality states four times per day for 1 week. During that week, participants also wore the EAR, and the recordings were coded to obtain observer ratings of participants' personality states. The correspondence between self-reported and observer-rated personality states can be taken as one clue about whether people have self-insight into their personality states (though, as we mentioned earlier, the criterion measure—in this case, observers' ratings—could be wrong, so the results are necessarily ambiguous). The results suggest that people have very good self-insight into their momentary levels of extraversion and conscientiousness. Agreement between self-reports and observer ratings of neuroticism was much lower, but this is likely due to neuroticism being very hard to detect from audio recordings. Finally, agreement was also low for momentary ratings of agreeableness. The authors interpret this finding as suggesting that people may not know how rude or kind they are acting in the moment, though they acknowledge that other interpretations (e.g., that the EAR observers lacked necessary context to make accurate ratings of state agreeableness) are reasonable.

Because there is little existing research in this area, it is hard to predict whether people will show high levels of self-knowledge of their personality states. It is possible that self-knowledge of states may be stronger than self-knowledge of traits. For example, a person may not be aware that they tend to be disagreeable overall, but they may be aware of when they are acting particularly disagreeable. Some theories of the self would predict that, indeed, it is easier for people to see the fluctuations in their own behavior, and that the difficult task is seeing the forest for the trees (i.e., extrapolating from states to traits).

The question of whether people have self-knowledge of their personality states also has profound implications for theories of personality and self-knowledge. Specifically, in his classic article “What Do We Know When We Know a Person?”, McAdams (1995) argues that knowing someone’s traits is the “psychology of the stranger,” and that to know someone on a deeper level, one has to understand the contextual variation in his or her personality. It follows, then, that to really know ourselves, we have to have insight into how and when our personalities fluctuate. Indeed, in order to have this kind of deeper self-knowledge, it is not enough to know when our personalities are fluctuating, we need to understand the causes—or triggers—of those fluctuations. This is consistent with dynamic models of personality (e.g., Mischel & Shoda, 1995), which posits that people differ not only in their typical levels of personality traits but also in the contextual factors that cause them to deviate from their typical levels. Some of us may be particularly disagreeable when interacting with our families, whereas others are uniquely disagreeable at work. Thus, the deepest kind of self-understanding would be to understand the “psychologically active ingredients of situations” that cause these idiosyncratic fluctuations. The most self-enlightened person is the one who knows not only his or her typical level of agreeableness and when they are deviating from that typical level, but also why they are deviating from that typical level. Indeed, it is easy to see how that kind of self-knowledge could be extremely useful for making life decisions (e.g., anticipating which job, partner, or lifestyle is most likely to elicit the best patterns of thoughts, feelings, and behaviors for oneself).

Knowing What You (Do Not) Know

We wanted to briefly discuss the possibility that people are aware of their blind spots. In research, we ask people to make judgments of themselves and of others, but we rarely ask how confident people are in these judgments. This oversight is important, because people may not be confident in or act on the judgments they provide in the laboratory. Indeed, when people are asked to report on

how confident they are in their metaperceptions, they seem to have some insight into when their metaperceptions are accurate for people they just met, as well as for people they know well (Carlson & Furr, 2013; Carlson, Furr, & Vazire, 2010). Put another way, people who were less accurate seemed to realize they were less accurate. Also, when asked to report on how biased their self-views are, people’s reports of their biases seem to be accurate when the accuracy criterion is their reputation (Bollich, Rogers, & Vazire, 2015); that is, when people were asked to evaluate how biased they were, their reports of bias were similar to what close others would say about them. Thus, in closing our discussion of what people know, while there are important blind spots in self-knowledge, sometimes people have some insight into the limitations of their knowledge.

Is Self-Knowledge Adaptive?

Thus far, we have reviewed whether and when people might have self-knowledge, but an equally important question is whether it is in people’s best interest to seek out self-knowledge. On the one hand, people who know what they are like should make better life choices and relate to others in better ways than do people without self-insight. Thus, people with more self-knowledge, including knowledge about negative qualities, should have greater psychological well-being and enjoy better-quality relationships than people with less self-knowledge. On the other hand, it is also possible that people who see the best in themselves experience better psychological health and relationships. Indeed, ideas such as “Fake it till you make it” reflect the notion that by convincing ourselves that we are great, we can better convince others, and perhaps one day, achieve our goal of greatness (Trivers, 1985).

The debate about the adaptiveness of self-knowledge and self-enhancement is ongoing, partly because of the criterion problems we outlined earlier and partly due to other methodological issues (i.e., whether enhancement is relative to objective criterion or to a hypothetical average person; Chung et al., 2016; Kurt & Paulhus, 2008). However, most of our own work suggests that

self-knowledge is more adaptive than lack of self-knowledge. For example, people whose self-perceptions of their behavior align with their actual behavior are liked more than people whose self-reports are less aligned, an effect that remains when researchers control for desirable personality traits (but this has yet to be tested in a confirmatory study; Tenney, Vazire, & Mehl, 2013). Likewise, people who know how they are seen by new acquaintances, friends, classmates, or a romantic partner are liked more than are people who are less aware, independent of positivity, and early accuracy seems to foster greater liking over time (Carlson, 2016a). This holds for people with personality disorders as well—being aware of the impression one’s romantic partner has of oneself is associated with higher relationship satisfaction (Carlson & Oltmanns, 2018). Importantly, these effects are not due to simply making or knowing one makes a positive impression. Indeed, experimental work suggests that people like individuals who express self-knowledge of their flaws (Ward & Brenner, 2006), which suggests that the benefits of self-knowledge are not limited to knowledge of positive traits. However, in a recent, rigorous study, He and Côté (2019) found that self-knowledge of emotional and cognitive abilities is not linked to better adjustment, and in another recent study, Humberg et al. (2019) also found that self-enhancement—rather than self-knowledge—is associated with better adjustment.

Is there evidence that self-enhancement is adaptive? In our view, the research is mixed. On the one hand, people with overly positive self-views are more narcissistic (Carlson & Khafagi, 2018; John & Robins, 1994) and experience declines in self-esteem and well-being over time in an academic context (Robins & Beer, 2001). Thus, poor self-knowledge seems to come at a cost to the self. Going further, self-knowledge seems to be highly socially valued. People who tend to self-enhance are seen as less psychologically adjusted by peers (Church et al., 2006; Colvin, Block, & Funder, 1995; Kurt & Paulhus, 2008), and people who have higher meta-accuracy are seen as more socially skilled than people who are less accurate (Carlson, 2016b). People higher in narcissism, a trait defined by overly positive self-views, tend to

be seen in positive ways and have status early on but lose their social value over time (Carlson & DesJardins, 2015; Paulhus, 1998). Thus, there may be some initial benefits to enhancement, but over time, people seem to like individuals who have self-knowledge. On the other hand, a recent meta-analytic review suggests that self-enhancement is associated with well-being, not only cross-sectionally but also longitudinally (Dufner, Gebauer, Sedikides, & Denissen, 2019).

Despite the large body of work suggesting that self-enhancement has a cost, there is some evidence that high self-esteem is linked to better mental health (Orth & Robins, 2013) and that for intellectual traits, self-enhancement is linked to greater social influence (Duftner et al., 2012, 2013). Likewise, for meta-accuracy, it seems that people who have less insight into the impressions they make report less psychopathology and greater well-being (Carlson, Wright, & Imam, 2017; Mosch & Borkenau, 2016), although psychopathology in this research was self-reported. Also, an individual’s meta-accuracy is unrelated to his or her own relationship quality with new acquaintances, friends, classmates, or romantic partners, suggesting that meta-accuracy is not directly beneficial in relationships (Carlson, 2016a). Thus, self-knowledge might not always confer immediate benefits to the self. Instead, others might reap most of the benefits of self-knowledge.

How Can We Improve Self-Knowledge?

Self-knowledge seems to be an important component of well-being, so how can we improve our understanding of ourselves? The best strategy seems to be to overcome the informational and motivational barriers that keep us from knowing ourselves. Given that others seem to know something we do not know about ourselves, finding ways to elicit and absorb more feedback should improve self-knowledge. Yet the people who know us best rarely provide feedback (DePaulo & Bell, 1996), and motivational barriers might prevent us from taking in the feedback available to us anyway. For example, narcissists are motivated to see themselves positively, and as such, become even

more positively biased by objective feedback (Robins & John, 1997b); that is, even if we are given all the relevant information about our personalities, we might respond quite defensively toward information that disconfirms our self-views or information that is negative.

To glean more information without motivational biases might involve developing mindfulness skills (Carlson, 2013). Mindfulness comprises two basic components: (1) attention to one's current experiences and (2) nonjudgmental observation and curiosity about these experiences (Bishop et al., 2004). These two components map onto the informational and motivational barriers to self-knowledge, respectively. Paying more attention to one's experiences might improve the amount of information one has about oneself (e.g., body language, emotions) while nonjudgmental observation might allow one to accept potentially threatening information. Indeed, there is some evidence that self-compassion is linked to greater self-knowledge of one's performance (Leary, Tate, Adams, Allen, & Hancock, 2007), training in mindfulness meditation can improve people's ability to differentiate between their transient emotional experiences and their global dispositions (Williams, Teasdale, Segal, & Soulsby, 2000), and self-affirmation prior to feedback can reduce defensive responding, which makes us more open to negative information about ourselves (Critcher, Dunning, & Armor, 2010). In summary, being more present and curious, and less defensive might allow us to see past our blind spots.

Summary

Self-knowledge is difficult to assess, but a growing body of work suggests that when it comes to knowing what we are like, the glass is both half-empty and half-full—specifically, self-perceptions tethered to reality (the glass is half-full), but other people sometimes know things we do not (the glass is half-empty). The major implication for people in general and for personality psychologists in particular is that knowing what a person is like is a bit like putting together pieces of a puzzle. Each piece, or source of

information, tells us something important about a person, but no single piece tells us everything.

Although we have reviewed a fairly large body of work, there is still much to learn about self-knowledge. For example, do people have knowledge of their own variability and of the contingencies that affect their behavior in everyday life? Do people know what drives them? Are people's narratives accurate? Furthermore, it seems that self-knowledge is adaptive, but are all forms of self-knowledge adaptive, or are there boundary conditions to the benefits of self-knowledge? Finally, how can we improve self-knowledge? Is there a single way (e.g., mindfulness), or do we need to adopt different strategies for different aspects of self-knowledge, or for different people? We hope future work explores these pressing questions.

NOTE

1. We use the terms *insight* and *knowledge* interchangeably.

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CHAPTER 42

Some Contributions of Economics to the Study of Personality

James J. Heckman
Tomáš Jagelka
Tim Kautz

Economics and psychology have long traditions investigating preferences that affect choices. Psychologist L. L. Thurstone (1927) created the modern framework for characterizing choices among discrete outcomes used in psychology and economics. Using that framework, economists and psychologists investigate (1) attitudes toward risk (“risk aversion”), (2) responses to ambiguous situations (ambiguity aversion), (3) valuation of future benefits relative to current benefits (time preference), (4) altruism, (5) positive and negative reciprocity, (6) trust, and (7) the ability to make rational decisions, which is closely related to intelligence (Choi, Kariv, Müller, & Silverman, 2014). Many other aspects of choice behavior are studied in both standard neoclassical and behavioral economics, as well as psychology (for discussions, see A. Becker, Deckers, Dohmen, Falk, & Kosse, 2012; Loewenstein, Weber, Hsee, & Welch, 2001; Falk, Becker, Dohmen, Huffman, & Sunde, 2016).

Economists and psychologists also assess life-relevant skills. The dominant paradigm in economics is the human capital model developed by G. Becker (1964). In that framework, human capital is usually envisaged as a homogenous substance that raises produc-

tivity in the workplace and in the home. It is a skill produced by families, schools, and firms, and it is embodied in individuals. Variations in levels of human capital explain variations in earnings and other lifetime outcomes such as health, employment, and wealth, to name only a few.

In the early days of human capital theory, there was a raging controversy associated with the “signaling hypothesis” (see Spence, 1972) that claimed job market returns to schooling reflect only a return to cognitive ability, and not to any acquired skill. IQ and human capital were assumed to be measured on the same one-dimensional scale.

As economists developed a deeper understanding of the determinants of earnings, they discovered that multiple skills are required in various labor market and life tasks (see Roy, 1951; Mandelbrot, 1962; Bowles & Gintis, 1976). These skills include conscientiousness, ability to work with others, and a variety of attributes that personality psychologists codified and analyzed. While the evidence was initially fragmentary, it was strongly suggestive and stimulated much further work. Relevant market skills were understood to be heterogenous in nature. Different labor market and life tasks require

skills in different amounts and proportions. Earnings are rewards to multiple tasks in different markets (Mandelbrot, 1962). People differ in their endowments of skills.

Economists contribute to personality psychology by using psychological skills (primarily the Big Five and its relatives) to predict life outcomes (see, e.g., Heckman, Stixrud, & Urzúa, 2006; Flinn, Todd, & Zhang, 2019) and to evaluate the outcomes of educational interventions (see Cunha & Heckman, 2008b; Cunha, Heckman, & Schenach, 2010; Heckman, Pinto, & Savelyev, 2013; Alan & Ertac, 2018; Kosse, Deckers, Schildberg-Hörisch, & Falk, 2020). They enrich personality psychology by developing and applying rigorous methodologies for measurement and assessment.

Economists relate psychologists' skills to economic preference parameters, which are the fundamental drivers of decisions in economic theory (see A. Becker et al., 2012; Borghans, Duckworth, Heckman, & ter Weel, 2008; Jagelka, 2018). Research on this topic is rapidly expanding in economics. An open question for both fields is the number and nature of preferences, personality types, and skills indicators required to adequately characterize differences in human potential.

This research has illuminated the information contained in the scores from achievement tests. Modern societies rely on written tests to sift and sort people, to evaluate students and schools, and to assess the performance of entire nations.¹ Achievement tests play a prominent role. The Organization for Economic Cooperation and Development (OECD) actively promotes Programme for International Student Assessment (PISA) tests. In the United States, high school dropouts can take a 7.5-hour achievement test—the General Educational Development (GED) exam—to certify that they are equivalent to high school graduates.²

Achievement tests were developed in the mid-20th century to measure a new concept—*general knowledge*—in an attempt to measure skills that are useful inside and outside of the classroom.³ Their developers thought that they had designed pencil-and-paper tests that would predict success in the labor market, in education, and in many other aspects of life. However, initially they

did not validate the tests' predictive power for important life outcomes outside the classroom.

Instead, validation of these tests is usually circular, as we illustrate below in our discussion of the GED. Achievement tests are typically validated using IQ tests and grades, and not by their ability to predict important nonacademic life outcomes. The recent literature has conducted more meaningful evaluations of these tests.

Achievement test scores predict only a small fraction of the variance in later-life success. For example, adolescent achievement test scores explain, at most, 17% of the variability in later-life earnings.⁴ Measurement error accounts for at most 30% of the remaining variability.⁵

Achievement tests do not adequately capture *noncognitive or socioemotional skills*, a broad set of characteristics including preferences and personality. Examples include perseverance (sometimes called "grit"), conscientiousness (also called "grit"), self-control, trust, attentiveness, self-esteem and self-efficacy, resilience to adversity, openness to experience, empathy, humility, tolerance of diverse opinions, and the ability to engage productively in society, which are valued in the labor market, in school, and in society at large. Until recently, these skills have largely been ignored in evaluations of persons, schools, and interventions to improve lifetime prospects. In recent research, economists and psychologists have constructed measures of these skills and provide evidence that they are stable across situations and predict meaningful life outcomes.⁶

Skills are not set in stone at birth and determined solely by genes. They can be fostered. Cognitive and noncognitive skills change with age and with instruction. Interventions to improve skills are effective to different degrees for different skills at different ages. Importantly, noncognitive skills are more malleable at later ages than are cognitive skills.

