EDITED BY

SARA
MALTZMAN

The Oxford Handbook *of*
TREATMENT PROCESSES
and OUTCOMES *in*
PSYCHOLOGY
A MULTIDISCIPLINARY,
BIOPSYCHOSOCIAL APPROACH

The Oxford Handbook of Treatment Processes and Outcomes in Psychology

OXFORD LIBRARY OF PSYCHOLOGY

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The *Oxford Library of Psychology,* a landmark series of handbooks, is published by Oxford University Press, one of the world's oldest and most highly respected publishers, with a tradition of publishing significant books in psychology. The ambitious goal of the *Oxford Library of Psychology* is nothing less than to span a vibrant, wide-ranging field and, in so doing, to fill a clear market need.

Encompassing a comprehensive set of handbooks, organized hierarchically, the *Library* incorporates volumes at different levels, each designed to meet a distinct need. At one level are a set of handbooks designed broadly to survey the major subfields of psychology; at another are numerous handbooks that cover important current focal research and scholarly areas of psychology in depth and detail. Planned as a reflection of the dynamism of psychology, the *Library* will grow and expand as psychology itself develops, thereby highlighting significant new research that will have an impact on the field. Adding to its accessibility and ease of use, the *Library* will be published in print and, later on, electronically.

The *Library* surveys psychology's principal subfields with a set of handbooks that capture the current status and future prospects of those major subdisciplines. This initial set includes handbooks of social and personality psychology, clinical psychology, counseling psychology, school psychology, educational psychology, industrial and organizational psychology, cognitive psychology, cognitive neuroscience, methods and measurements, history, neuropsychology, personality assessment, developmental psychology, and more. Each handbook undertakes to review one of psychology's major subdisciplines with breadth, comprehensiveness, and exemplary scholarship. In addition to these broadly conceived volumes, the *Library* also includes a large number of handbooks designed to explore in depth more specialized areas of scholarship and research, such as stress, health and coping, anxiety and related disorders, cognitive development, or child and adolescent assessment. In contrast to the broad coverage of the subfield handbooks, each of these latter volumes focuses on an especially productive, more highly focused line of scholarship and research. Whether at the broadest or most specific level, however, all of the *Library* handbooks offer synthetic coverage that reviews and evaluates the relevant past and present research and anticipates research in the future. Each handbook in the *Library* includes introductory and concluding chapters written by its editor to provide a roadmap to the handbook's table of contents and to offer informed anticipations of significant future developments in that field.

An undertaking of this scope calls for handbook editors and chapter authors who are established scholars in the areas about which they write. Many of the

nation's and world's most productive and best-respected psychologists have agreed to edit *Library* handbooks or write authoritative chapters in their areas of expertise.

For whom has the *Oxford Library of Psychology* been written? Because of its breadth, depth, and accessibility, the *Library* serves a diverse audience, including graduate students in psychology and their faculty mentors, scholars, researchers, and practitioners in psychology and related fields. Each will find in the *Library* the information they seek on the subfield or focal area of psychology in which they work or are interested.

Befitting its commitment to accessibility, each handbook includes a comprehensive index, as well as extensive references to help guide research. And because the *Library* was designed from its inception as an online as well as a print resource, its structure and contents will be readily and rationally searchable online. Further, once the *Library* is released online, the handbooks will be regularly and thoroughly updated.

In summary, the *Oxford Library of Psychology* will grow organically to provide a thoroughly informed perspective on the field of psychology, one that reflects both psychology's dynamism and its increasing interdisciplinarity. Once published electronically, the *Library* is also destined to become a uniquely valuable interactive tool, with extended search and browsing capabilities. As you begin to consult this handbook, we sincerely hope you will share our enthusiasm for the more than 500-year tradition of Oxford University Press for excellence, innovation, and quality, as exemplified by the *Oxford Library of Psychology.*

Peter E. Nathan
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Introduction

1

Treatment Processes and Outcomes in Psychology: A Multidisciplinary, Biopsychosocial Approach

Sara Maltzman

Abstract

The Oxford Handbook of Treatment Processes and Outcomes in Psychology offers a multidisciplinary, biopsychosocial approach to research and practice in psychology pertinent to applied settings. It is written for practitioners from varying disciplines and perspectives (e.g., counseling, clinical, school, and developmental psychology; social work), researchers in these areas, as well as oversight bodies (e.g., mental health clinics and government agencies) tasked with the oversight of mental health services provided to the communities they serve. Practitioners and researchers in various disciplines tend to be "siloed," accessing a restricted literature that typically does not extend far beyond their area of study. The result is suboptimal exposure to an accurate science base that can inform practice and research. This *Handbook* presents a multidisciplinary approach from experts in their respective fields to understanding clients and treatment across the life span. It includes detailed discussions in several chapters that expand on core areas of research and practice that already have a substantive research base, such as the therapeutic alliance, temperament, therapist variables, and career counseling. The *Handbook* also provides chapters in new areas of research (e.g., neuroimaging, the role of medications, and evaluating the placebo effect) to provide a data-based assessment of the current state of the research in these areas. This *Handbook* provides "hands-on" guidance and suggestions, based on research, for identifying interventions that are effective, determining what factors can affect treatment effectiveness, and considerations for the evaluation of the provision of mental health services for children, adolescents, adults, and families at the case or aggregate level.

Key Words: biopsychosocial, multidisciplinary, treatment outcomes, therapeutic alliance

Introduction: Why this *Handbook*?

This *Handbook* was developed at the invitation of Oxford University Press (OUP), who requested that it expand on my chapter titled "Processes and Outcomes in Counseling and Psychotherapy" (Maltzman, 2012), published in *The Oxford Handbook of Counseling Psychology*. The 2012 chapter reviewed "hot topics" and enduring issues I have encountered over 20 years of direct practice and in oversight–consultative positions associated with public mental health services. Addressing these issues can promote the delivery of optimal mental health treatment.

Bridge The Continuing Science–Practice Schism

There continues to be a science–practice schism, not only between psychology research and psychology practice as a whole, but across sub-disciplines within psychology. This suboptimal cross-fertilization, or *siloing*, in which researchers restrict their literature searches and resources

to narrow parameters within their own areas of interest, may have the unintended consequence of limiting the internal validity and generalizability of the resultant research. This occurs because a restricted review of the relevant research will limit understanding of related factors and can compromise research methodology and data interpretation (Maltzman, 2012). In fact, this recognition of siloing within psychology resulted in a call for a new division, Implementation Science, within the American Psychological Association (Lewis et al., 2013) to combat this fragmentation.