A growing body of empirical research shows that noncognitive skills rival IQ in predicting educational attainment, labor market success, health, and criminality.⁷ Both IQ and noncognitive skills predict scores on achievement tests. Noncognitive

skills predict outcomes above and beyond their effects in predicting scores on achievement tests.⁸

This chapter provides an overview of the main findings from the study of personality by economists. It acquaints psychologists with recently developed economic frameworks and the frontier of research in economics. It challenges psychologists to make sharper measurements with conceptually stronger foundations.

The rest of the chapter is in three parts. We discuss issues of measurement in the first part. In the second part, we present evidence on the predictive power of personality skills. In the final part, we discuss research on skill formation.

Measuring Cognitive and Noncognitive Skills

Cognitive Skills

Measures of cognition have been developed and refined over the past century. Cognitive ability has multiple facets.⁹ Psychologists distinguish between *fluid intelligence* (the rate at which people learn) and *crystallized intelligence* (acquired knowledge).¹⁰ Achievement tests are designed to capture crystallized intelligence,¹¹ whereas IQ tests, like Raven's progressive matrices (1962), are designed to capture fluid intelligence.^{12, 13}

This new understanding of cognition is not widely appreciated by economists. Many use IQ tests, standardized achievement tests, and even grades as interchangeable measures of "cognitive ability" or intelligence.¹⁴ Scores on IQ tests and standardized achievement tests are strongly correlated with each other and with grades.¹⁵ However, these general indicators of "cognition" measure different skills and capture different facets of cognitive ability.^{16, 17} Scores on these tests are also influenced by noncognitive skills and the amount of effort that a test taker exerts.

Measuring Noncognitive Skills

We use the term *noncognitive skills* to describe the personal attributes not thought to be measured by IQ tests or achievement

tests. These attributes go by many names in the literature, including soft skills, personality traits, noncognitive abilities, character skills, and socioemotional skills. These different names connote different properties.¹⁸ *Traits* suggests a sense of permanence and possibly also of heritability. *Skills* suggests that these attributes can be learned. In reality, the extent to which these personal attributes can change lies on a spectrum. Both cognitive and noncognitive skills can change and be changed over the life cycle, but through different mechanisms and with different ease at different ages. We use the term *skill* throughout this chapter precisely because all attributes can be shaped.

Personality psychologists have studied noncognitive skills for the past century. Psychologists primarily measure noncognitive skills by using self-reported surveys or observer reports. They have arrived at a relatively well-accepted taxonomy of noncognitive skills called the Big Five, well-known to readers of this volume. Some argue that the Big Five are the "longitude and latitude" of noncognitive skills, by which all more narrowly defined skills may be categorized.¹⁹

While the Big Five measures are now widely used in psychology, there are several other taxonomies, including the Big Three, the Multidimensional Personality Questionnaire (MPQ), and the Big Nine, that are conceptually and empirically related to the Big Five.²⁰ Other taxonomies, including psychopathology as measured by DSM-IV and measures of temperament, have also been related to the Big Five.²¹ In earlier research, Almlund et al. (2011) and Becker et al. (2012) summarize evidence showing that economic preference parameters are not closely related to the Big Five measures and apparently represent different attributes. Preference parameters along with the noncognitive skills measured by personality psychologists govern behavior.²² Recent work by Jagelka (2018) challenges this research and establishes a much tighter link than previously thought by his more careful treatment of measurement error and modeling mistakes made by persons being surveyed. The search is on for a minimal set of skills required to characterize empirically based human differences. The field is currently wide open.

A Task-Based Framework for Identifying and Measuring Skills

A leading personality psychologist (and author in this volume) defines personality (noncognitive) traits (skills) as follows: “Personality traits are the relatively enduring patterns of thoughts, feelings, and behaviors that reflect the tendency to respond in certain ways under certain circumstances” (B. Roberts, 2009, p. 140). Roberts’s definition of personality (“noncognitive”) skills, and the one favored by Almlund et al. (2011), suggests that all psychological measurements are calibrated on measured behaviors or “tasks” broadly defined. Tasks include taking IQ tests, answering personality questionnaires, performing a job, attending school, completing secondary school, participating in crime, or performing in an experiment run by a social scientist. Figure 42.1 depicts how performance on a task can depend on incentives, effort, and cognitive and noncognitive skills. Performance on different tasks depends on these components to different degrees.²³ People can compensate for their shortfalls in one dimension by having strengths in other dimensions.

In psychology, common practice is to assess skills by self-reported questionnaires (for one widely used questionnaire, see John, 2000; John & Srivastava, 1999). However, performance on any task or any observed behavior can be used to measure personality and other skills.²⁴

For example, completing high school requires many other skills besides those

measured by achievement tests, including showing up in school, paying attention, and behaving in class.²⁵ A good score on an IQ test requires both ability and effort, which is affirmed by incentives to succeed in this task. While this point is generally known, it tends to be forgotten in naive use of personality and achievement inventories.

Inferring skills from performance on tasks requires standardizing all of the other contributing factors that produce the observed performance. The inability to parse and localize behaviors that depend on a single skill or ability gives rise to a fundamental problem of assessing the contribution of any particular skill to the successful performance on any task (or measure). This problem is commonly ignored in empirical research that studies how cognitive and noncognitive skills affect outcomes.²⁶

There are two distinct issues that need to be addressed when using tasks to measure skills. First, performance on tasks depends on incentives created by situations. Different incentives elicit different amounts of effort on the tasks used to measure skills. Accurately measuring noncognitive skills requires standardizing for the effort applied in any task. Second, performance on most tasks depends on multiple skills. Not standardizing for other relevant skills that determine performance on a particular task used to measure a particular skill can produce misleading estimates of that skill.

These issues are empirically relevant. For example, incentives can increase effort and

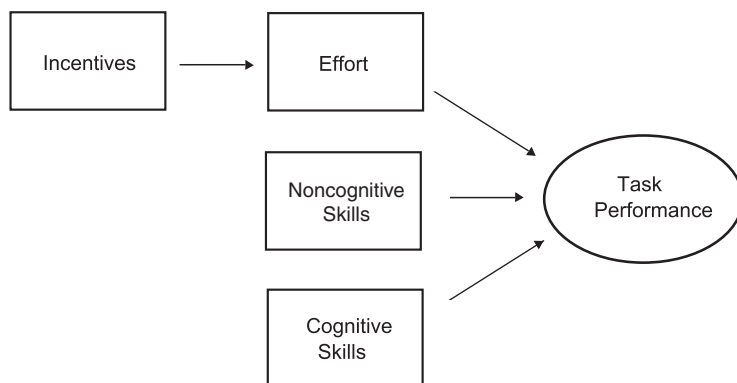


FIGURE 42.1. Determinants of task performance.

thus influence scores on IQ tests. Studies conducted over the past 40 years show that incentives can increase IQ scores, particularly among low-IQ individuals. Providing M&M candies for correct answers can increase scores by an amount equivalent to the Black–White gap in IQ.²⁷ However, there is no evidence that the effect of incentives persists. It has yet to be shown that creating incentives for performance on one test improves performance on subsequent tests even of the same nature, or in any other life task. Indeed, there is some evidence that such incentives, in fact, may worsen subsequent performance (Deci & Ryan, 1985; Ryan & Deci, 2000).

Not all persons respond with equal strength to incentives. Research by Borghans et al. (2008) and Segal (2012) shows that the responsiveness of persons to incentives on IQ and achievement tests depends on their noncognitive skills. Borghans et al. (2008) survey a body of literature that establishes the power of incentives to shape IQ scores. Duckworth, Quinn, Lynam, Loeber, and Stouthamer-Loeber (2011) show that the motivation of test takers predicts IQ scores.

The same issues apply to measures of noncognitive skills. While less is known about the degree to which situations or incentives can affect how people respond to self-reported measures of noncognitive skills, Chen, Feng, Heckman, and Kautz (2020) provide some experimental evidence. They conducted

two experiments that show how survey conditions—part of a student’s situation—can affect student responses on the Big Five questionnaire. The first experiment shows that providing information about the Big Five affects how students report on their skills. The second experiment shows that providing incentives for performance on a separate task affects how students respond on a Big Five questionnaire. This evidence demonstrates the need to standardize for aspects of the situation and incentives when measuring noncognitive skills.

The recent literature shows that noncognitive skills predict standardized achievement test scores, which some psychologists assume are good measures of intelligence.²⁸ Figure 42.2 (based on Dutch data) shows how the variability across persons in the scores on one achievement test, the Differential Aptitudes Test (DAT),²⁹ are determined by IQ and noncognitive measures. Noncognitive skills explain a substantial portion of the variability across persons in DAT scores, as well as the variance in achievement scores above and beyond the variance that IQ explains when both measures of noncognitive skill and IQ are included in a regression. These findings caution the interpretation that standardized achievement tests only measure cognitive ability. They also capture noncognitive skills.³⁰

In *The Bell Curve*, Herrnstein and Murray (1994) argued that intelligence is a pri-

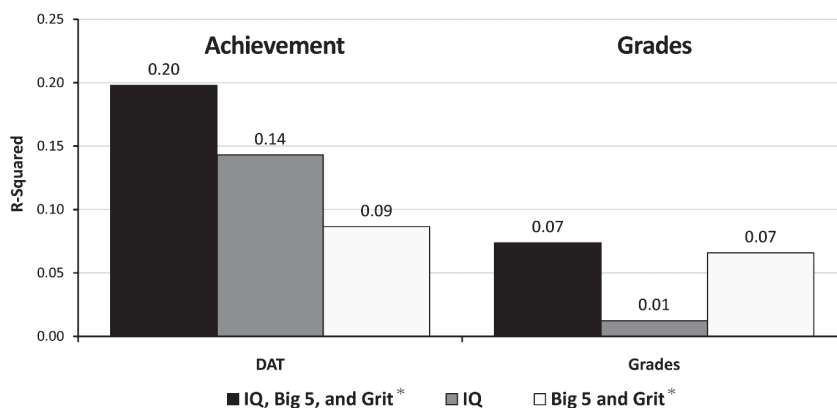


FIGURE 42.2. Decomposing variance explained for achievement tests and grades into IQ and noncognitive skills: Stella Maris Secondary School, Maastricht, Holland. Source: Borghans et al. (2011a). Note: Grit is a measure of persistence on tasks (Duckworth et al., 2007).

many determinant of later-life outcomes. However, they used an achievement test (the AFQT) as their measure of intelligence. Therefore, as discussed earlier, their findings implicitly showed the power of both cognitive and noncognitive skills in shaping life outcomes in the United States. Furthermore, recent studies have also demonstrated that other measures of noncognitive skills can add predictive power above and beyond achievement tests (see Kautz & Zanoni, 2019; Heckman, Humphries, & Kautz, 2014).

Reference Bias

Answers from self-reports can be misleading when comparing levels of personality skills across different groups of people. Most personality assessments do not anchor their measurements in any objective outcome.³¹ For example, the German Socio-Economic

Panel (GSOEP) asks respondents to rate themselves on the following statement: “I see myself as someone who tends to be lazy” (Lang, John, Lüdtke, Schupp, & Wagner, 2011). The scale ranges from *strongly disagree* to *strongly agree*. In answering this question, people must interpret the definition of *lazy*, which likely involves comparing themselves to other people. If different groups have different standards or reference points, comparing skills across groups can be highly misleading. Laziness may mean different things to different groups of people.

This measurement problem—sometimes called *reference bias*—is empirically important.³² Schmitt, Allik, McCrae, and Benet-Martínez (2007) administered a Big Five personality questionnaire to groups of people in a variety of different countries. Using their estimates, Figure 42.3 shows how OECD countries rank (from high to low) in conscientiousness—the tendency to be hard-

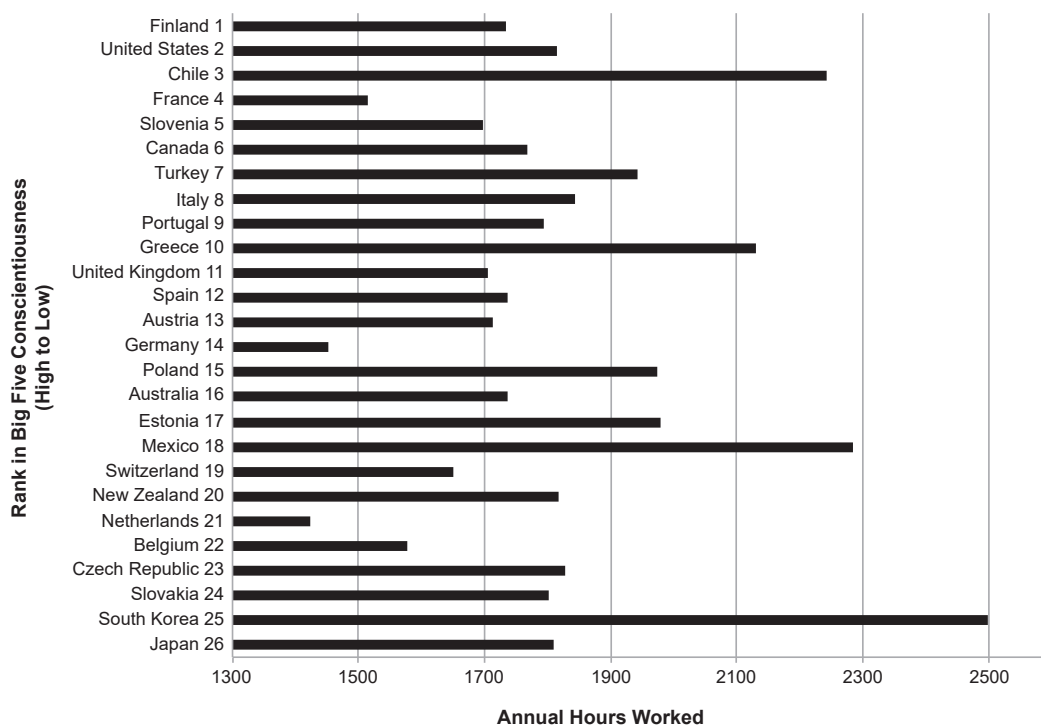


FIGURE 42.3. National rank in Big Five conscientiousness and average annual hours worked. Source: The conscientiousness ranks come from Schmitt et al. (2007). These measures were taken in 2001 (Schmitt, 2002). The hours worked estimates come from Organization for Economic Cooperation and Development (2001). Note: Several countries are omitted due to lack of data.

working and persistent. The bars display the average number of hours that people work in the country.

At first glance, the results are surprising. South Korea ranks second to last in terms of conscientiousness but also ranks first in the number of hours worked. South Korea is not an anomaly. Country-level reports of Big Five conscientiousness are unrelated to the number of hours worked. The rank correlation between hours worked and conscientiousness across countries is negative, though statistically insignificant.³³ This finding contrasts with studies showing that noncognitive skills tend to be positively related with labor supply within individual countries.³⁴

Anchoring vignettes improve the performance of surveys. For example, the PISA 2012—an instrument that assesses student achievement across countries, also included a teacher support scale based on subjective student ratings of their teachers and corresponding anchoring vignettes. Before adjusting responses using vignettes, the correlation across countries of achievement and (positive) teacher support suggested a negative relationship between the two variables (Kyllonen & Bertling, 2013). This result is surprising, since teacher support and achievement are typically positively related. After adjusting the scale using the vignettes, the correlation between the two variables increased and became positive—as would be expected. The unadjusted negative relationship was the misleading result of reference bias.

These findings are relevant for constructing measures of noncognitive skills. Granting that achievement tests miss important skills, would the self-reported Big Five be a useful supplement to school evaluations? The possibility of reference bias suggests that it might not. For example, self-reports of conscientiousness might measure different things for different schools.

This issue is especially relevant given that some school districts are using self-reported measures of noncognitive skills in their accountability systems (West, Buckley, Krachman, & Bookman, 2018). One obvious concern with accountability is that teachers or principals might coach students to give favorable responses on noncognitive skill

surveys. The previously discussed evidence of Chen et al. (2020) and the potential for reference bias suggests that such surveys are susceptible to more subtle biases.

Psychologists have addressed this problem.³⁵ Some surveys include vignette-based questions that attempt to standardize for aspects of the culture or situation. They attempt to frame questions so that the people in the survey answer within a common situation. However, this approach might not work well for evaluating schools, especially if teachers have incentives to coach children on taking these tests, so that they score better and give answers perceived to be positive. Direct use of standard psychological measures can be problematic.³⁶

Studies Measuring Skills Using Behaviors

Ralph Tyler, who pioneered the development of achievement tests, recognized their limitations.³⁷ He suggested using measures of behavior such as performance, participation in student activities, and other observations by teachers and school administrators to complement achievement tests when evaluating students and schools. Several recent papers demonstrate that this is a promising approach. Heckman et al. (2013) showed that teacher ratings of elementary schoolchildren's behaviors are strong predictors of adult outcomes, and that early childhood interventions promote the noncognitive skills measured by these ratings. Heckman, Humphries, and Kautz (2014) estimated the causal effect of cognitive and socioemotional (noncognitive) skills on a variety of outcomes. They measured socioemotional (noncognitive) skills using risky and reckless behaviors measured in the adolescent years.³⁸ They developed and applied methods to use high school grades to measure both cognitive and noncognitive skills. They showed that noncognitive skills promote educational attainment, beneficial labor market outcomes, and health.

Jackson (2018) studied the effect of teachers on students' cognitive and noncognitive skills. In a fashion similar to Heckman et al. (2018), Jackson measured cognitive skills using achievement test scores, while measuring noncognitive skills using absences, suspensions, grades, and grade progression.

These measures of noncognitive skills predicted adult outcomes with a strength similar to measures of cognitive ability. His measures of noncognitive skills are commonly available from the administrative records of schools. Kautz and Zanon (2019) use early measures of behavior in school to predict graduation and college attendance.

Similar to Ralph Tyler's suggestion of using participation in extracurricular activities to measure noncognitive skills, Lleras (2008) measured noncognitive skills in part by using 10th graders' participation in sports, academic clubs, and fine arts activities. Participation in these activities predicted educational attainment 10 years later, even after controlling for cognitive ability as measured by achievement tests.

Similarly, some studies have measured self-control using psychological scales, while others have used behavioral measures. A meta-analysis by Pratt and Cullen (2000) revealed that behavioral measures are at least as good at predicting crime as measures based on self-reported taxonomies. In a similar vein, Benda (2005) used both types of measures in the same study and found that behavioral measures predict crime better than psychological scales.

Hirschi and Gottfredson (1993) suggested that objective behavioral measures might be preferred to self-reports, partly because the act of filling out a survey requires some level of self-control. Answering survey questions is in itself a task that relies on skills beyond the ones targeted by the survey. Similarly, any self-reported questionnaire is also based on a behavior in two distinct ways. On the one hand, completing the questionnaire is a behavior that could be influenced by aspects of the situation, such as through incentives to respond in a particular way or survey administration conditions. On the other hand, many questionnaires require respondents to reflect on past behavior, which could in turn depend on the situation or incentives they faced at the time. For example, one commonly used Big Five item asks respondents the extent to which they agree with the statement, "I see myself as someone who tends to be lazy" (John & Srivastava, 1999). The extent to which they might have behaved in a lazy way might depend on the incentives they faced to work hard at the time.

Some criticize this approach and argue that it is tautological to use measures of behavior to predict other behaviors, even though the measures are taken early in life to predict later life behaviors.³⁹ However, as suggested by Figure 42.1, all tasks or behaviors can be used to infer a skill as long as the measurement accounts for other relevant skills and incentives of the situation in which the task is performed. In addition, many of the recent studies in economics use early measures of behaviors to predict behaviors in adulthood (see, e.g., Heckman et al., 2013, 2018; Heckman, Humphries, & Kautz, 2014). Self-reported scales should not be assumed to be more reliable than behaviors, although personality psychologists often assume so. The question is which measurements are most predictive and which can be implemented in practice. The literature suggests that there are objective measurements of noncognitive skills that are not plagued by reference bias.

Measuring Economic Preferences

In economic theory, preferences for risk and time are considered to be fundamental drivers of a wide range of decisions. Economists assume that people make choices so as to maximize their well-being or "utility." Attitudes toward risk are commonly embodied by the "coefficient of risk aversion," a parameter that governs the shape of an individual's utility function. Risk preference affects decisions beyond those directly related to uncertainty (e.g., whether to buy insurance). Attitudes toward time are captured by discount rates. They represent how people compare the value of outcomes that occur today to the value of outcomes that occur in the future. More recently, economists have devoted increasing attention to an expanded list of preferences such as altruism or trust, and to behavioral biases that skew decisions.

Choices on incentivized tasks are one way to measure preferences.⁴⁰ Games and choice tasks have been developed to elicit each preference with careful attention devoted to ensuring that they are incentive compatible.⁴¹ For example, attitudes toward risk are commonly elicited by having an individual make a series of choices between a lottery and an increasing fixed payment (see Harrison &

Rutström, 2008, for an overview). Initially, when the fixed payment is low, most individuals choose the lottery. They switch to the fixed payment once it becomes sufficiently attractive to them. The later in the sequence of choices when they switch, the more they are willing to tolerate risk. These tasks can be augmented to test for various behavioral biases such as loss aversion (by making one of the options in the lottery a negative payment; see Fehr & Goette, 2007) or certainty premium (by replacing the fixed payment in each choice task with a second lottery; see Callen, Isaqzadeh, Long, & Sprenger, 2014). Analogously, time preference can be elicited from a series of choices between a fixed payment today and an increasing series of payments in the future (Andersen, Harrison, Lau, & Rutström, 2008), altruism is measured as the amount that an individual would gratuitously transfer to another person out of an endowment given to him by an experimenter (Forsythe, Horowitz, Savin, & Sefton, 1994), and so forth. Each experimental task is designed to engage a specific preference, while minimizing the role of confounding preferences or skills on performance.

Inferring preferences from choices that involve precise monetary tradeoffs avoids the reference bias we discussed in the previous sections. As individuals are paid according to their choices, their decisions reveal their true preferences⁴² and can be converted to specific preference parameters under certain assumptions about the utility function.⁴³ These parameters can then be compared across schools, districts, and cultures.

When incentivized elicitation is impractical due to logistical difficulties or budgetary constraints, researchers sometimes use hypothetical questions that do not offer actual payoffs. However, this approach can result in “hypothetical bias.”⁴⁴ Some questionnaires only compare hypotheticals, as in contingent evaluation surveys that ask respondents to place a value on hypothetical choices. Others have respondents compare choices between hypothetical and incentivized measures, that is, between stated and revealed preference (see Harrison, 2006).

One possible approach to avoid hypothetical bias is instrument calibration. It involves experimentally identifying a hypothetical

question or task that yields preferences that most closely approximate those elicited in an incentivized setting. Falk et al. (2018) implemented this approach to elicit and compare economic preferences around the world. Another approach, statistical calibration, relies on identifying differences between preferences elicited in an incentivized and non-incentivized setting and correcting for them.⁴⁵ It is best employed when these differences vary in a systematic way with observed characteristics. Special care needs to be taken when eliciting preferences from young children. Simple, clearly explained games and choice tasks work best in this setting.⁴⁶

Are Economists' Preferences Psychologists' Personality Skills?

Economists and psychologists consider preferences and personality skills respectively to be person-specific determinants of behavior that are stable across situations. The natural question is whether they represent two different approaches to studying the same underlying concepts or whether they capture fundamentally separate aspects of human differences. In the latter case, combining them would yield a more complete model for explaining human behavior. Despite an intuitive link between certain preferences and personality skills—risk aversion and extraversion, time preference and conscientiousness, altruism and agreeableness—early attempts to empirically document the hypothesized relationships yielded mixed results (for a summary of the literature to date, see, e.g., Daly, Harmon, & Delaney, 2009; Dohmen, Falk, Huffman, & Sunde, 2010; Rustichini, DeYoung, Anderson, & Burks, 2016; Almlund et al., 2011). Indeed, A. Becker et al. (2012) concluded that while both preferences and personality skills predict behavior such as labor market success, health, and life satisfaction, they are only weakly related and thus likely capture separate underlying constructs.

Recent work by Andersson, Holm, Tyran, and Wengström (2018) and Jagelka (2018) advances this literature. They show that failure to find a tight mapping between preferences and personality may be an artifact of the inherent difficulty in relating two unob-

served constructs, both of which are difficult to measure.⁴⁷ They demonstrate that carefully separating true preferences from noise in observed decisions and in answers to survey questions about personality is essential in advancing this line of research. Allowing for heterogeneity among people, Jagelka (2018) showed that four factors related to cognitive ability and three of the Big Five personality skills explain up to 50% of the variation in preferences for risk and time and in individuals' capacity to make consistent rational choices. Variation among individuals in conscientiousness by itself explains 33% of heterogeneity in people's impatience, and 10% of the variation in their risk aversion. Furthermore, attitude toward risk is linked to both extraversion and to cognitive ability, while the latter also explains individual propensities to make mistakes (i.e., to pick options that they in fact do not prefer).⁴⁸

Over the past decades, behavioral economists have documented numerous departures from decision making implied by standard preferences and rationality assumptions of neoclassical economic theory. Individuals with lower cognitive ability are more likely to make inconsistent choices (Choi et al., 2014), do not seem to learn efficiently by updating their beliefs when presented with new evidence (El-Gamal & Grether, 2012), are overconfident with respect to their absolute and relative performance (Chapman et al., 2018), and so on. The literature documents that people sometimes seem aware of these biases and are willing to pay to have their choices restrained so that they do not regret them later (Augenblick, Niederle, & Sprenger, 2015).⁴⁹

The proliferation of documented patterns in deviations from rational decision making has led to efforts to synthesize them in a general tractable model using behavioral summary statistics (Gabaix, 2014; Chetty, 2015). Stango and Zinman (2019) measured 17 behavioral biases linked to financial decision making alongside standard economic preferences, cognitive skills, and noncognitive skills. Most individuals in their sample displayed multiple behavioral biases, with the average person exhibiting 10 out of 17. They showed that biases are related to cognitive skills but not to the Big Five. They are highly correlated with financial outcomes:

A one standard deviation increase in their summary of bias parameters is associated with an approximately 30% decrease in subjective and objective measures of an individual's financial condition.

Dean and Ortoleva (2019) present evidence that some of these biases are strongly correlated with each other, but represent multiple independent dimensions. These findings suggest that decisions are strongly influenced by a rich interplay of preferences, biases, and skills, as well as the other factors depicted in Figure 42.1. Economists and psychologists have begun to understand the drivers of heterogeneity in decisions using disparate techniques. Evidence is mounting that there is an overlap between the economists' system of preferences and the psychologists' system of personality. Interestingly, standard economic preference parameters are mainly related to noncognitive skills, while the ability to effectively implement those preferences in practice (the quality of decision making) is associated with cognitive ability. Further study of a broader array of preferences and skills will yield a more complete mapping and ultimately a unified set of determinants of human behavior drawing from the strengths and insights of the two fields.

Are Noncognitive Skills Stable across Situations?

Many have questioned whether there are stable noncognitive skills, that is, whether people exhibit the same noncognitive skills across different situations at a fixed point. Walter Mischel's (1968) *Personality and Assessment* gave rise to a heated "personality-situation" debate within psychology that pitted social psychologists who favored situational factors as primary determinants of behavior against personality psychologists who considered stable personality (noncognitive) traits (skills) more consequential. Mischel argued that aspects of situations overshadow any effect of personality (noncognitive) traits (skills) on behavior. Ironically, Mischel himself later demonstrated the stability and predictive power of noncognitive skills over the life cycle (as measured by the performance of subjects in demonstrating self-control in early childhood) in

his celebrated “marshmallow experiment.”⁵⁰ Oblivious to this evidence, behavioral economists continue to echo Mischel’s 1968 claim (see, e.g., Thaler, Mullainathan, & Kahneman, 2008).

A large body of evidence reviewed in Almlund et al. (2011) showed that stable noncognitive skills exist and are predictive of many behaviors.⁵¹ An early paper by Epstein (1979) presented compelling evidence that, averaging over tasks and situations, people act in a predictable fashion with a high level of reliability of average behavior (“measured noncognitive skills”) across situations.⁵² Some noncognitive skills show predictable patterns over the course of a person’s life. Todd and Zhang (2019) presented evidence on the life cycle evolution of noncognitive skills using Australian longitudinal data. People become more conscientious with age and more agreeable, but less extraverted. Their causal study showed that schools foster these skills. Overall, many noncognitive skills seem to stabilize around the age of 30, but agreeableness increases thereafter. However, there is little longitudinal evidence on the evolution of time and social preferences. See Golsteyn and Schildberg-Hörisch (2017) for a summary of the literature on the stability of preferences and personality.

The Predictive Power of Noncognitive Skills

Correlational Evidence

A substantial body of evidence shows that noncognitive skills predict a wide range of life outcomes, including educational achievement, labor market outcomes, health, and criminality. For many outcomes, the predictive power of noncognitive skills rivals that of measures of cognitive ability. Of the Big Five, conscientiousness—the tendency to be organized, responsible, and hardworking—is the most widely predictive across a variety of outcomes (see Borghans et al., 2008; B. Roberts et al., 2007; Almlund et al., 2011; Heckman & Kautz, 2012). Conscientiousness predicts years of schooling with the same strength as measures of intelligence (Almlund et al., 2011).

Aspects of job performance are also related to academic performance. Both require completing work on a schedule and involve

intelligence to varying degrees. As with academic performance, numerous studies and meta-analyses have found that conscientiousness is associated with job performance and wages (Nyhus & Pons, 2005; Salgado, 1997; Hogan & Holland, 2003; Barrick & Mount, 1991). Figure 42.4 presents correlations of the Big Five and IQ with job performance. Of the Big Five factors, conscientiousness is the most strongly associated with job performance but is about half as predictive as IQ. Conscientiousness, however, may play a more ubiquitous role than IQ. The importance of IQ increases with job complexity (the information processing requirements of the job). Cognitive skills are more important for professors, scientists, and senior managers than for semiskilled or unskilled laborers (Schmidt & Hunter, 2004). The importance of conscientiousness does not vary much with job complexity (Barrick & Mount, 1991); this suggests that it applies to a wider spectrum of jobs.