Break Down Siloing Within Psychology and with Related Disciplines

In addition to siloing within psychology, siloing occurs among psychology and related disciplines such as social work, psychiatry, and neuroscience. Although there may be references to research in related disciplines, literature searches have tended to stay within one's own discipline rather than seeking out primary sources within the field of interest. This lack of cross-fertilization may have the unintended consequence of limiting the internal validity and generalizability of the resulting research. Ultimately, the suboptimal integration of research can have a negative impact on mental health practice. Additionally, each discipline has its own "culture" and language; without cross-threading and communication across disciplines, provision of optimal mental health services may be compromised (Coates, 2015; Linden, 2015). Identification of siloing as a barrier and the call to promote communication across disciplines has been recognized outside of psychology and the social sciences, as well (Pagliari, 2007).

Promote Quality Training and Supervision

Public mental health service agencies are a primary source for training mental health practitioners from multiple disciplines. This agency role creates an imperative to emphasize the quality of supervision and training to ensure optimal care for their clients, who are likely to have significant mental health needs. Siloing and suboptimal cross-threading among disciplines and subdisciplines ultimately may affect the quality of training and supervision of interns, and consequently the quality of service delivery to those clients.

Increase the Multidisciplinary Knowledge Base

Research and practice pertaining to human behavior requires integration of knowledge from a multidisciplinary perspective. In this chapter, *multidisciplinary* is defined as the collection and integration of information from multiple disciplines while remaining in one's own discipline; in contrast, *interdisciplinary* reflects the integration and synthesis of multiple sources of information into a "coordinated and coherent whole" (Choi & Pak, 2006). The lines have blurred within and across disciplines. It is becoming more difficult to find publications within psychology and the social sciences that do not reference research that originated in medicine (including psychiatry), epigenetics, epidemiology, and/or neuroscience (e.g., Hoagwood, 2003). The integration of research from these fields is critical for an accurate understanding of etiological factors salient to a particular client, as well as in identifying an effective treatment for a particular client.

Provide Stakeholders with Tools for Critical Evaluation of Research and Resources

Not all sources of information are equal regarding the quality of the cited research. Terms such as "trauma-informed" or "evidence-based" treatment (EBT) increase the confusion because they are misinterpreted as indicating that rigorous experimental evaluation has occurred (Lohr, Gist, Deacon, Devilly, & Varker, 2015), when often that is not the case. This use of "pseudoscientific" terms to promote a particular assessment or treatment approach is another factor contributing to the delivery of suboptimal mental health services (for a detailed discussion of these issues, see Lilienfeld, Lynn, & Lohr, 2015).

Thus, a core goal is identifying sources of research that stakeholders can have confidence in when trying to make sense of the plethora of available information and resources. The amount of information pertaining to psychological treatments available to researchers and practitioners in psychology and related fields can feel overwhelming. For example, Hilgard reported in 1978 that the American Psychological Association (APA) published 18 journals (Hilgard, 1978). As of 2015, that number was 29 (plus two secondary journals), a 61% increase. The Association for Psychological Science and the Psychonomic Society, two additional primary professional organizations in psychology, publish multiple journals. There are multidisciplinary scientific associations with publications of interest to psychology and related disciplines, such as the American Association for the Advancement of Science and the New York Academy of Sciences. Then there are associations in specialty areas and allied fields, such

as social work, neuroscience, neuroimagery, epidemiology, epigenetics, public health, and medicine, with journals that may publish papers related to mental health treatment.

For all of the above reasons, practitioners, clinics, government agencies, and oversight bodies struggle to identify information and resources that can assist them in determining:

 • What to spend money on for training practitioners and enhancing practice
 • What to measure for assessing treatment outcomes
 • How to assess the efficient delivery of quality mental health services

The above issues are complex. To attempt to address them all, in adequate depth, is not the intention of this *Handbook*. Rather, the reader is asked to view this *Handbook* as a primer or sampler of a necessarily multidisciplinary approach to research across these areas. Thus, the goal of this *Handbook* is to introduce the reader—graduate student, practitioner, clinic administrator, graduate faculty member, government agency—to the current status and latest research pertaining to issues described by experts in their respective fields. The multidisciplinary list of contributors is deliberate; the goal is to assist readers in breaking down silos while identifying sources of information in which they can have confidence. Each chapter provides entrée to associated literature to which the reader can return to access research in greater depth.

What This *Handbook* Does Not Cover

This *Handbook* focuses on issues pertinent to clients and families self-referring for treatment. It does not address issues related to forensic practice, which has additional standards, guidelines, and caveats pertaining to service delivery when clients are court-involved (e.g., *Guidelines for Psychological Evaluations in Child Protection Matters*; American Psychological Association [APA], 2013; *Specialty Guidelines for Forensic Psychology*; APA, 2013).

Nor does this *Handbook* focus primarily on serious mental illness in adults or serious emotional disturbance in children and youth. Rather, it focuses on topics and issues relevant to practitioners from a variety of disciplines and subdisciplines who work with clients across the life span and across the continuum of psychosocial functioning. A deliberate emphasis on prevention and early intervention and treatment with children and families reflects the burgeoning research in these areas.

Core *Handbook* Values

Consistent with historical and core values first explicated in counseling psychology (Altmaier & Ali, 2012), the mental health consumer movement (Campbell & Leaver, 2003; Davidson, Tondora, Lawless, O'Connell, & Rowe, 2009), and the federal call for improving mental health services (President's New Freedom Commission on Mental Health, 2003), this *Handbook* incorporates the following principles:

 • Recognition and respect for individual differences across the life span which includes:
 • Commitment to the provision of physical and mental health services that are multiculturally sensitive, responsive, and competent (e.g., American Psychological Association, 2002, 2012; Coleman et al., 2012; Diaz-Cuellar & Evans, 2014; Elbulok-Charcape, Rabin, Spadaccini, & Barr, 2014; Hope & Chappell, 2015; McFadden, 2015; Porter, 2014; Schouler-Ocak et al., 2015).
 • Awareness that psychosocial functioning—the client's ability to adaptively and successfully function across life roles—is important for understanding the client holistically. Enhancement of psychosocial functioning and the promotion of resilience are optimal treatment goals (Greenberg, 2006).
 • Assessment of client strengths which promotes an integrated, holistic approach to treatment and helps guard against the potential for negative bias on the part of the practitioner.
 • Inclusion of the client and family (as indicated) as active partners in treatment and goal-setting (e.g., Hoagwood, 2003).