Other measures of persistence and self-control have been advocated as new and relevant dimensions of human potential. Grit is one of the proposed alternatives (see Duckworth, Peterson, Matthews, & Kelly, 2007; Duckworth & Quinn, 2009). However, a recent review found that correlations between grit and conscientiousness range between 0.80 and 0.98 and that grit adds little predictive power beyond conscientiousness, suggesting that grit is not an entirely separate dimension of human performance (Credé, Tynan, & Harms, 2017).

Cobb-Clark, Dahmann, Kamhofer, and Schildberg-Hörisch (2019) showed in German data that self-control measured using the “Tangney scale” (Baumeister, Boone, & Tangney, 2004) predicts better health, educational, financial, and labor-market outcomes, as well as increased self-reported life satisfaction. Using a series of natural experiments, they argue that self-control is a cause rather than a consequence of increased schooling, and that it is responsive to the overall institutional environment. When controlling for cognitive ability, the Big Five, schooling, and economic preferences, they find that self-control predicts years of schooling, health, and life satisfaction. The authors thus concluded that beneficial effects of self-control are largely mediated by

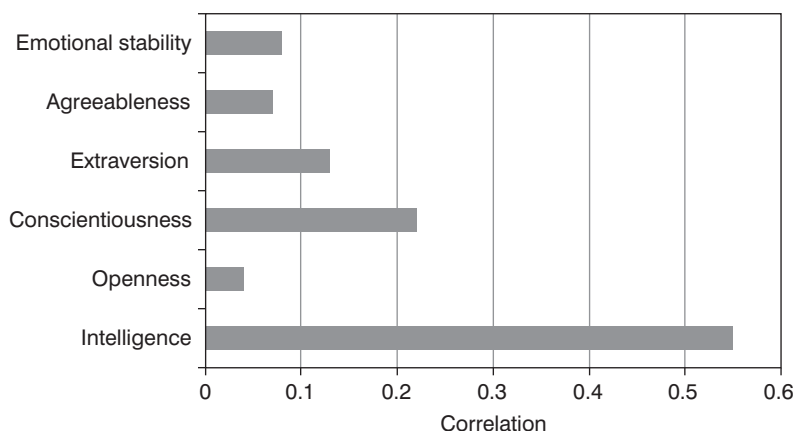


FIGURE 42.4. Associations with job performance. Source: The correlations reported for personality skills come from a meta-analysis conducted by Barrick and Mount (1991). The correlation reported for intelligence comes from Schmidt and Hunter (2004). Note: The values for personality are correlations that were corrected for sampling error, censoring, and measurement error. Job performance was based on performance ratings, productivity data, and training proficiency. The authors do report the timing of the measurements of personality relative to job performance. Of the Big Five, the coefficient on conscientiousness is the only one that is statistically significant, with a lower bound on the 90% credibility value of 0.10. The value for intelligence is a raw correlation.

its impact on educational attainment. However, it is also possible that the marginal predictive power of self-control over economic preferences and the Big Five in this study can be explained by a more precise measure of self-control available in their data relative to other noncognitive skills.⁵³

Measures of noncognitive skills rival IQ and measures of socioeconomic status in predicting longevity.⁵⁴ B. Roberts et al. (2007) reviewed evidence from 34 different studies on the predictive validity of the Big Five personality measures, relative to that of cognitive ability and socioeconomic status. Most studies they survey control for relevant background factors, including gender and severity of disease. B. Roberts and colleagues converted the results of each study into correlation coefficients that can be compared across studies. Figure 42.5 presents results from their analyses. Conscientiousness is a stronger predictor of longevity than any other Big Five skill and a stronger predictor than either IQ or socioeconomic status.⁵⁵ In general, skills related to conscientiousness, openness to experience, and agreeableness are associated with longer lives.⁵⁶ The mag-

nitudes of the relationships vary across studies.

Of the Big Five, conscientiousness and agreeableness are most predictive of criminality. In a sample of at-risk youth, boys who engaged in severe delinquent behaviors were more than three-fourths of a standard deviation lower in agreeableness and conscientiousness, as measured by mothers' reports at age 12 or 13 than boys who had minor or no delinquent behaviors up to that age (John, Caspi, Robins, Moffitt, & Stouthamer-Loeber, 1994). Noncognitive skills also predict financial outcomes. For example, households with a high internal locus of control⁵⁷ save more of their income (Cobb-Clark, Kasenboehmer, & Sinning, 2016).

There is a growing literature in economics on the predictive power of economic preferences and behavioral biases. Falk et al. (2016) conducted a comprehensive survey-based study of economic preferences across the world. They found that contemporaneous measures of preferences within countries are correlated with savings decisions, labor market choices, and prosocial behaviors. Furthermore, they present some evidence

that differences in preferences across countries are related to differences in per capita income, entrepreneurial activities, and the frequency of armed conflicts. Choi et al. (2014) showed that a one standard deviation increase in choice inconsistency is associated with an almost 20% increase in household wealth. Stango and Zinman (2019) found a similar impact of an increase in the number of exhibited behavioral biases on objective and subjective measures of financial well-being.

There is comparatively little evidence of the predictive power of early measures of preferences on later life outcomes. Golsteyn, Grönqvist, and Lindahl (2014) showed that survey-based time preferences elicited in Swedish data at age 13 predict outcomes decades later, mirroring the findings from Mischel's marshmallow study. In fact, the impact seems to grow over time. Individuals who were more patient at age 13 had higher grades through high school and college, higher incomes, a lower probability of being unemployed, lower obesity, and a lower likelihood of dying before the age of 50. The

effects are heterogenous, and the association between early measures of patience and outcomes seems to be mediated by increased investments in human capital. Cadena and Keys (2015) confirmed the link between patience and human capital accumulation using U.S. data. They found that impatience is related to time-inconsistent behavior such as dropping out of college after having already attended it for 3 years and conjecture that present bias (or short-run impatience) is the main culprit. Not only do impatient individuals accumulate less human capital and thus earn less, they also tend to express more regret later in life.

Accounting for randomness in observed decisions seems crucial and offers a promising avenue for future research. A large body of previous literature treated estimates of preferences and skills as if they were error-free. This is a strong assumption. In a study of twins, Beauchamp et al. (2017) showed that accounting for measurement error increases the predictive power of estimates of risk preferences. Lower risk aversion is related to more risky financial decisions and a

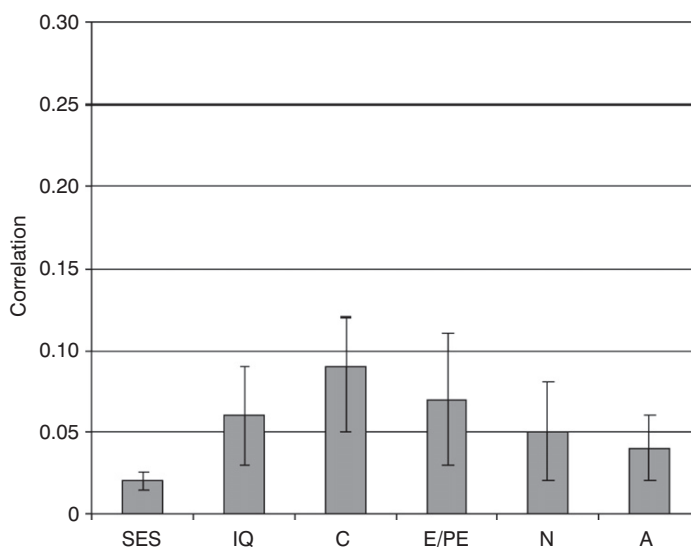


FIGURE 42.5. Correlations of mortality with noncognitive skills, IQ, and socioeconomic Status (SES). Source: B. Roberts et al. (2007). Note: The figure represents results from a meta-analysis of 34 studies. Average effects (in the correlation metric) of low SES, low IQ, low conscientiousness (C), low extraversion/positive emotion (E/PE), neuroticism (N), and low agreeableness (A) on mortality. Error bars represent standard errors. The lengths of the studies represented vary from 1 year to 71 years.

higher probability of owning a business, but also higher alcohol consumption and more smoking. Castillo et al. (2018) found that after correcting for decision error, more risk averse eighth graders in Georgia, have fewer behavioral problems a year later and are more likely to graduate from high school.⁵⁸

As with most studies in personality psychology, the evidence presented in Figures 42.4 and 42.5, and most of the literature, does not address the question of causality; that is, do measured skills *cause* (rather than just predict) outcomes? Empirical associations are not a reliable basis for policy analysis. As previously noted (see Figure 42.1), multiple skills and effort all generate performance in a given task. Many studies in personality psychology do not control for all of the factors that produce performance on measured tasks. They equate measures of outcomes with the skill being measured.⁵⁹ This practice can lead to a substantial bias in inference about the importance of any particular skill. The discussion of the GED program and survey of the intervention literature later in this chapter presents evidence on the causal relationship between skills and outcomes.

The Skills Needed for Success in the Labor Market

Another perspective on the importance of noncognitive skills comes from surveys of employers and workers. In a 1991 U.S. report, the Secretary's Commission on Achieving Necessary Skills (SCANS) conducted an extensive analysis of which skills workers needed in the American workforce.⁶⁰ The Commission researched the literature, consulted with experts, and conducted detailed interviews with workers and/or supervisors in 50 occupations. The interviews rated the importance of various skills in the context of illustrative tasks and tools on the job. Using these sources, the Commission categorized necessary skills into basic skills, thinking skills, personal qualities, and a set of workplace competencies. In addition to reading, writing, and math skills, basic skills include listening and speaking. The thinking skills cover creative thinking, decision making, problem solving, reasoning, and the abil-

ity to learn. SCANS specifies that personal qualities include responsibility, self-esteem, sociability, self-management, integrity, and honesty. It identifies five groups of workplace competencies: the ability to allocate resources (time, money, facilities), interpersonal skills (e.g., teamwork, teaching others, leadership), the ability to acquire and to use information, the ability to understand systems, and the ability to work well with technology.

Furthermore, some authors claim that the importance of social skills for success in the labor market is increasing. Deming (2017) claimed that between 1980 and 2012, jobs requiring high levels of social interaction grew by nearly 12 percentage points as a share of the U.S. labor force. Social skills are complementary to cognitive skills, and jobs that require a combination of both have become increasingly prevalent. Given the increased automatization of the production process, social skills are at the heart of the remaining advantage of humans over machines. They allow workers to coordinate tasks more efficiently and thus to specialize in those tasks in which they are relatively more productive. Accordingly, the labor market return to social skills was much greater in the 2000s than in the mid-1980s and 1990s, while that of cognitive skills has declined slightly. However, Deming's estimates have been challenged and appear to be sensitive to alternative treatments of the same data. Caines, Hoffmann, and Kambourov (2017a) showed that the greatest growth in economic returns accrues to bundles of cognitive and noncognitive skills, and not to either separately. This is consistent with the pioneering work of Mandelbrot (1962).

Employer surveys reinforce the importance of skills that go well beyond academic skills. In a survey of 3,200 employers in four large U. S. metropolitan areas, employers reported that personal qualities, such as responsibility, integrity, and self-management, are as important as or more important than basic skills (Holzer, 1997). In another employer survey undertaken in the mid-1990s of 3,300 businesses (the National Employer Survey), employers ranked attitude, communication skills, previous work experience, employer recommendations, and industry-

based credentials above years of schooling, grades, and test scores as part of the skills needed for success in the workplace (Zemsky, 1997).

Noncognitive skills are especially critical for entry level and hourly workers. Of employers drawn from a national sample in the United States in 1996, 69% reported rejecting hourly applicants because they lacked basic employability skills, such as showing up every day, coming to work on time, and having a strong work ethic. This percentage is more than double the percentage of rejected applicants due to inadequate reading and writing skills. Rejections for not passing a drug test were almost as common as rejections for lack of literacy skills.⁶¹ In a 2007 survey of employers in Washington State, about 60% reported difficulty in hiring. They experienced less difficulty finding workers with adequate reading, writing, and math skills than with appropriate occupational, problem solving, teamwork, communication, and adaptability skills, as well as positive work habits and a willingness to accept supervision.⁶²

Evidence from the United Kingdom supports these findings. A 1998 survey of 4,000 employers found that the four skills found most lacking in 16- to 24-year-olds were technical and practical skills, general communication skills, customer handling skills, and teamwork skills.⁶³ At the bottom of the list were numeracy and literacy skills. In a 2002 survey of 4,000 employers in the United Kingdom, 23% of employers reported a significant number of their staff members were less than fully proficient at their jobs. Skill shortfalls were most common in communication, teamwork, other technical and practical skills, customer handling, and problem solving, and least common in numeracy and literacy.⁶⁴

Consistent with these findings, the Confederation of British Industry defines employability as (1) values and attitudes compatible with the work, including a desire to learn, to apply that learning, to improve, and to take advantage of change; (2) basic skills (literacy and numeracy); (3) key skills (communication, application of numbers, information technology, improving one's own learning and performance, working with

others, problem solving) sufficient for the needs of the work; (4) other generic skills, such as modern language and customer service skills; and (5) job-specific skills and the ability to manage one's own career.

An ethnographic approach provides some revealing examples of how skills are used in context and how nonacademic skills are often developed and used as part of a "community of practice."⁶⁵ In addition to formal knowledge, Nelson (1997) pointed out that workplaces require not only facts, principles, theories, and math and writing skills, but also informal knowledge embodied in heuristics, work styles, and contextualized understanding of tools and techniques. In her revealing case study of auto repair workers, Nelson argued that social skills of new workers are very important for learning the informal knowledge of experienced workers, as captured in stories, advice, and guided practice. For a more recent discussion, see García (2014). The Atlanta Federal Reserve (Jones, 2018) recently issued a comprehensive assessment of workforce improvement strategies that include mentoring and fostering social skills of prospective workers. This reflects the growing understanding of the importance of multiple skills in the labor market and highlights the need to measure them appropriately.

Differences in personality and preferences may explain some of the apparent puzzles concerning wage disparities between individuals and groups of individuals. Using Australian data, Cobb-Clark and Tan (2011) showed that sorting into occupations by gender is in part driven by different sector-specific returns to noncognitive skills for men and women. However, they found that the wage gap is largely driven by disparities for men and women within occupations.⁶⁶ Caliendo, Cobb-Clark, and Uhlenborff (2015) explicitly modeled the job search process and allowed it to depend on an individual's locus of control and other characteristics. Using data from a German survey of the newly unemployed, they found that people with a higher locus of control believe that expending effort in searching for a job is more productive. Accordingly, they search more intensely and have higher reservation wages⁶⁷ than those with a lower locus

of control. Flinn et al. (2019) built on this research, use the same dataset, and add wage bargaining, which helps explain the gender wage gap. They showed that heterogeneity in endowments of noncognitive skills and in their valuations on the labor market largely account for the much discussed disparity. Specifically, women tend to score higher on agreeableness than men and are penalized for it in the wage bargaining process. Furthermore, men are compensated more highly for conscientiousness, which is an important contributor to productivity.

Evidence from the GED Testing Program

Studies of the GED testing program provide additional causal evidence on the effect of noncognitive skills on life-relevant outcomes. The GED is a standardized achievement test that serves as an alternative to a high school diploma. High school dropouts can take the 7.5-hour GED exam to certify that they have the “general knowledge” of a high school graduate. The test was widely used but is now in decline. The GED testing program produced as many as 12% of high school certificates issued each year in the United States. The GED program provides insight into the effects of personality skills on outcomes. GED recipients have the same cognitive skill as high school graduates but differ in their noncognitive skills (see Heckman, Humphries, & Kautz, 2014).

Table 42.1 displays the “validity” of the GED test as analyzed by psychometricians. It gives correlations between GED scores and other achievement test scores. GED test scores are strongly correlated with scores on other standardized achievement tests. The correlations range from 0.61 with the General Aptitude Test Battery (GATB) to 0.88 with the Iowa Test of Educational Development, the progenitor of the GED. By the standards of psychometrics, the GED test is “valid.”

By psychometric standards, GED recipients have higher skills than other dropouts. Figures 42.6a and 42.6b shows the distributions of a factor extracted from the components of the Armed Services Vocational Aptitude Battery (ASVAB) for high school dropouts, GED recipients, and high school graduates.⁶⁸ The sample excludes people who attend postsecondary education. The distribution of the scores of GED recipients is much more like that of high school graduates than that of high school dropouts.

If they have the same cognitive ability as high school graduates, then why do they drop out of high school? Success in school requires other skills. On a variety of other dimensions, GED recipients behave much more like other dropouts. Figure 42.7 shows measures of early adolescent drug use, crime, sex, and violence extracted from three data sources.⁶⁹ Male high school graduates perform better on all measures than high school dropouts or GED recipients. GED recipients

TABLE 42.1. Validities of GED Test

Test	Correlation	Source(s)
Armed Forces Qualification Test (AFQT)	.75–.79 ^a	Means & Laurence (1984)
Iowa Test of Educational Development	.88 ^a	Means & Laurence (1984)
American College Test (ACT)	.80 ^a	Means & Laurence (1984)
Adult Performance Level (APL) Survey	.81 ^a	Means & Laurence (1984)
New York’s Degrees of Reading Power (DRP) Test	.77 ^a	Means & Laurence (1984)
Test of Adult Basic Education (TABE)	.66–.68 ^a	Means & Laurence (1984)
General Aptitude Test Battery (GATB)	.61–.67 ^a	Means & Laurence (1984)
National Adult Literacy Survey (NALS) factor	.78 ^b	Baldwin (1995)

^aUses mean GED subtest scores.

^bUses a general GED factor.

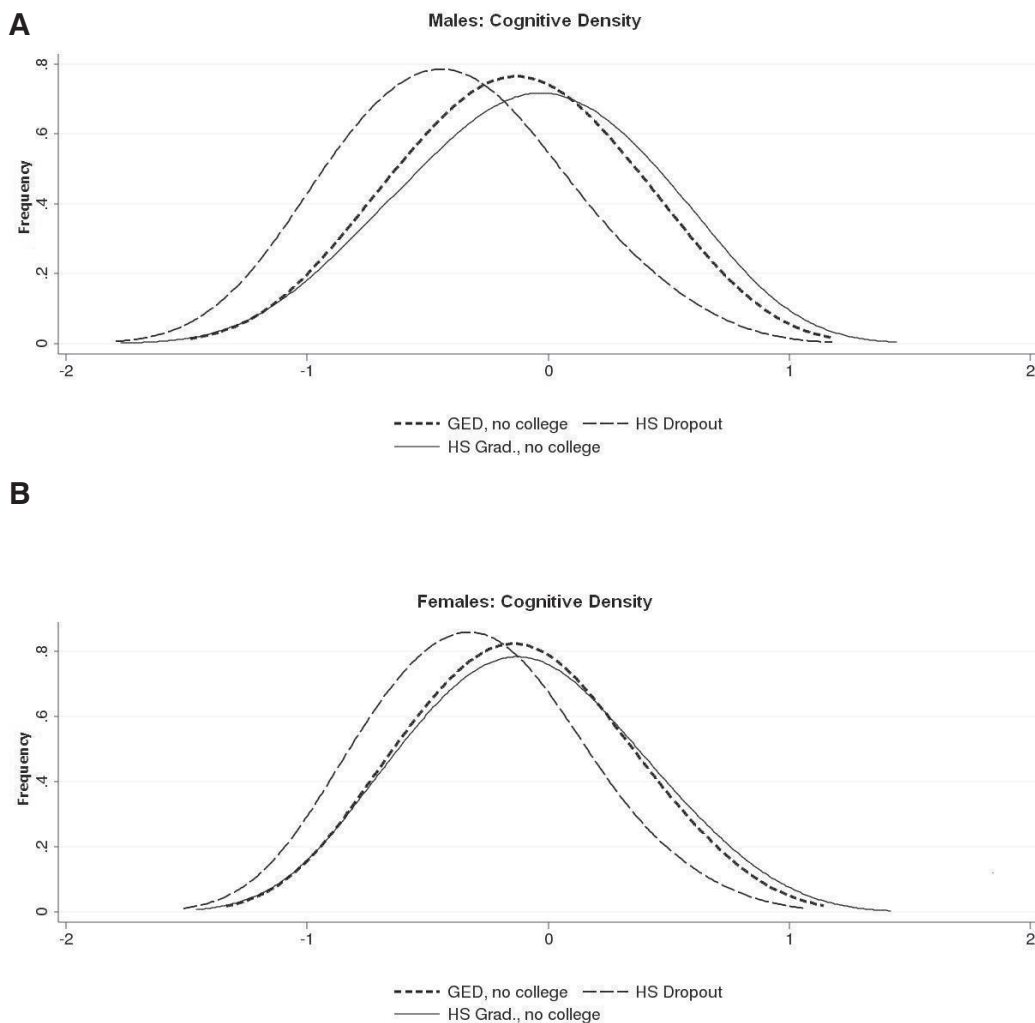


FIGURE 42.6. Cognitive ability by educational status: (a) Males, (b) Females. Source: Reproduced from Heckman et al. (2011), which uses data from the NLSY79. Note: The distributions represent cognitive ability factors estimated using a subset of the Armed Services Vocational Aptitude Battery (ASVAB) and educational attainment as laid out in Hansen et al. (2004). The sample is restricted to the cross-sectional subsample for both males and females. Distributions show only those with no post-secondary educational attainment. The cognitive ability factors are normalized by gender to be mean zero standard deviation one.

are much more similar to dropouts but in several cases are statistically significantly *more likely* to engage in risky behaviors than other dropouts. On no outcome measure in Figure 42.7 are dropouts statistically significantly more likely to engage in risky behaviors compared to GED recipients. Figures 42.8a and 42.8b summarize these ado-

lescent behaviors using a single factor and shows that unlike the cognitive summary measures, the distribution of the noncognitive (personality) summary measure of GED recipients is much closer to that of dropouts than to that of high school graduates.

Figures 42.8a and 42.8b show the distribution of a factor summarizing the diverse

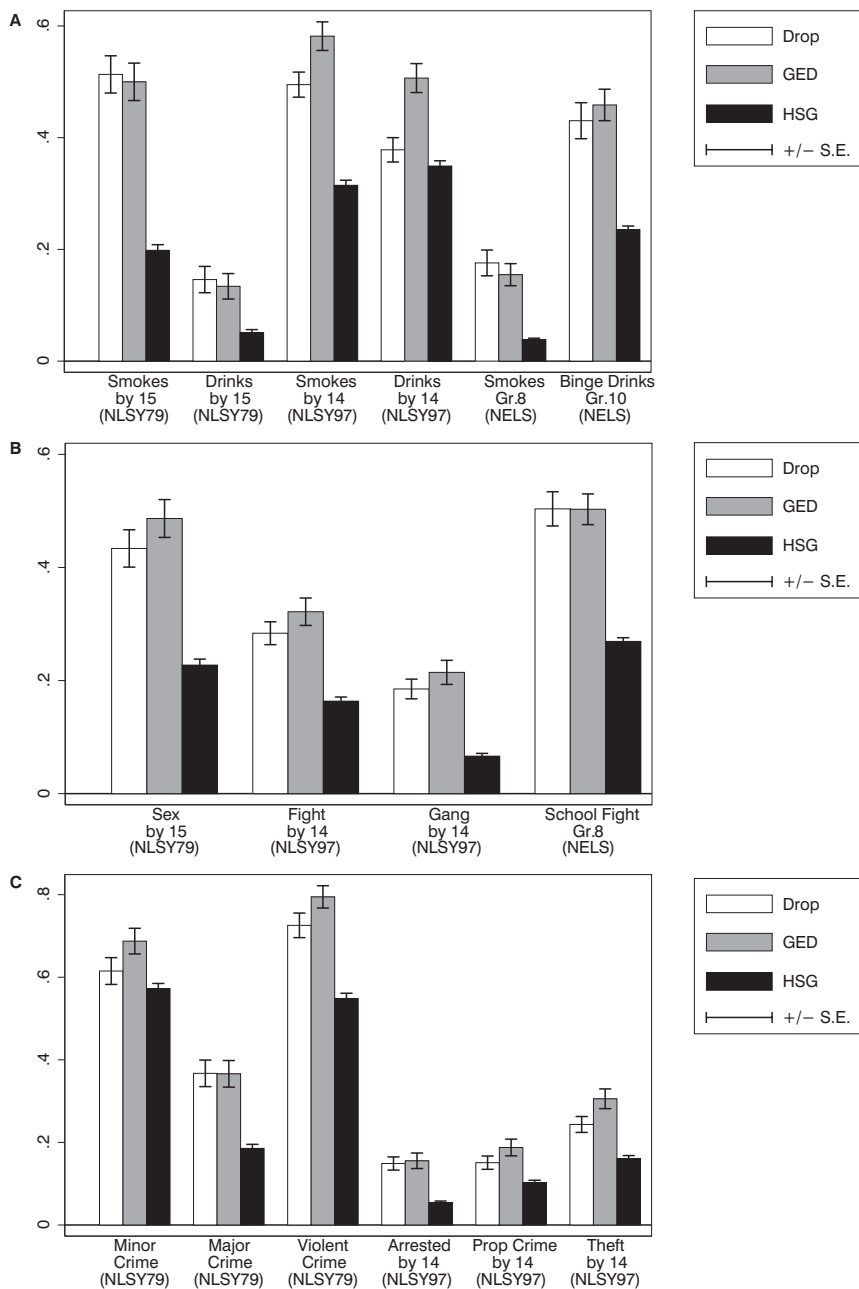


FIGURE 42.7. Measures of adolescent behaviors for male dropouts, GED recipients, and high school graduates: (a) smoking and drinking, (b) sex and violent behavior, (c) criminal behavior. Sources: Heckman et al. (2014, Chapter 3), NLSY79, NLSY97, National Educational Longitudinal Survey. Note: Minor crime includes vandalism, shoplifting, petty theft, fraud, holding or selling stolen goods. Major crime includes auto theft, breaking/entering private property, grand theft. Violent crime includes fighting, assault, aggravated assault. Tests of significance: The estimates for GED recipients and high school graduates are statistically significantly different at the 5% level for all variables. The estimates for dropouts and high school graduates are statistically significantly different at the 5% level for all variables, except for “Minor Crime (NLSY79)” and “Drinks by 14 (NLSY97).” The estimates of “Smokes by 14 (NLSY97),” “Drinks by 14 (NLSY97),” and “Theft by 14 (NLSY97)” between GED recipients and dropouts are statistically significantly different at the 5% level.

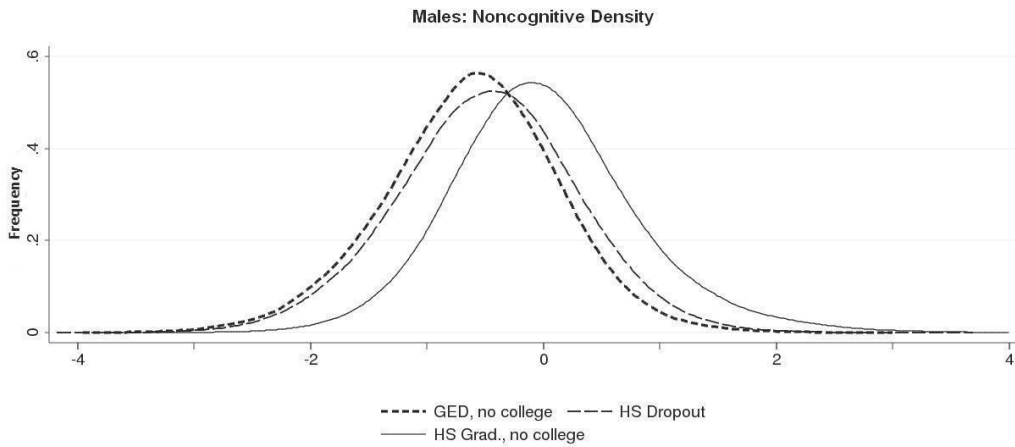
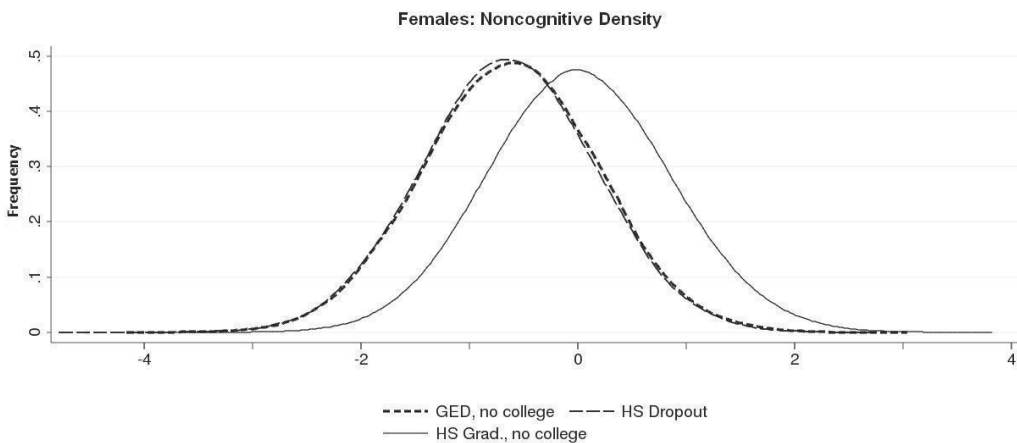
A**B**

FIGURE 42.8. Distribution of noncognitive skills by education group and distribution of a summary measure of noncognitive ability by education group: (a) Males, (b) Females. Source: Reproduced from Heckman et al. (2011), which uses data from the NLSY79. Note: The distributions represent noncognitive ability factors, estimated using measures of early violent crime, minor crime, marijuana use, regular smoking, drinking, early sexual intercourse, and educational attainment as in Hansen et al. (2004). Sample restricted to the cross-sectional subsample for both males and females. Distributions show only those with no postsecondary educational attainment. The noncognitive ability factors are normalized to be mean zero standard deviation one.

measures of adolescent risky behavior for dropouts, GED recipients, and high school graduates. On this index, GED recipients are nearly identical to high school dropouts.

The skills that cause GED recipients to drop out of high school manifest themselves in many other life outcomes. One potential benefit of the GED certificate is that it opens doors to postsecondary education. Figure 42.9 shows postsecondary educational attainment for GED recipients and high school graduates. About 40% of GED recipients enroll in a 2- or 4-year college. Nearly half drop out within the first year. Only 3–4% earn a BA or AA degree by age 40.

GED recipients lack persistence in a variety of tasks in life. Figure 42.10 shows the survival rates in employment (overall), employment in a given job, marriage, and in the condition of not having been incarcerated. GED recipients tend to exit employment, become divorced, and enter jail at

rates similar to those of high school dropouts, while high school graduates are much more persistent.