A Multidisciplinary, Biopsychosocial Approach

The term *biopsychosocial model* is used in this *Handbook* to reflect the complicated, multilevel interactions among environmental, biological, social, and psychological factors that ultimately are manifested in individual differences in psychosocial functioning and responses to environmental stimuli (see chapters in this volume by Beeghly, Perry, & Tronick; Gartstein, Putnam, Aron, & Rothbart; Jenny & Dougall; Williams, Ginsberg, & Mandryk). Discussions of the biopsychosocial model as intended in this *Handbook* include Maltzman, 2012, and Novack et al., 2007. This definition should not be confused with the *biomedical model*, which is an organ-based disease model that views psychological, environmental, and social

factors as secondary (Lane, 2014). The biopsychosocial model also recognizes that understanding individuals in their social, community, and cultural contexts is a critical prerequisite for appropriate intervention and treatment (e.g., Luthar, Sawyer, & Brown, 2006; Maltzman, 2013; see chapters in this volume by Lochman et al. and Williams et al.). For these reasons, as readers will note, this *Handbook* focuses primarily on moderator and mediating variables that contribute to treatment outcomes at the individual level and thus must be considered when attempting to assess treatment effectiveness at the aggregate level.

Handbook Goals and Organization

This *Handbook* has four main goals:

• Describing mediating and moderator variables—intraindividual differences and ecological, biopsychosocial contexts—that may influence a client's concerns and response to treatment across the life span.
• Describing criteria for, and examples of, interventions and treatments across the life span that have sufficient research support to warrant dissemination.
• Describing variables associated with treatment outcomes that warrant assessment at the individual or aggregate level.
• Describing approaches, methods, and/or tools for assessing the above variables.

Some of these topics have substantial research histories and are described in detail in *Handbook* chapters, such as discussion regarding what constitutes evidence-based treatment (Jobe-Shields, Costello, Jackson, & Hanson); flexibility and adaptation of evidence-supported treatments (Sanetti, Collier-Meek, & Fallon); and how to assess appropriate length of treatment and response to treatment (Nielsen, Bailey, Nielsen, & Pedersen).

Client, therapist, and factors influencing the therapeutic alliance with children and youth are described by Fjermestad, McLeod, Tully, and Liber; factors associated with adult clients are discussed by Kimpara, Brunet, Alsante, and Beutler. Boswell, Constantino, and Anderson's chapter describes client characteristics that are potential obstacles to treatment; Marmarosh and Wallace discuss attachment as a moderator variable in counseling and psychotherapy with adults.

More recent research topics described in detail in this *Handbook* include enhancement of child and youth functioning and resilience by using parent interventions (see chapter by Gewirtz & Gliske); prevention strategies as treatment for enhancing resilience in children (see chapter by Kumpfer & Magalhães); and leveraging community resources to provide needed services to children and adolescents (Lochman et al., this volume). Hansen reviews the status of theories and interventions for career counseling with diverse client populations as an illustration of the promotion of psychosocial functioning across life domains and adult developmental stages.

Other topics are relatively new in terms of research attention in psychology. Chapters on these topics provide the reader with an introduction and overview of these fields: Aschieri, Fantini, and Smith provide a detailed discussion and guide to collaborative therapeutic assessment with children and their families, adolescents, adults, and couples. Baum provides two chapters on self-care, a topic of increasing contemporary salience to mental health practitioners. The first of those chapters discusses theory and principles regarding therapist self-care, and the second describes issues affecting therapists who experience the direct impact of an adverse event while providing professional mental health services.

Three topics with research bases outside of psychology covered in this *Handbook* include the description and potential leverage of the placebo effect in psychological research and treatment (see chapter by Amanzio & Palermo); the complicated interactions among medication and nonpharmacological treatments (see chapter by Karpova); and the current state of research regarding neuroimaging techniques and caveats regarding application to practice at the case level (see chapter by Nugent & Furey). Data from neuroimaging studies have been of particular interest to mental health practitioners and researchers alike because they appear to reflect "hard" data associated with "real" science, as opposed to "soft" data typically collected within psychology and the social sciences (i.e., latent constructs assessed via observational and self-report data; Meehl, 1978). However appealing they may be, these newer technologies have methodological issues of their own, requiring caveats for practitioners and researchers attempting to use these data for theory building (i.e., developing the nomological net; Meehl) and for determining whether these technologies can be used for assessment and treatment purposes at the individual case level (see Nugent & Furey, this volume).

Finally, all stakeholders in the treatment process—practitioners, clinics, oversight and regulatory bodies, and most importantly, clients—want

to know whether a particular treatment provided for a particular client with particular concerns is likely to be effective. Ultimate questions include what to measure, when to measure, and how to measure critical components for assessing progress during treatment, as well as the outcomes of treatment. The chapter by Holmqvist discusses issues pertaining to differences in measurement associated with the different perspectives of client and therapist. Of interest to agencies and oversight bodies, Laska and Nordberg discuss variability across therapist quality, the impact of therapist variability on treatment outcome, and how to assess this impact; and Kivlighan and Kivlighan provide a careful comparison of treatment modalities (individual, couple, family, and group).

Thus, the intention of this *Handbook* is to model a multidisciplinary look at important contemporary issues in psychological treatment processes and outcomes across the life span. It is hoped that researchers, practitioners, local agencies, and oversight bodies gain an initial understanding of these important issues and clear guidance on where, and how, to obtain further knowledge and direction regarding these vital topics.

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Biopsychosocial Influences

Temperament and Personality

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Abstract

This chapter provides an overview of theory and research addressing temperament and personality, particularly as these are relevant to clinical applications. Our review begins with a brief history of influential frameworks and foundational constructs, including aspects they share in common and others engendering disagreement. Measurement approaches, development of temperament/personality, the biological underpinnings, and studies addressing cross-cultural and gender differences, are also noted in this review. The chapter concludes with problems in adaptation associated with temperament, focusing on ameliorating those difficulties through clinical applications of temperament and personality constructs with children and adults. Importantly, a developmental, empirically focused perspective informed this chapter, and as a result, this work includes references to developmental periods from early childhood to adulthood, emphasizing approaches that have received empirical support.