Adjusting for their differences in cognitive ability, male GED recipients perform virtually the same as high school dropouts in the labor market. Figure 42.11 shows (a) hourly wages and (b) annual earnings of male GED recipients and high school graduates compared to high school dropouts for different age groups. The first set of bars shows outcomes after adjusting for age, race, and region of residence. The second set of bars shows effects after additionally adjusting for scores on the AFQT. The third set of bars shows the effects after additionally adjusting for standard measures of family background. GED recipients and high school graduates outperform dropouts in regressions that only adjust for age, race, and region of residence. After adjusting for cognitive ability, GED recipients are indistinguishable from

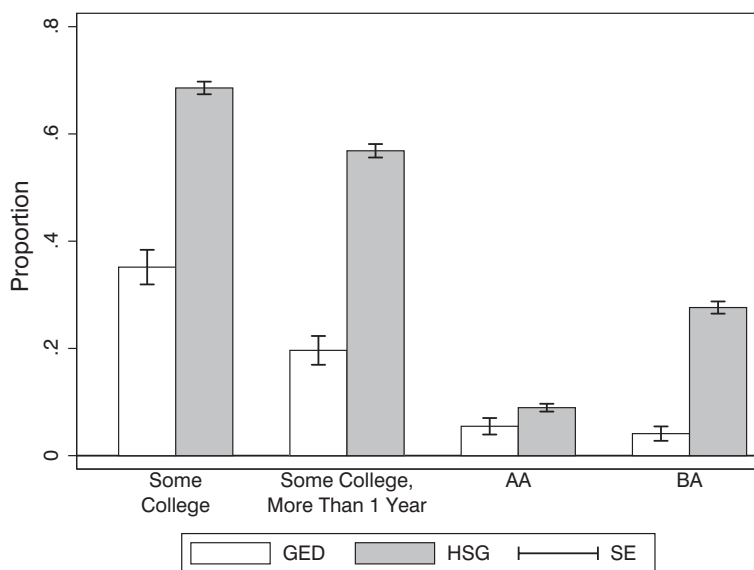


FIGURE 42.9. Postsecondary educational attainment across education groups through age 40 (NLSY79)—Males. Source: Heckman et al. (2014, Chapter 4), NLSY79. Note: The graph shows postsecondary educational attainment of GED recipients and high school graduates (HSG). Variable definitions: “Some College” represents people who entered any postsecondary institution ever. “Some College, More Than 1 Year” represents people who completed at least 1 year of some postsecondary education ever. “AA” represents people who obtained associate’s degrees ever. “BA” represents people who obtained bachelor’s degrees ever. “BA” also includes people with higher education: MA, PhD, and professional degrees. Tests of significance: The estimates for GED recipients and HSG are statistically significantly different at the 5% level for all but attainment of the AA degree.

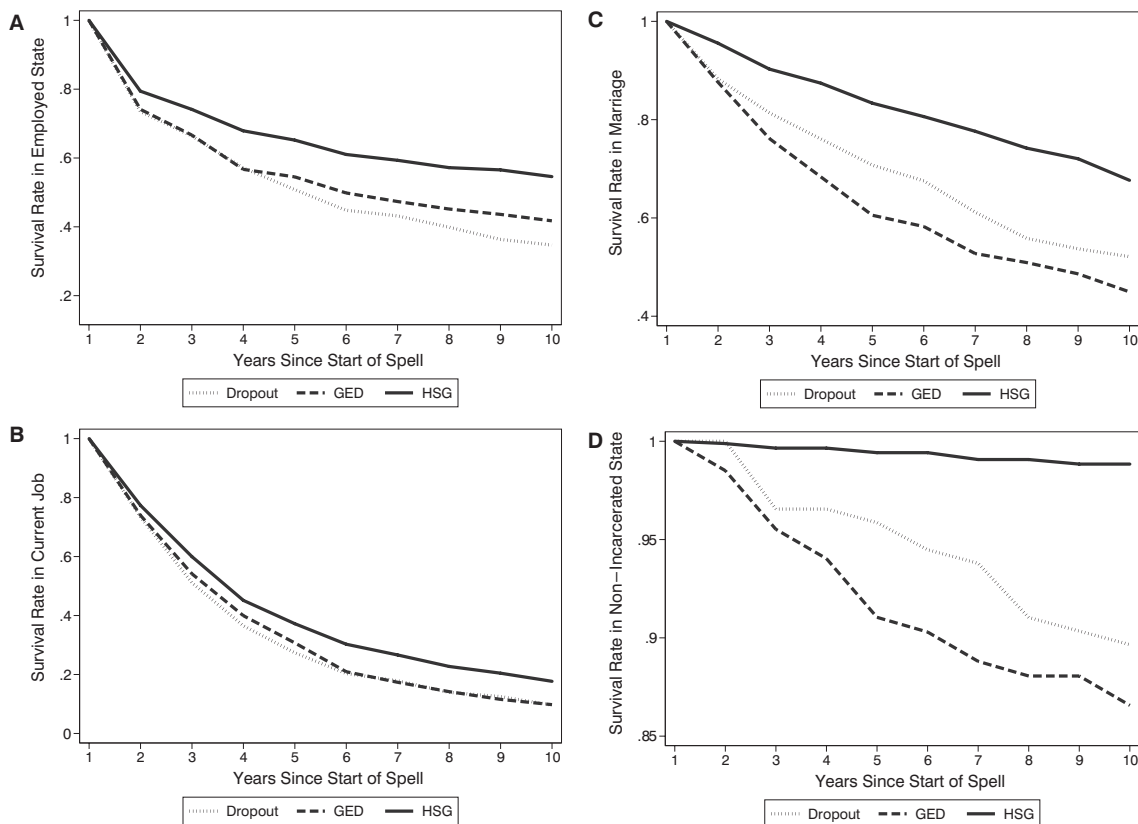


FIGURE 42.10 Survival rates in various states for male dropouts, GED recipients, and high school graduates (HSG): (a) Survival rate in employment, (b) Survival rate in staying on a job, (c) Survival rate in marriage, (d) Survival rate in staying out of jail. Source: Heckman et al. (2014, Chapter 4), NLSY79, nationally representative cross sectional sample. Note: The spell to first time being incarcerated begins in the first year that individuals exit school. Tests of significance: The estimates for GED recipients and HSG are statistically significantly different at the 5% level for all but the second year of “Survival Rate in Not Having Been Incarcerated.” The estimates for dropouts and HSG are statistically significantly different at the 5% level for all but the second year of “Survival Rate in Not Having Been Incarcerated.” The estimates for dropouts and GED are statistically only significantly different at the 5% level for the fifth year of the “Survival Rate in Marriage.”

dropouts, whereas high school graduates earn more and have higher hourly wages. Adjusting for family background characteristics does not change the story.⁷⁰

Causal Evidence from Intervention Studies

Predictive studies do not establish causality. Most studies in personality psychology do not address the question of causality (i.e., whether measured skills *cause* rather than

just predict outcomes). Empirical associations are not a reliable basis for policy analysis. In this section, we discuss difficulties in establishing causality. We also summarize several studies that provide evidence that personality skills *cause* outcomes.

We introduce a simple framework to analyze the effect of skills on outcomes and how skills evolve over time.⁷¹ Equation 42.1 shows how an outcome at age a , T_a , which is the performance on a task, depends on cognition C_a , personality P_a , other acquired

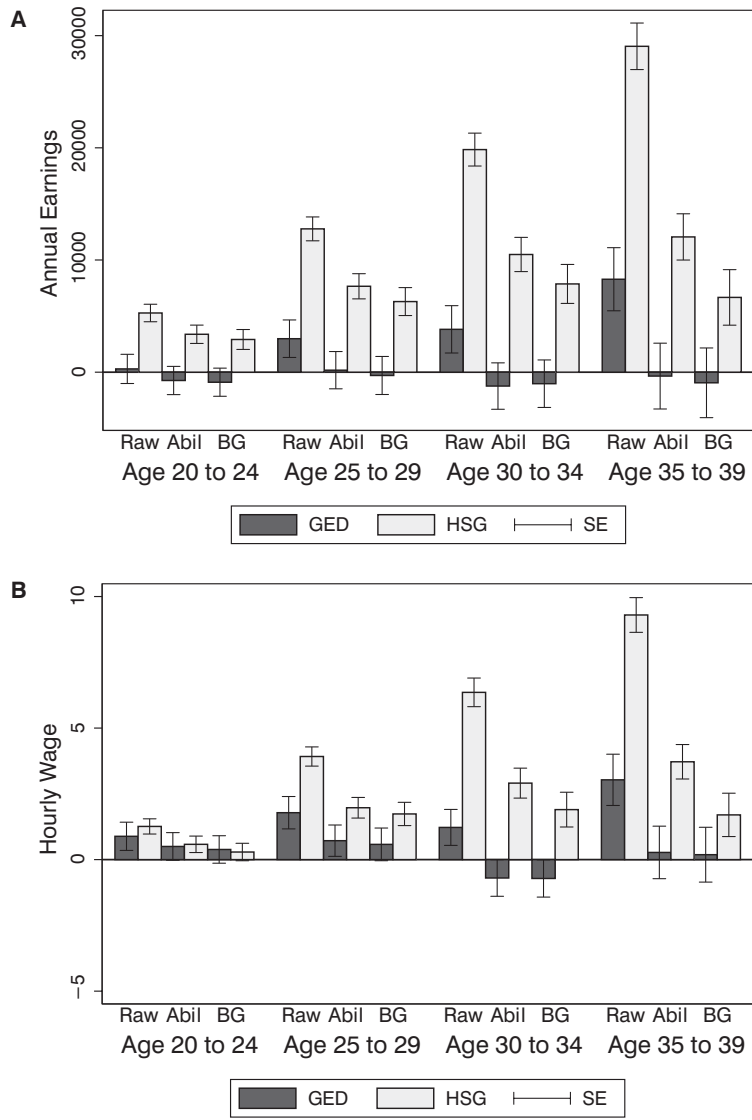


FIGURE 42.11. Labor market outcomes differences by age: NLSY79—Males: (a) Annual Earnings, (b) Hourly Wage. Source: Heckman et al. (2014, Chapter 3), NLSY79. Controls: “Raw”—age, race, and region of residence; “Abil”—age, race, region of residence, and AFQT adjusted for schooling at time of test; “BG”—mother’s highest grade completed, urban status at age 14, family income in 1978, broken home status at age 14, living in the south at age 14, AFQT, and factors based on adolescent behavioral measures, crime and school performance. Regressions exclude those reporting earning more than \$300,000 or working more than 4,000 hours. Note: All regressions allow for heteroskedastic errors and, when appropriate, clustering at the individual level.

skills such as education and job training K_a , and the effort allocated to the task e_{T_a} :

$$T_a = \phi_a(C_a, P_a, K_a, e_{T_a}), \quad (42.1)$$

$$a = 1, \dots, A.$$

Equation 42.2 shows how the effort allocated to task T_a depends on cognition C_a , personality P_a , other acquired skills K_a , incentives R_{T_a} , and preferences γ_a :

$$e_{T_a} = \Psi_{T_a}(C_a, P_a, K_a, R_{T_a}, \gamma_a), \quad (42.2)$$

$$a = 1, \dots, A.$$

This representation distinguishes preferences from skills, although as previously noted, the two are likely closely related. Their relationship is an ongoing topic of research.

The effort applied to a task is the outcome of a choice problem that depends on skills, preferences, and incentives, much like a supply equation in the standard economic theory of consumer choice. Preferences can be thought of as additional skills. Some psychological theories posit that people have limited effort that they can divide among different tasks (see, e.g., Baumeister & Tierney, 2011).

Equations 42.1 and 42.2 formalize the difficulty in establishing causal relationships between outcomes and skills. Multiple skills and effort generate performance in a given task. Many studies in psychology and economics do not control for these inputs and equate measurement of a set of outcomes with the skill the analyst is trying to measure. This practice can lead to a substantial bias in inference about any particular skill.

In addition, most studies assume a linear or at least monotonic relationship between outcomes and skills. This practice is particularly problematic for measuring personality skills, where the effect of a skill on an outcome is not always linear or monotonic. Too much of a good thing can be bad. For example, extreme levels of skills are associated with psychopathologies. High levels of conscientiousness are associated with obsessive-compulsive disorder, which hinders task performance (Samuel & Widiger, 2008). Nonlinearities can also arise when skills and incentives interact, as in the analyses of Borghans et al. (2008) and Segal (2012),

who showed that people with different personality skills respond differently to incentives on tests.⁷²

Skills evolve over time through investment and habituation.⁷³ Equation 42.3 shows that skills at age $a + 1$ are age-dependent functions of cognitive ability, personality skills, other acquired skills, preferences, and investment I_a at age a . In this way, previous levels of skills and acquired skill affect current levels of skills and acquired skills. Equation 42.3 formalizes the notion that skills governing performance at a point in time are themselves the outcome of investment and habituation:

$$(C_{a+1}, P_{a+1}, K_{a+1}, \gamma_{a+1}) = \eta_a(C_a, P_a, K_a, \gamma_a, I_a), \quad (42.3)$$

$$a = 1, \dots, A.$$

In conjunction with resource constraints, a “deeper” set of preference parameters at age a may govern investment decisions and effort allocated to tasks. See Figure 42.12 for a schematic.

In addition, investment today increases the stock of future skills, which in turn increases the return to future investments. Economists call this phenomenon *dynamic complementarity*. This channel increases the returns to early investments, because it makes future investments more productive. For this reason, Cunha et al. (2010) showed that it is economically efficient to invest in the most disadvantaged young children, because it raises their payoffs from future investments. Heckman and Mosso (2014) presented a more complete discussion of static and dynamic complementarity and a formal proof of when early investment is more effective compared to later investment.

An important extension of this modeling approach is that performance on current tasks themselves can depend directly on performance of past tasks independent of a person’s skills or effort. This embodies the idea of habituation that was discussed by Aristotle (see Ross, 1956): Constant practice of moral behavior can make persons moral habitually. Formally, Equation 42.1 can be modified as

$$T_a = \phi_a(C_a, P_a, K_a, e_{T_a}, T_{a-1}), \quad (42.4)$$

$$a = 1, \dots, A.$$

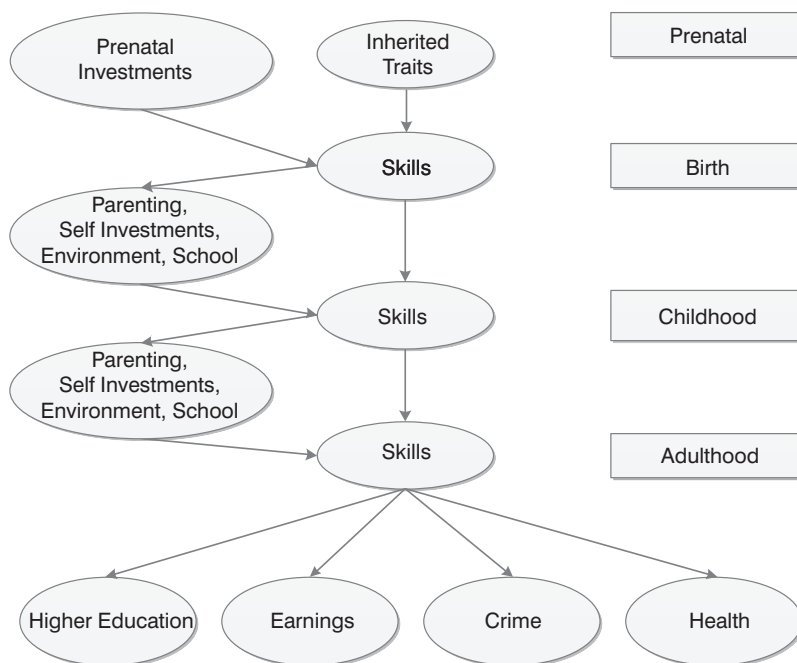


FIGURE 42.12. Framework for understanding skills development.

where T'_{a-1} might represent a fundamentally different task that measures the same set of skills. For example, T'_{a-1} could represent the number of course credits that a student earns, and T_a could represent graduating from high school. Both are valid measures of skills. As suggested by Jackson (2018) and Kautz and Zanolini (2019), credits earned is a valid measure of noncognitive skills, because successfully completing courses depends on noncognitive skills. Similarly, as argued by Heckman, Humphries, and Kautz (2014), graduating from high school is a task that depends in part on noncognitive skills. A complication arises because students who earn more credits in ninth grade might be more likely to graduate from high school in part, not only because they have higher levels of skills, but also because high school graduation is a direct function of credits earned. More generally, task T'_{a-1} captures something other than the underlying skills of students that can affect performance on T_a . Econometric methods can separate the direct effect of past measures from the effect of skills (Athans & Falb, 2013; Granger, 1969; Heckman, 1981a, 1991b, 1991c;

Harvey, 1989; Torgovitsky, 2015; Williams, 2020). Models of this type are also common in the economics literature and are informative, because they capture learning (G. Becker & Murphy, 1988; Hai & Heckman, 2019; Pollak, 1976).