Key Words: temperament, personality, clinical applications, developmental, cross-cultural, gender differences

Introduction

The concept of temperament has grown in prominence with the recognition of its importance for multiple processes and outcomes throughout the life span, incorporating many areas of functioning (e.g., relationships, social-emotional adjustment, physical health). This recognition, in turn, is in large part a reflection of theoretical and empirical research efforts providing consistent evidence of the important roles played throughout life by temperament attributes (Zentner & Shiner, 2012). Although multiple definitions of temperament have been proposed, these share a common foundation of outlining a set of early-appearing and biologically influenced individual differences that form a core of the emerging personality and enhance understanding of both social-emotional development and adult functioning.

Although temperament influences the development of personality (Rothbart, 2011), and temperament constructs overlap both conceptually and empirically with constructs of personality (De Pauw, Mervielde, & Van Leeuwen, 2009; Evans & Rothbart, 2007; Mervielde & De Pauw, 2012), these domains can be conceptually differentiated. Specifically, personality is a more inclusive, broader construct (encompassing attitudes and self-concept, among other attributes and characteristics), whereas temperament represents a subset of biologically based personality dimensions that can be measured in the first few years of life, with some traits apparent at birth—and some would argue prenatally—as well as being observed in non-human species (DiPietro, Hodgson, Costigan, & Johnson, 1996; Panksepp & Burgdorf, 2003; Snidman, Kagan, Riordan, & Shannon, 1995).

In this chapter we provide a brief account of how the understanding of temperament has developed historically, including descriptions of influential frameworks and foundational constructs. We then describe measurement approaches related to construct validity

and reliability, before focusing on the development of temperament/personality, its biological underpinnings, and studies addressing cross-cultural and gender differences. Finally, this chapter describes problems in adaptation associated with temperament and ways to address these difficulties through clinical applications of temperament and personality constructs with children and adults. These applications vary considerably at different developmental stages, reflecting the different tasks or milestones individuals are expected to achieve at specific times.

Brief History of Temperament and Conceptual Definitions

The study of temperament traits has a long history, with only relatively recent attention devoted to the development of these attributes. Earlier and more contemporary models of temperament have framed it in different ways, some in terms of types, others using continuous dimensions to capture the nature of these individual differences. Various temperament models, theories, and systems attempt to build on earlier ones, offering some improvements, and the resulting frameworks are not mutually exclusive. Rather, these successive systems function like lenses through which a researcher or a clinician could view an individual, choosing the lens that appears to be most appropriate given individual and contextual considerations.

Individual differences in temperament were initially described in the fourfold typology of the Greco-Roman physician, Vindician, which persisted throughout the Middle Ages and the Renaissance. That framework described different types of temperament as being linked with various fluids within the body: Melancholic-sadness (black bile), Choleric-anger (yellow bile), Sanguine-positive affect (blood), and Phlegmatic-slow to warm-up (phlegm). All individuals were viewed as demonstrating a propensity for one of these four temperament types, and all differed in the strength and balance of the four components of temperament.

In the early twentieth century, major schools in Europe contributed to temperament research. In the United Kingdom, studies of individual differences in temperament and personality were carried out using adults' self-reports, which yielded several factors, or broad dimensions, including introversion-extraversion (a more reserved style, marked preference for solitary activities on one end of the continuum, and energetic and outgoing behavior on the other end), and emotional stability-instability, later labeled "neuroticism," wherein individuals low on

neuroticism are emotionally stable, in part as a result of being less reactive to stress (Eysenck, 1947). Jeffrey Gray revised this model, proposing individual differences in behavioral activation (produced in response to opportunities for reward) and inhibition (resulting from punishment-related cues), as well as in tendencies to exhibit fight/flight, a physiological reaction in response to a perceived threat to survival. Arguably, in making this revision Gray was influenced by the Russian school of temperament research, led by Ivan Pavlov. Pavlov was strongly interested in the individual differences he observed among animals used in his studies of learning, and proposed the existence of excitatory and inhibitory brain processes to account for his observations, also referring to his dogs in temperament terms such as "quick to anger" and "hard to frighten" (Gray, 1980, p. 106). Referring to Pavlov's model, Jan Strelau (1983) wrote that temperament results from a biological evolution peculiar to both humans and animals. The usefulness of considering connections across species in the origins of individual differences is evident in a recent collection of papers on the emergence of personality in animals (Trillmich & Hudson, 2011). Additionally, evidence of analogous traits in primates and other social animals has been suggested as a criterion for temperament (Buss & Plomin, 1984; Zentner & Bates, 2008). Personality research with adults has focused in large part on the five factors model, often referred to as the Big Five: Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (Digman, 1990; Goldberg, 1993).

Perhaps the single most influential investigation of children's temperament, the New York Longitudinal Study (NYLS), was initiated in the 1950s by Alexander Thomas and Stella Chess (e.g., 1977; Thomas, Chess, Birch, Hertzig, & Korn, 1963). Thomas and Chess referred to temperament as the "how" of behavior, describing the style or manner with which a particular action is performed more so than "what" behaviors were demonstrated, and identified nine dimensions of temperament:

1. Activity: The level, tempo, and frequency of motor activity.
2. Approach/withdrawal: The child's first response, positive or negative, to unfamiliar persons, objects, situations.
3. Threshold: The intensity of stimulation required for a child to respond.
4. Mood: The amount of pleasant, joyful, friendly behavior, as contrasted with unpleasant, crying, unfriendly behavior.

5. Intensity: The energy level of the child's reaction, irrespective of the type of stimulation or reaction.

6. Rhythmicity: The regularity and predictability of sleep, hunger/feeding, and elimination.

7. Adaptability: The ease of modifying the response to new or altered situations in a manner desired by the caregiver.

8. Distractibility: The interference with or changes in direction of the child's behavior with respect to external stimuli.

9. Attention span/persistence: The duration of the child's activities and their continuation, even when the child becomes frustrated.

These researchers also described "difficult temperament" as including low rhythmicity, high withdrawal, slow adaptation, high frequency of negative mood, and intense reactions. The "easy temperament" category, on the other hand, was described as including regular eating, sleeping, elimination cycles, a positive approach response to new situations, along with frustration tolerance; whereas "slow-to-warm-up children" were characterized as showing negative responses when exposed to new situations, but were able to slowly accept these situations with repeated exposure. Thomas and Chess also introduced the concept of "goodness-of-fit" to characterize the degree of match between the child's characteristics and the parent's demands or expectations. The basic thesis is that a good match between a child's temperament and his or her environment (parenting in particular) leads to more positive adjustment, whereas a poor fit between child characteristics and the demands of his or her surroundings leads to problematic outcomes. These ideas paved the way for a variety of theoretical models and empirical investigations addressing early-appearing individual differences.

Buss and Plomin (1975; 1984) applied five criteria as defining properties of temperamental traits: (a) existence of the trait in animals, (b) adaptive function, (c) heritability, (d) early appearance and stability, and (e) little change evidenced over time. These restrictive criteria discount a number of traits that change substantially in form throughout development, and Buss and Plomin contended that only emotionality, activity, and sociability qualified as the three key dimensions of temperament. While heritability plays a key role in their conceptualization of temperament, Buss and Plomin noted that environmental forces could act on the individual to promote change.

Goldsmith and Campos (1982) proposed an alternative definition, arguing that the basic emotions (i.e., anger, fear, sadness, joy, disgust, interest, and surprise) represent the core of temperament. They described individual differences in temperament as the likelihood of experiencing and expressing the primary emotions, and the frequency and intensity of emotional reactions. Goldsmith and Campos noted the importance of both the expressive and receptive aspects of individual differences in social interactions; that is, in children's ability to express emotions and to recognize, decode, and understand the emotional expressions of others.

Rothbart and Derryberry (1979, 1981) proposed a psychobiological model of temperament. These investigators defined temperament as constitutionally based individual differences in emotional, motor, and attentional reactivity, and in self-regulation, demonstrating consistency across situations and relative stability over time. The term "constitutional" emphasizes the connection between temperament and biology. Over the long history of study, individual differences in temperament have been linked to the constitution of the organism as it was understood at the time, and this term now applies to underlying neurobehavioral systems, as well as genetic influences. *Reactivity* refers to the latency, rise time, intensity, and duration of response to stimulation. Emotional reactivity is important, and applies to fear, anger, sadness, and positive emotions. *Self-regulation* refers to processes serving to modulate reactivity; these include behavioral approach, withdrawal, inhibition, and executive attention. This definition of temperament has appealed to researchers in part because it can be applied to temperament observed across the life span. In essence, the psychobiological approach represents an attempt to identify unique domains of temperament (a number of which correspond to attributes noted in other temperament frameworks), mapping these onto underlying neurobehavioral systems, and outlining their developmental pathways and interactions.

The psychobiological approach represents a systematic integration of existing temperament and personality models, as well as other relevant areas of scientific inquiry, including neuroscience (Rothbart, 2011). This integration includes dimensions proposed by Thomas and Chess that have been supported by empirical research (Rothbart, 2012). The questionnaires that Rothbart and colleagues have developed within the psychobiological tradition to assess temperament in infants, toddlers, older children, adolescents, and adults each contain scales assessing multiple (between 14 and 20) discrete dimensions. For example, the Children's Behavior

Questionnaire (Rothbart, Ahadi, Hershey, & Fisher, 2001) includes scales for Positive Anticipation, Smiling/Laughter, High Intensity Pleasure, Activity Level, Impulsivity, Shyness, Discomfort, Fear, Anger/Frustration, Sadness, Soothability, Inhibitory Control, Attentional Focusing, Low Intensity Pleasure, and Perceptual Sensitivity. This fine-grained approach to measurement has allowed for a structural operationalization of temperament. Despite differences in the specific components that have been measured at different ages, the higher order temperament constructs extracted from parent- and self-report measures across different developmental periods have been quite similar (Gartstein & Rothbart, 2003; Putnam, Ellis, & Rothbart, 2001; Putnam, Gartstein, & Rothbart, 2006; Rothbart et al., 2001). The first of these factors, *Negative Emotionality*, involves tendencies to experience and display fear, anger, sadness, and physical discomfort; it is reminiscent of neuroticism factors that have emerged in analyses of adult personality structure (e.g., Digman, 1990). The second factor, *Surgency*, is manifested in large part through smiling, laughing, activity, appreciation of high-intensity stimulation, and approaching novel stimuli (Gartstein & Rothbart, 2003; Rothbart, 1989). The surgency factor label is frequently used interchangeably with the terms "positive emotionality" and "extraversion," including characteristics of enthusiasm, activity, approach tendencies, and sociability (e.g., Rothbart & Ahadi, 1994). The third factor reflecting Regulatory Capacity and Effortful Control is composed of dimensions involving attention-related abilities (e.g., maintaining attentional focus) and enjoyment of calm activities (e.g., being read or sung to). In analysis of adult self-reports, which allow for the assessment of subjective experience, a fourth dimension titled *Orienting Sensitivity* has emerged. It measures tendencies to detect subtle aspects of one's environment and body, as well as to experience spontaneous cognitive content (Evans & Rothbart, 2007). This factor is highly correlated with the personality factor of Openness.

In contrast to the work of researchers exploring multiple dimensions, much of Jerome Kagan's work focused on the unitary construct of *behavioral inhibition*, generally defined as "hesitancy to approach new/unfamiliar objects or situations" (Kagan, 1998). Inhibited children can be described as shy, cautious, fearful, and motorically tense, whereas uninhibited children tend to be social and outgoing (extraverted) in novel situations, and do not show as much motor restraint as inhibited children. Kagan and colleagues viewed this classification system as reflecting underlying biological differences, and they reported a number of physiological differences between inhibited and uninhibited youngsters in the first 5 years of life (e.g., Kagan & Fox, 2006; Kagan, Reznick, & Snidman, 1987). These differences include higher and more stable heart rates, elevated muscle tension, and higher levels of cortisol for inhibited children. The behavioral inhibition construct is most clearly analogous to the fear and shyness dimensions included in more comprehensive models. Elaborations on Kagan's research (e.g., Fox, Henderson, Rubin, Calkins, & Schmidt, 2001; Putnam & Stifter, 2005), however, suggested that the uninhibited group is not only characterized by relative fearlessness but also by the motivation to experience intense and novel experiences, suggesting that two temperament dimensions are involved. Consistent with the proposal that behavioral inhibition is influenced by two systems, one governing approach and one governing withdrawal, scales assessing shyness are typically associated with both the Surgency and Negative Affectivity factors of temperament.

Elaine Aron and Arthur Aron (1997) also focused on a single trait, which they labeled Sensory Processing Sensitivity (SPS). This construct is understood as a genetically based disposition that involves a deeper (Craik & Lockhart, 1972) or more elaborate (Mesulam, 1998) cognitive processing of stimuli that may be driven by high emotional reactivity. Investigation of this trait grew from exploratory research on what is meant when clinicians and the general public use the term "sensitive" to describe individuals (E. Aron & Aron, 1997, Study 1): Persons responding to advertisements seeking those who were introverted or "easily overwhelmed by stimuli" were interviewed. The responses from this interview were used as a foundational basis for the creation of the Highly Sensitive Person (HSP) Scale, which was refined over a series of six studies (E. Aron & Aron, 1997, Studies 2–7) with diverse samples into a 27-item scale with strong convergent and discriminant validity and internal consistency.