This framework recognizes that different skills might be relatively easy to shape at different stages of the life cycle. *Sensitive periods* for a given skill are periods when investments are relatively more productive. *Critical periods* for a particular skill are periods when investment during any other period is not productive.

Figure 42.12 illustrates why understanding the effects attributable to specific interventions is such a challenging task. Most empirical studies only investigate the interventions aimed at one slice of the life cycle. They do not connect the links in Figure 42.12 or correct for the effects of later investment in producing the outcomes attributed to early investments. One important area for future research on skills formation is to better document how early interventions influence the efficacy of later interventions.

Evidence from the Perry Preschool Program and Other Interventions

Evidence from the Perry Preschool Program shows how noncognitive skills can be changed in ways that produce beneficial lifetime outcomes. The Perry Preschool Program enriched the lives of 3- and 4-year-old low-income Black children with initial IQs below 85 at age 3.⁷⁴

Participants were taught social skills in a “plan-do-review” sequence where students planned a task, executed it, and then reviewed it with teachers and fellow students. They learned to work with others when problems arose.⁷⁵ In addition, home visits promoted parent–child interactions. The program ended after two years of enrollment and both treatments and controls entered the same school. The program was evaluated by the method of random assignment.

The program did not improve IQ scores in a lasting way. Figure 42.13 shows that, by age 10, treatment and control groups had the same average IQ scores. Many critics of early childhood programs seize on this finding and related evidence to dismiss the value of early intervention studies. Similar evidence from Head Start programs and a faith in IQ as a central determinant of life success strongly influenced Arthur Jensen’s (1969) views about the genetic determination of skills.

Nevertheless, the program improved outcomes for both boys and girls, resulting in a statistically significant rate of return of around 6–10% per annum for both boys and girls (see Heckman, Moon, Pinto, Savelyev, & Yavitz, 2010). These returns are above the post–World War II, pre-2008 meltdown in stock market returns to equity estimated to be 5.8% per annum.⁷⁶

The Perry Preschool Program worked primarily through improving personality skills. Participants had better direct measures of personal behavior (a weighted average of “absences and truancies,” “lying and cheating,” “stealing,” and “swears or uses obscene words” measured by teachers in the elementary school years). Participants of both genders improved their “externalizing behavior,” a psychological construct related to agreeableness and conscientiousness. For girls, the program improved openness to experience (proxied by academic motivation). The program also improved scores on the California Achievement Test (CAT). This supports the previous evidence that shows performance on achievement tests depends in part on personality skills. Arthur Jensen’s lifetime campaign against early intervention program was based on using faulty measures of relevant lifetime skills.

Other studies are broadly consistent with the evidence from the Perry Preschool study. Analyses of data from Project STAR

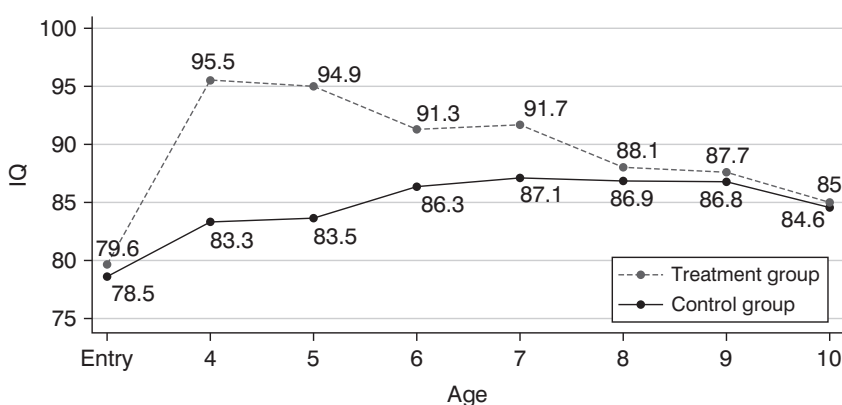


FIGURE 42.13. Perry Preschool Program: IQ by age and treatment group. Note: IQ measured on the Stanford–Binet Intelligence Scale (Terman & Merrill, 1960). The test was administered at program entry and at each of the ages indicated. From Cunha, Heckman, Lochner, and Masterov (2006) and Heckman and Masterov (2007), based on data provided by the HighScope Foundation.

(Steps to Achieving Resilience), a program that randomly assigned kindergartners and teachers to classes of different sizes, yields results similar to the Perry Program. Using data from Project STAR, Dee and West (2011) found that assignment to a small class is associated with positive changes in personality. In a follow-up analysis, Chetty et al. (2011) examined Project STAR and found that students placed in higher-quality kindergarten classes—as measured by their peer’s average performance on a Stanford Achievement Test—had significantly higher earnings in early adulthood.

The curriculum Promoting Alternative Thinking Strategies (PATHS) teaches self-control, emotional awareness, and social problem-solving skills, and is aimed at elementary school children (see Bierman et al., 2010). A recent random assignment, longitudinal study demonstrates that the PATHS curriculum reduces teacher and peer ratings of aggression, improves teacher and peer ratings of prosocial behavior, and improves teacher ratings of academic engagement.⁷⁷ PATHS is an exemplar of school-based social and emotional learning (SEL) programs. A recent meta-analysis found that such school-based programs improved grades by 0.33 standard deviations and achievement test scores by 0.27 standard deviations (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011).⁷⁸ Likewise, several random assignment evaluations of Tools of the Mind, a preschool and early primary school curriculum targeting development of self-control, show that it improves classroom behavior, as well as executive function, defined as higher-level cognitive skills including inhibitory control, working memory, and cognitive flexibility (Barnett et al., 2008; Barnett, Yarosz, Thomas, & Hornbeck, 2006; Bodrova & Leong, 2001; Diamond, Barnett, Thomas, & Munro, 2007; Lillard & Else-Quest, 2006).⁷⁹ Positive findings are reported for the Montessori preschool curriculum (Lillard & Else-Quest, 2006). Unlike the Perry study, these studies do not have long-term follow-ups.

There is evidence that targeted intervention efforts can improve preferences and skills. In contrast to the multifaceted curricula described earlier, studies targeting improvement in aspects of conscientious-

ness are designed to isolate a particular mechanism producing behavioral change. In early work, Rueda, Rothbart, McCanliss, Saccomanno, and Posner (2005) designed a set of computer exercises to train attention in children between ages 4 and 6 years. Children in the intervention group improved in performance on computer tasks of attention relative to children who instead watched interactive videos for a comparable amount of time. Similarly, Stevens, Fanning, Coch, Sanders, and Neville (2008) designed a 6-week computerized intervention and showed that it can improve selective auditory attention (i.e., the ability to attend to a target auditory signal in the face of an irrelevant, distracting auditory signal). While yielding interesting preliminary results, these programs had only short-term follow-ups and involved very small samples.

A recent strand of research has focused on testing and implementing interventions on a larger scale and directly in school. Alan and Ertac (2018) claim that an intervention in Turkey designed to encourage forward-looking behavior by increasing the salience of future selves improves patience measured on experimental tasks. The effect has persisted and 3 years later, is associated with an improved “behavior grade” for girls and high-achieving students. However, the study is badly flawed and has to be taken with more than the usual grain of salt. Kosse et al. (2020) showed that social skills may also be impacted. They studied a mentoring intervention program in Germany that randomly paired children from low-income families with college student mentors. Before the intervention, children from low-income families scored lower on measures of prosociality. The gap across income groups disappeared for the treated group and this effect was found 2 years later. Finally, Algan, Beasley, Vitaro, and Tremblay (2014) studied a 2-year intervention (implemented at the time of entry into primary school) aimed at improving noncognitive skills in boys who were disruptive in kindergarten. They found that it increased self-control and trust, improved labor market participation, and reduced criminal behavior in early adulthood.

Several studies suggest that noncognitive skills can be remediated in adolescence.

Martins (2010) analyzed data from EPIS (Exploration, Preparation, Implementation, and Sustainment), a program developed to improve student achievement of 13- to 15-year-olds in Portugal by increasing motivation, self-esteem, and study skills. The program consists of one-on-one meetings with a trained staff member or meetings in small groups. The intervention was tailored to each participant's individual skills deficit. Overall, the program was successful and cost-effective, decreasing grade retention by 10 percentage points. Kautz and Zanoni (2019) found similar effects for a mentoring program in high schools in disadvantaged neighborhoods.

Heckman et al. (2006) used a version of Equation 42.3 to analyze the effects of increases in education on measured cognition and noncognitive measures.⁸⁰ Controlling for the problem of reverse causality (that schooling may be caused by noncognitive skills), they found that schooling improves both personality and cognitive skills, and that these skills, in turn, boost life outcomes.⁸¹ Heckman et al. (2018) estimated a sequential model of education to study the effects of education on a variety of outcomes. Correcting for selection into education, they found that early cognitive and personality skills affect schooling choices, labor market outcomes, adult health, and social outcomes, and that increasing education promotes beneficial labor market, health, and social outcomes.

Todd and Zhang (2019) confirmed that returns to schooling arise in part because education improves noncognitive skills. They found that these changes are concentrated predominantly among individuals from poorer families and tend to stabilize by the age of 30. Furthermore, some authors claim that cognitive and noncognitive skills are associated with sorting into different job types, and individuals who score high on both tend to choose more schooling and subsequent employment in white-collar occupations. Kassenboehmer, Leung, and Schurer (2018) contributed to this literature and provided estimates of the effect of university education on the Big Five personality skills. Controlling for selection into college, they showed that it increases the extraversion

skill by 0.3 standard deviations and seems to have some impact on agreeableness, although the latter is quite heterogeneous and depends on family background.

Cunha et al. (2010) estimated a model of the technology of skills formation using longitudinal data on the development of children with rich measures of parental investment and child skills. They controlled for the endogeneity of investment using shocks to family income, along with other instruments. Their model is a version of Equation 42.3. Skills are self-productive and exhibit dynamic complementarity: Current values of skills affect the evolution of future skills through direct and cross effects. A leading example of a cross-effect is that more motivated children are more likely to learn.⁸² They estimate parameters that summarize how past personality skills affect future cognitive skills.

Cunha et al. (2010) found that self-productivity becomes stronger as children become older, for both cognitive and personality skills.⁸³ It is more difficult to compensate for the effects of adverse environments on cognitive endowments at later ages than it is at earlier ages. This finding is consistent with the high rank-stability of cognition for ages past 10–12 reported in the literature. It also helps to explain the evidence on the ineffectiveness of cognitive remediation strategies for disadvantaged adolescents (documented in Cunha, Heckman, Lochner, & Masterov, 2006; Knudsen, Heckman, Cameron, & Shonkoff, 2006; Cunha & Heckman, 2007).

Personality skills foster the development of cognition, but not vice versa (see Cunha et al., 2008a; Cunha et al., 2010). It is relatively easier at all stages of life to compensate for early disadvantage in endowments by boosting personality skills.⁸⁴ However, personality seems to stabilize around the age of 30.⁸⁵ Thus, the most effective adolescent interventions target personality skills.⁸⁶

Some life experiences, such as employment, can also improve personality. Using a randomized controlled trial, Gottschalk (2005) found that working at a job can improve locus of control, a trait related to neuroticism, that measures the extent to which individuals believe that they have control

over their lives through self-motivation or self-determination, as opposed to the extent that the environment controls their lives (Rotter, 1966).⁸⁷ He used data from the Self-Sufficiency Project (SSP), in which some welfare recipients were randomly offered substantial subsidies to work. The subsidy more than doubled the earnings of a minimum wage worker. People in the experimental group worked about 30% more hours than those in the control group. After 36 months, those who received the subsidy were more likely to have an improved locus of control.

Negative life experiences can have lasting effects on preferences and personality as well. Americans who experienced sexual abuse and parental neglect in childhood appear to have increased levels of neuroticism and lower conscientiousness and openness to experience at age 30 (Fletcher & Schurer, 2017). Afghanis who experienced violence exhibit more risk tolerance but also a higher preference for certainty when asked to recall fearful events (Callen et al., 2014). Furthermore, Malmendier and Nagel (2011) documented that individuals who experienced negative financial events such as the Great Depression exhibit a lower willingness to take financial risks.⁸⁸ Anger, Camehl, and Peter (2017) showed that sometimes trauma can also result in positive changes in personality. Studying German data, they found that job loss due to factory closings increased openness to experience for highly educated workers, while leaving other dimensions of personality unchanged.

Economic preferences have also been shown to have a causal impact on outcomes.⁸⁹ Montizaan, de Grip, Cörvers, and Dohmen (2016) exploited a change in the Dutch public pension system in 2006 that affected workers born after 1950. By comparing the reaction of public sector workers born just after the reform took effect to those born just before, they found that affected individuals who scored higher on negative reciprocity reduced their work effort (measured by self-reported on the job motivation). Furthermore, this decline seemed proportional to the degree of perceived unfairness—it is larger for workers born very close to the cut-off date and among those who work with many colleagues who were unaffected—and

also the closeness to the “perpetrator” of the injustice (those working directly for the central government shirk more).

Summary

In this chapter, we have reviewed recent evidence from economics and psychology on the importance of personality. The evidence shows that success in life depends on many skills, not just those measured by IQ, grades, and standardized achievements tests. Personality skills predict and *cause* outcomes.

Economic analysis clarifies psychological studies by establishing that psychological attributes are measured by performance on tasks. It enriches the analysis of human differences by providing anchored measures of economic preferences and studying their links to personality and cognitive skills. Psychological attributes have different productivities in different tasks. Performance on tasks depends on incentives and multiple skills, giving rise to a fundamental identification problem when measuring any single skill. This identification problem is empirically important even for measures of cognitive skills.

The importance of cognitive and noncognitive skills increases with the complexity of a task. Given their endowments of skills and the incentives they face, people sort into tasks in life in pursuit of their comparative advantage. Recent research by Caines et al. (2017a) and Beaudry, Green, and Sand (2016) shows that labor market rewards are increasing for those who have large *bundles* of both social and cognitive skills. They perform complex tasks. The demand for such bundles is increasing, not the demand for cognitive or noncognitive skills alone, despite some recent claims to the contrary. In fact, there is evidence that the demand for cognitive skills alone is in decline (see Caines et al., 2017a, 2017b; Beaudry, Green, & Sand, 2016), and the evidence for a rise in the demand for cognitive or noncognitive skills by themselves is debated in the literature.