The original and multiple subsequent studies (see E. Aron, Aron, & Jagiellowicz, 2012) suggest that the SPS construct is unidimensional. However, some investigations of the HSP Scale suggest that the SPS construct may have two, three, or four facets, or even independent dimensions (Evans & Rothbart, 2008; Smolewska, McCabe, & Woody, 2006). For example, Evans and Rothbart, based on a combination of factor analytic techniques and theoretical considerations, describe the HSP Scale as assessing two relatively distinct characteristics.

One characteristic is a tendency to be acutely aware of subtleties in the environment and open to emotional experience; this corresponds closely to the basic SPS theoretical model and is highly correlated with the Orienting Sensitivity temperament factor identified in adults (Evans & Rothbart, 2008). The second characteristic is closely related to the Negative Affectivity factor identified by Rothbart and colleagues, and reflects the tendency to become emotionally overwhelmed by high levels of stimulation. E. Aron et al. (2012), however, argue that many of the HSP Scale items are based on annoyance with unpleasant stimuli that high-scoring individuals are especially likely to notice, and that these items may be responsible for the significant correlation with negative affectivity. At the same time, some individuals who score high on the HSP Scale may be acquiescing to the negative affectivity items representing the high end of the negative emotionality dimension, rather than sensitivity, per se. As a result of this debate, more recent research using the HSP controls for trait negative affectivity. It should also be noted that factor analytic approaches used to date may be problematic in light of recent findings that the SPS trait may be a dichotomous taxon (that is, a two-group-categorical variable, not a continuous variable) with a substantially non-equal distribution, with approximately 20% having the trait (E. Aron et al., 2012). Thus, the actual factor structure of the HSP Scale, whether unifactorial or multifactorial—and if, multifactorial, in what ways and owing to what sources—awaits future research.

The argument for the evolutionary basis of SPS (e.g., Wolf, Van Doorn, & Weissing, 2008) has received empirical support from a recent large-sample study in Germany (Borries, 2012), and from a study conducted some years ago on a related trait described by Kagan as "inhibited." In Kagan's research, 4-month-old infants who reacted with intense negative affect when exposed to such stimuli as a moving mobile or the smell of a cotton swab dipped in dilute butyl alcohol were highly likely to be classified as inhibited during later childhood (Kagan & Snidman, 1991), implicating sensory processing sensitivity in the etiology of behavioral inhibition. Using formal taxometric methods, Woodward, Lenzenweger, Kagan, Snidman, and Arcus (2000) found that the trait of sensitivity distributed as a minority-majority; in other words, an approximately dichotomous category variable with the minority (in this study about 10%) having the

trait. The biological underpinnings of sensitivity to context are also evident in animal science/comparative research, as this trait has been identified in over 100 other species (Wolf et al., 2008). There are likely advantages for a minority to have a strategy of "pausing to check" while processing subtle aspects of a situation for both threats and opportunities (McNaughton & Gray, 2000). The observed manifestation of sensitivity in a minority of the population is understood as a function of being "negative frequency dependent" (Wolf et al., 2008), in that if the majority of a species were equally responsive, there would not be an advantage to the trait. Because sensitivity also has physiological costs, and in some situations attending to subtleties in one's environment does not provide useful information, much of the time the majority are not affected by their lack of sensitivity.

Measurement

Multiple measurement approaches have been involved in the assessment of temperament. Some measurement tools have been used primarily in research, and others also have been employed in more applied situations (e.g., psychotherapy). Whereas laboratory observation techniques have been used largely in research efforts, parent/self-report and interview-based methodologies have been used more in both research and applied settings, largely due to practical considerations (e.g., ease of administration, low cost).

Observational measures of newborns and young infants include assessments of reactivity to multiple modes of stimulation, whereas observations of older infants, toddlers, and preschoolers also permit evaluation of attention-based regulatory capacities (Posner & Rothbart, 2007; Rothbart, Sheese, Rueda, & Posner, 2011). Observations of young children are frequently carried out in the laboratory, following a structured set of procedures; however, observations can also be conducted in the child's home or the hospital. For example, the Neonatal Behavioral Assessment Scale (NBAS; Brazelton, 1973) can be administered shortly after birth, and it is often employed in the hospital setting. Temperament dimensions identified in the neonatal period include distress proneness or irritability, soothability, alertness, and activity level; for a review of this topic, see Rothbart (2011). The NBAS has been used in a variety of settings, including clinical applications. For example, van den Boom (1995) used the NBAS irritability scale to screen newborns for an intervention study in which parents of more

irritable infants were instructed to interact with their babies in a more sensitive/responsive manner in order to prevent insecure attachment.

For older infants and children, the Laboratory Temperament Assessment Battery (Lab-TAB; Goldsmith & Rothbart, 1996) has been frequently used to provide observation-based indicators for multiple attributes (Anzman-Frasca, Stifter, Paul, & Birch, 2013; Degnan et al., 2011; Perry, Mackler, Calkins, & Keane, 2014). In assessing infants, this battery yields measures of activity, fear, anger proneness, interest/persistence, and joy/pleasure starting at 6 months of age. Scores are derived across multiple structured episodes; for example, a series of masks are displayed for the infant in 10-second presentations in order to elicit fearful reactions. Lab-TAB tasks produce indicators that can be coded in a standardized and reliable manner, enabling comparisons of studies carried out in different research programs. Predictive validity of Lab-TAB has also been demonstrated. In one study, children who demonstrated increasingly intense fear reactions over infancy in response to a set of unusual masks were shown to demonstrate more pronounced anxiety symptoms in the toddler period than infants whose fearfulness did not increase dramatically (Gartstein et al., 2010).

A number of laboratory tasks addressing elements of effortful control, based in the fundamental quality of suppressing a dominant response to perform a subdominant response, have been designed for preschool children by Grazyna Kochanska (e.g., Kochanska, Murray, & Harlan, 2000). Some of these episodes address the child's ability to delay gratification. For example, in "Snack Delay," children wait, with their hands placed on a mat in front of them, for an experimenter to ring a bell before they retrieve a candy treat. Codes include scores for keeping hands on the mat and off the candy. Effortful attention also can be evaluated via this battery by administering the "Shapes," a modified Stroop task requiring the child to forego responding to a dominant perceptual stimulus (a large object) and instead respond to a subdominant stimulus (a small object embedded within the larger item). Coding reflects the child's pointing to the correct (small) or incorrect (large) object. Kochanska et al. (2000) administered a battery of tasks similar to these to children at 22 and 33 months of age, and they reported substantial consistency in individual differences in child behavior (e.g., average correlations between tasks equaled .27 at 22 months and .42 at 33 months).

The procedures used by Kagan to assess behavioral inhibition reflect changes in the ways that the construct is displayed at different ages. For example, at 21 months of age, children were exposed to a variety of events designed to be relatively unfamiliar, such as interaction with a novel adult or a robot with flashing lights, with inhibition indexed by the presence of fretting and withdrawal (Garcia Coll, Kagan, & Reznick, 1984). At age 5½, children were administered a number of challenging cognitive tasks (e.g., recalling a series of words); asked to engage in "risky" activities such as falling backwards onto a mattress; given the opportunity to play a game in ways that would either ensure victory or involve the possibility of failure; and observed during interactions with familiar and unfamiliar peers. Hesitance to engage and delay in the decision to take chances were used as markers of inhibition (Reznick et al., 1986). At age 7½, inhibition during interaction with an adult experimenter was assessed through more subtle signs, such as the number of spontaneous comments or frequency of hand explorations of the face (Kagan, Reznick, Snidman, Gibbons, & Johnson, 1988). During adolescence, the subjects were interviewed regarding their fears, including their experiences of feeling uncomfortable around new people (Schwartz, Snidman, & Kagan, 1999). Despite the substantial differences in the situations and behaviors employed at these different ages, substantial stability was demonstrated across time: For instance, whereas 61% of those who had been inhibited as toddlers reported high social anxiety as adolescents, only 27% of uninhibited toddlers indicated social anxiety as teens (Schwartz et al., 1999).

Several parent-report instruments are available for temperament assessment. These questionnaires vary depending on the targeted developmental period (i.e., infancy, toddler/preschool, school-age, adolescence, or adulthood), the underlying temperament theory (i.e., Buss & Plomin framework, Thomas & Chess, or Rothbart's psychobiological model), and on the reported psychometric properties. Concerns have been raised regarding bias or inaccuracies in parent-report questionnaires (Kagan, 1998), largely because of the caregivers' presumed inability to maintain an objective stance regarding their offspring. Minimizing the impact of potential bias on ratings of temperament is an important goal. In our own work (e.g., Gartstein & Rothbart, 2003), we have attempted to do so by asking parents questions about specific behaviors demonstrated in concrete situations within

a limited time span, rather than asking for more global or comparative ratings.

Concerns regarding bias must also be balanced by a consideration of strengths of parent reports. For example, parents are in a unique position to provide information regarding their infants' temperament, given that others do not have the necessary access to the babies to provide such descriptions. Furthermore, ethical and practical constraints on laboratory observations may not capture the full repertoire of the child's reactivity and regulation (Rothbart & Gartstein, 2008). More successful parent-report instruments have demonstrated satisfactory psychometric properties and have been linked with important outcomes, such as observation-based and physiological indicators, parent–child interaction factors, attachment security, and symptoms/behavior problems; for a review, see Gartstein, Bridgett, and Low (2012). This wide support of the validity of parent-report instruments has led researchers and clinicians to rely on these tools to the extent that parent-report surveys constitute the most frequently used assessment method (Rothbart & Bates, 2006).

In addition to parent-report measures, self-report questionnaires can be used with adolescents as young as 11 years of age (Ellis & Rothbart, 2001). Self-report is the most frequently used method for gathering temperament and personality-related information about adults, and a number of instruments are available from multiple temperament perspectives. For example, the NYLS Early Adult Questionnaire (Thomas, Mittelman, Chess, Korn, & Cohen, 1982) is a self-report instrument that represents the nine NYLS temperament categories. Thomas et al. (1982) reported adequate estimates of reliability (internal consistency) and validity for this measure, with the latter derived on the basis of correlations between each scale and ratings made by interviewers on the nine temperament dimensions. The Adult Temperament Questionnaire (ATQ; Evans & Rothbart, 2007), originating in the psychobiological model of Rothbart and Derryberry (1981), represents one of the more recent additions to adult temperament measures. The reliability of individual scales has been demonstrated, and associations between the Big Five personality scales mentioned earlier in this chapter, and the factor scores of the ATQ have been reported. These data provide a connection between the literatures on childhood temperament and adult personality, as they link Negative Affectivity to Neuroticism, Surgency/

Positive Affectivity to Extraversion, Effortful Control to Conscientiousness, and Orienting Sensitivity to Openness, and connections between Surgency/Positive Affectivity, Regulatory Capacity/ Effortful Control and Agreeableness were made in our own work (Putnam & Gartstein, 2014).

Various Big Five questionnaires are available for use with children and adults. Among these, the Neuroticism-Extroversion-Openness Personality Inventory- Revised (NEO-PI-R; Costa & McCrae, 1992) often has been a measure of choice in research with adults, including cross-cultural studies. This instrument represents an updated and extended version of the original Neuroticism-Extroversion-Openness Inventory (NEO-I; Costa & McCrae, 1976), which only addressed these three personality factors. The NEO-PI-R includes a number of facets, or subscales, that are combined to provide the five factor-level scores. For example, Neuroticism is composed of Anxiety, Hostility, Depression, Self-consciousness, Impulsiveness, and Vulnerability to Stress. This instrument has a variety of applications, including organizational uses; in one case, politicians' personality ratings were linked with a number of performance domains (e.g., neuroticism and conscientiousness contributed to resilience and analytical skills; Silvester, Wyatt, & Randall, 2014). Childhood-oriented instruments are also available to measure the five personality factors. For example, school-age children and adolescents can be administered the Big Five Questionnaire–Children (Barbaranelli, Caprara, Rabasca, & Pastorelli, 2003). This instrument also has been employed in a variety of research contexts. For example, contributions of personality traits to academic performance have been examined, with higher conscientiousness predicting higher self-efficacy beliefs, more positive performance expectations, and more demanding goals; greater openness also was linked with higher self-efficacy beliefs (Cupani & Pautassi, 2013).