Skills are stable across situations. However, their manifestations depend on incentives to apply effort in the situations where they are measured and also on other skills.

Skills are not set in stone. They change over the life cycle and can be enhanced by education, mentoring, parenting, and environmental influences to different degrees at different ages.

Scores on achievement tests capture both cognitive and personality skills. Children who are more academically motivated and more open to experience learn more and have higher test scores. More motivated children also try harder on achievement tests.

The studies surveyed here demonstrate that the growing partnership between economists and psychologists is contributing greatly to knowledge. The fields have a lot to learn from each other. Recent evidence changes the way we think about the sources of individual differences in life performance and ways to design effective policies for equalizing opportunities.

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NOTES

1. The Programme for International Student Assessment (PISA) evaluates student performance in math, science, and reading across countries, and its results attract a lot of media attention and influence policy. Scores from the year 2000 PISA test led Germany to reevaluate its educational system and introduce a variety of reforms (Grek, 2009). The creators of the original PISA tests called them literacy tests, not achievement tests, because PISA was designed to capture how knowledge can be applied to other

contexts (Organization for Economic Cooperation and Development [OECD], 2014b). However, this was also the goal of the original achievement tests. We are unable to find any studies establishing that the original PISA measures were fundamentally different skills than those measured by achievement tests. Recently, however, PISA 2012 has added some component tests designed to capture aspects of noncognitive skills, including openness, locus of control, and motivation (OECD, 2014a).

2. See Heckman and Kautz (2014a) for a detailed discussion of the GED program and an evaluation of its benefits.

3. For histories of achievement tests see Quinn (2014) and Heckman and Kautz (2014a).

4. See Heckman and Kautz (2012). IQ tests alone explain at most 7% of this variability. Other work by Borghans, Golsteyn, Heckman, and Humphries (2016) shows that achievement tests explain a smaller proportion of lifetime success.

5. See Bound, Brown, and Mathiowetz (2001).

6. See the studies by Borghans et al. (2008) and Almlund, Duckworth, Heckman, and Kautz (2011). The modern literature traces back to Bowles and Gintis (1976), and Bowles, Gintis, and Osborne (2001). An important study in sociology is the work of Peter Mueser reported in Jencks (1979).

7. For reviews, see Heckman and Kautz (2012); Heckman and Kautz (2014a, 2014b); Almlund et al. (2011); Borghans et al. (2008), and B. Roberts, Kuncel, Shiner, Caspi, and Goldberg (2007).

8. See Kautz and Zanoni (2019).

9. See Carroll (1993) and Ackerman and Heggestad (1997) for discussions.

10. See, for example, Nisbett et al. (2012).

11. See R. Roberts et al. (2000).

12. See Raven, Raven, and Court (1988). The high correlation between scores on intelligence tests and scores on achievement tests is in part due to the fact that both require intelligence and knowledge. Fluid intelligence promotes the acquisition of crystallized intelligence. Common developmental factors affect the formation of both skills.

13. Carroll (1993) and Ackerman and Heggestad (1997) discuss more disaggregated facets of cognitive ability.

14. This practice is true even among leading professional psychologists. For example, all of these measures are assumed to capture intelligence in Flynn (2007), Nisbett (2009), and Nisbett et al. (2012).

15. See Heckman and Kautz (2012).

16. See Borghans, Golsteyn, Heckman, and Humphries (2011a).

17. It is an irony of the testing literature that high school grades are more predictive of first-year college performance than standardized achievement test (SAT) scores (Bowen, Chingos, & McPherson, 2009). The SAT and related tests were once thought

to be a more objective measure of student quality than high school grades (Lemann, 1999).

18. See Almlund et al. (2011) and Borghans et al. (2008) for comparisons of some of these different taxonomies.

19. See Costa and McCrae (1992).

20. See Borghans et al. (2008) and Almlund et al. (2011) for comparisons of these taxonomies.

21. See, for example, Cloninger, Dragan, Svra-kic, Bayon, and Przybeck (1999).

22. A deeper question, as yet not systematically investigated in the literature in economics or psychology, is whether the “traits” captured by the alternative measurement systems are the expression of a more basic set of preferences or goals. McAdams (2006) adds goals to the list of possible skills. Almlund et al. (2011) and Heckman et al. (2012) develop a model in which preferences and endowments of skills determine the effort applied to tasks. As shown in the next section, performance on tasks is the source of any measurement of a skill. Hence, in their framework, measures of skills are determined, in part, by preferences

23. A growing body of research shows that performance on tasks is moderated by a variety of behavioral biases (for recent summaries, see Chapman, Dean, Ortoleva, Snowberg, & Camerer, 2018; Stango & Zinman, 2019).

24. See Almlund et al. (2011).

25. The idea of using behaviors to measure non-cognitive skills is old. Ralph Tyler (1973; also see Rothstein, Jacobsen, & Wilder, 2008) suggested using measures of behavior to capture noncognitive skills in his first proposal for the National Assessment of Educational Progress tests. This idea is pursued in the recent literature (Heckman, Humphries, & Veramendi, 2018; Jackson, 2018). See Kautz and Zanolini (2019) for a recent application of this idea. We discuss this approach more extensively in a later section.

26. See Borghans et al. (2011a), Almlund et al., 2011, and Heckman and Kautz (2012) for discussions of this problem.

27. See Borghans et al. (2008), Clingman and Fowler (1976), Edlund (1972), Ayllon and Kelly (1972), Breuning and Zella (1978), Holt and Hobbs (1979), Larson, Saccuzzo, and Brown (1994), and Segal (2012). This evidence is summarized in Borghans et al. (2008) and Almlund et al. (2011).

28. See, for example, Nisbett (2009).

29. The correlation between DAT and the widely used Armed Forces Qualification Test (AFQT) scores in the National Longitudinal Study of Youth 1979 (NLSY79) is .75 (Borghans, Golsteyn, Heckman, & Humphries, 2016). Friedman and Streicher (1985) estimate correlations between .65 and .82 in a sample of high school sophomores and juniors. Kettner (1976) estimates correlations between DAT and the AFQT subtests of .76–.89 in a sample of juniors and seniors.

30. In the Stella Maris data, openness to experience is strongly correlated with IQ. See Borghans et al. (2011b).

31. These are called Likert (1932) scales.

32. Reference bias is also problematic in health surveys that use self-reported, subjective health assessments (see Groot, 2000).

33. $r = -0.07$ ($p = 0.73$).

34. See the studies summarized in Almlund et al. (2011).

35. For further discussion of reference bias, see Duckworth (2012), Goldammer (2010), Peng, Nisbett, and Wong (1997), Heine et al. (2001), Heine, Lehman, Peng, and Greenholtz (2002), Heine, Buchtel, and Norenzayan (2008), Naumann and John (2011), and Schmitt et al. (2007).

36. In an attempt to address reference bias, some psychologists measure skills using behaviors. Heine et al. (2008) examine cross-country differences in conscientiousness using objective measures, including walking speed, postal workers' speed, and the accuracy of clocks in public banks. To measure walking speed, researchers timed how long it took for a random sample of people to walk 60 feet in public areas. Postal workers' speed was assessed by measuring how long it took for postal workers to sell stamps.

37. See Heckman, Humphries, and Kautz (2014).

38. The measure of risky and reckless behavior is based on whether adolescents engaged in any of the following behaviors: stealing from a store, purposefully damaging property, taking something worth less than \$50, or conning someone.

39. See the discussion in Pratt and Cullen (2000) and Benda (2005).

40. See Golsteyn and Schildberg-Hörisch (2017) for a review.

41. A mechanism is said to be incentive compatible if it provides individuals with an incentive to truthfully and fully reveal their preferences. As of now, there is no existing theory regarding incentive compatibility in making hypothetical choices. However, there is some evidence that people have a preference for being honest and for being seen as honest (Abeler, Nosenzo, & Raymond, 2019).

42. There is evidence that the level of incentivization (stakes) also matters (see Holt & Hobbs, 1979).

43. Harrison and Swarthout (2016) showed how appropriately designed experimental elicitation can be used to empirically test competing theories of decision making under risk that allow for various biases.

44. *Hypothetical bias* refers to differences in response between settings in which consequences are hypothetical and real.

45. The responses from a hypothetical setting are corrected for “hypothetical bias” so as to match those which would have been obtained in an incentivized setting (where choices would have had real consequences).

46. Sutter, Zoller, and Glätzle-Rützler (2019) provides a comprehensive summary of this literature.

47. Other research also suggests that preferences and personality are measured with a significant amount of error. For example, Beauchamp, Cesarini, and Johannesson (2017) found that adjusting for measurement error increases both the predictive power of risk preference in terms of observed outcomes and leads to higher measured correlations with noncognitive skills. Castillo, Jordan, and Petrie (2018) found that only risk aversion estimates corrected for decision error predict life outcomes.

48. Risk and time preferences are also related to cognitive ability; however, the relationship is likely weaker. Higher cognitive ability is associated with more patient behavior (see, e.g., Dohmen, Falk, Huffman, & Sunde, 2018; Jagelka, 2018). The effect of cognitive skills on risk aversion is more controversial and there have been studies that found a positive link, a negative link, or no link (see Dohmen et al., 2018, for a recent summary of the literature). Andersson et al. (2018) suggests that estimated relationships may have been biased by features of the experimental design, while Jagelka (2018) shows that explicitly modeling for noise in observed choices and survey responses flips the estimated link between cognitive ability and risk preference from negative to positive.

49. Note that “bias” is in general measured against a maintained model of rational decision making, which, in fact, may not be widely accepted.

50. A participant (usually a child) was given a marshmallow. The experimenter left the room and told the participant that he or she would receive a second marshmallow if he or she resisted consuming the marshmallow until the experimenter returns. The length of time that the participant waits is a measure of short-term discounting. The children who could wait had much better lifetime outcomes (for a recent discussion of this study, see Mischel et al., 2010).

51. See the special issue of the *Journal of Research in Personality* (2009) entitled “Personality and Assessment at Age 40,” for a recent discussion.

52. R^2 of .6–.8, where R^2 is a measure of variance explained.

53. The authors use 13 indicators to construct a measure of self-control, but only three for each of the Big Five personality traits, and only one general question for measuring each of risk and time preference.

54. For a recent study, see Friedman and Martin (2011).

55. The timing of the measurements of noncognitive skill relative to the outcomes varies by study.

56. See Friedman and Martin (2011), Martin, Friedman, and Schwartz (2007), Kern and Friedman (2008), Mroczek and Spiro (2007), Boyle et al. (2005), Schulz, Bookwala, Knapp, Scheier, and

Williamson (1999), and Kubzansky, Sparrow, Vokonas, and Kawachi (2001).

57. Judge, Erez, Bono, and Thoresen (2002, p. 693) found that locus of control is highly related to emotional stability, which is the inverse of neuroticism; indeed, they say that “measures purporting to assess self-esteem, locus of control, neuroticism, and generalized self-efficacy may be markers of the same higher order concept.”

58. Castillo, Ferraro, Jordan, and Petrie (2011) showed that higher patience is also associated with fewer disciplinary referrals at school.

59. Selecting measures and verifying them is part of the mysterious and inherently subjective process of “construct validity” in psychology. For a discussion, see Borghans et al. (2008).

60. See the Secretary’s Commission on Achieving Necessary Skills (1992).

61. See Barton (2006).

62. See the Washington Workforce Training Board (2008).

63. See Westwood (2004).

64. See Hillage, Regan, Dickson, and McLoughlin (2002).

65. See Stasz (2001).

66. Antecol and Cobb-Clark (2013) corroborate these findings using U.S. data.

67. A *reservation wage* is the minimum wage for which a person is willing to accept a job.

68. Similar results are found for females.

69. See the NLSY79, the National Longitudinal Survey of Youth 1997 (NLSY97), and the National Educational Longitudinal Survey (NELS). For discussion of these datasets, see Heckman, Humphries, and Veramendi (2018).

70. Most of the patterns found for women parallel those found for men. However, there are some important differences. While female GED recipients share similar cognitive and personality skills as male GED recipients, their outcomes differ. After accounting for differences in cognitive ability, female GED recipients do not earn higher hourly wages than other dropouts, but unlike men, they have higher annual earnings, because they are more likely to participate in the labor force. The increased labor supply response is largely due to female GED recipients who attain some postsecondary education or who have dropped out of high school due to pregnancy. See our book, Heckman, Humphries, and Kautz (2014), for a full discussion of the evidence on the performance of GED recipients.

71. This framework draws on Almlund et al. (2011).

72. Formally, this occurs when $\frac{\partial^2 \psi_{T_a}}{\partial P_a \partial R_{T_a}} \neq 0$.

73. Todd and Wolpin (2006) find that differences in parental investment (home inputs) explain almost a third of the Black–White and Hispanic–

White achievement gap. Also see Cunha and Heckman (2008a).

74. We draw on the analysis of Heckman, Pinto, and Savelyev (2013).

75. Sylva (1997) describes the Perry program as a Vygotskian program fostering personality skills. Vygotsky developed a psychology of child development in structured social settings that emphasized development of social and personality skills.

76. See DeLong and Magin (2009).

77. See Bierman et al. (2010).

78. Note, however, that the largest federal study to date on character education programs, including PATHS, failed to find evidence for improvements in behavior or academic performance (see Social and Character Development Research Consortium, 2010).

79. However, a more recent large-scale study (Farran, Lipsey, & Wilson, 2011) does not find any effect of the program on self-regulation or literacy, language, and mathematics achievement.

80. They estimated the effect of schooling on self-esteem and locus of control, personality skills related to neuroticism. The Rosenberg Self-Esteem Scale attempts to assess the degree of approval or disapproval of oneself (Rosenberg, 1965). The relationship between these measures and the Big Five skills of neuroticism is discussed in Almlund et al. (2011).

81. Both Heckman, Humphries, and Veramendi (2018) and Heckman et al. (2006) used an identification strategy based on matching on proxies for unobserved skills that correct for measurement error and the endogeneity of schooling.

82. There is preliminary evidence that the personality of one's peers may also have an impact on one's outcomes. Golsteyn and Schildberg-Hörisch (2017) exploited random variation in assignment of students to university tutorial sections to estimate a positive effect on performance from having more persistent and more risk averse peers. This effect is limited to students who themselves have a low degree of persistence and is twice as large in magnitude as that of having peers with higher GPAs. As the hours spent studying are unaffected, the authors concluded that the presence of persistent and risk-averse peers directly enhances the productivity of low-persistence students in their company.

83. In the language of economics, the elasticity of substitution for cognitive inputs is smaller later in life.

84. Elasticities of substitution are essentially the same at different stages of the life cycle.

85. See Todd and Zhang (2019) and Terracciano, McCrae, and Costa (2010).

86. Cunha et al. (2006) reported that 16% of the variation in educational attainment is explained by adolescent cognitive skills, 12% is due to adolescent personality (socioemotional skills), and 15% is due to measured parental investments.

87. The relationship between locus of control and the Big Five trait of neuroticism is discussed in Almlund et al. (2011).

88. However, it is unclear what part of these changes can be attributed to changes in risk preferences as opposed to altered beliefs about returns to investing.

89. As discussed earlier, recent research suggests that they may be strongly related to noncognitive personality skills traditionally measured by psychologists.

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