Development of Temperament

Although temperament has been operationalized in different ways (for reviews, see Rothbart, 2011; Shiner et al., 2012), it is typically defined in terms of relative stability (Buss, 1989; Plomin, Loehlin, & DeFries, 1985; Rothbart, 2011; Rothbart & Bates, 2006; Strelau, 1989; Thomas et al., 1963; Wachs & Kohnstamm, 2001). Despite rapid overall infant development in the first years of life (Bornstein, Arterberry, & Lamb, 2014), stabilities have been widely and consistently reported for infant temperament (Bornstein, Gaughran, & Seguí,

1991; Carey & McDevitt, 1978; Crockenberg & Acredolo, 1983; Dittrichova, Brichacek, Paul, & Tantermannova, 1982; Field, Vega-Lahr, Scafidi, & Goldstein, 1987; McDevitt & Carey, 1978; Peters-Martin & Wachs, 1984; Plomin et al., 1985; Plomin et al., 1993; Sostek & Anders, 1977). For example, Rothbart (1986) examined infant temperament at 3, 6, and 9 months of age and reported stability of positive reactivity across both 3- and 6-month intervals and stability of negative and overall reactivity across 3-month intervals. Worobey and Blajda (1989) reported that several dimensions of temperament exhibited stability from 2 weeks to 2 months and from 2 months to 12 months, and Carranza Carnicero, Pérez-López, González Salinas, and Martínez-Fuentes (2000) showed that temperament was generally stable across the first year of life. Negative affectivity assessed in infancy predicted distress in the preschool period (Putnam, Rothbart, & Gartstein, 2008), and stability in negative emotionality constructs by the toddler years has been reported (e.g., Lemery, Goldsmith, Klinnert, & Mrazek, 1999).

Nonetheless, temperament tends to be less stable early in life, presumably because the period of infancy to preschool age is a time of major changes in the regulative aspects of temperament, including a shift from an orienting based regulatory system to systems of effortful control (Posner, Rothbart, Sheese, & Voelker, 2012). The emergence of effortful control coincides with rapid development of the brain's executive attention system, influenced by the lateral prefrontal cortex (PFC) and anterior cingulate cortex (ACC) regions of the brain (Rothbart, Derryberry, & Posner, 1994; Rueda, 2012). As these control systems come online, they change the expression and the stability of temperament (Shiner et al., 2012); as a result, temperament may not stabilize until the preschool years (Roberts & DelVecchio, 2000). Whereas infancy is marked in large part by the dominance of neurobehavioral systems responsible for the reactive and emotive domains of temperament, effortful control, defined as the flexible attention-based control system, develops later in childhood (at about 2–7 years of age), and continues to mature into early adulthood (Jacques & Marcovitch, 2010; Posner & Rothbart, 2007). This protracted developmental trajectory is understood to be a function of the maturation of the brain circuitry responsible for executive functions, and it is expected to change connections between other temperament attributes and adjustment as executive attention "comes online."

Importantly, temperament is understood to be open to environmental influences, so that consistent or differing experiences of children can contribute to the stability or instability of temperament. For example, temperament in infancy appears to be shaped in part by the actions of others (see Bates, Schermerhorn, & Petersen, 2012, for a thorough review) that are likely culturally dependent (Paulussen-Hoogeboom, Stams, Hermanns, & Peetsma, 2007; Raval, Martini, & Raval, 2007). Additionally, genes can play a role in the instability, as well as stability, of temperament (Saudino & Wang, 2012).

The majority of studies concerning differential continuity of temperament and personality addressed homotypic continuity, i.e., continuity of similar behaviors over time. Whereas homotypic continuity is most likely to be evident after puberty, Kagan (1969) has argued that due to rapid developmental changes in the early years of life, a great deal of continuity during childhood will be heterotypic, wherein an underlying developmental process is constant over time, yet its manifestations vary with development. According to Kagan, behavioral inhibition and related phenomena are shown in different ways over the course of development. For example, Kagan, Snidman, and Arcus (1998) found that 4-month-old infants who reacted to novel stimuli with high amounts of negative affect and activity were likely to avoid interaction with peers at 4 years of age; and Putnam, Rothbart, and Gartstein (2008) found that toddler effortful control was predicted by both surgency and orienting/regulatory capacity measured during infancy.

Not surprisingly, later in childhood and adulthood, stability has been demonstrated over longer time intervals. For example, Shiner, Masten, and Tellegen (2002) demonstrated continuity from 8–12 years to 20 years of age between earlier surgency and later positive emotionality, and anger/hostility at 7 years of age predicted adult measures of this attribute (Kubzansky, Martin, & Buka, 2004). Beyond childhood, stability tends to increase, peaking after 50 years of age (Roberts & DelVecchio, 2000). Of course, some changes in temperament and personality occur even in adulthood, and it is of interest that Caspi and Shiner (2006), in their review of this literature, found that individuals whose personalities changed little from adolescence to adulthood were "more intellectually, emotionally, and socially successful as adolescents" (p. 337). This may reflect "win, stay; lose, shift" strategies.

Biological Correlates of Temperament

A number of studies categorized as either quantitative or molecular genetics have provided strong support for genetic contributions to temperament. *Quantitative* genetic studies provide information about the relative contributions of environmental and genetic influences. *Molecular* genetics studies identify specific genes associated with various attributes. In quantitative studies, heritability estimates—i.e., effect sizes for the proportion of phenotypic variance attributable to genetic influences—are estimated by comparing the similarity of monozygotic twins to dizygotic twins or adoptive siblings to biological siblings. These studies suggest that 20% to 60% of variability in temperament can be explained by genetic factors (Saudino & Wang, 2012). This genetic influence has been demonstrated for reactive traits (e.g., activity level, sociability/positive affect), as well as for regulatory tendencies (e.g., inhibitory control, attentional focusing) across different age groups. In infancy, distress to limitations, fear, and activity dimensions of temperament were explained in large part by additive genetic effects, suggesting a lack of meaningful shared environmental influences (Goldsmith, Lemery, Buss, & Campos, 1999). Lemery-Chalfant, Doelger, and Goldsmith (2008) analyzed data from a sample of twins in middle childhood. These investigators reported heritability ranging from 68% to 79% for parental reports of effortful control, and a heritability estimate of 83% for observer ratings of attentional control, with a lack of shared environment contributing to either measure. In adolescence and adulthood, research using the Tridimensional Personality Questionnaire (Cloninger, Svrakic, & Przybeck, 1993) has shown strong genetic contributions to dimensions of harm avoidance, sensation seeking, and reward dependence (e.g., Heiman, Stallings, Hofer, & Hewitt, 2003; Heiman, Stallings, Young, & Hewitt, 2004).

Molecular genetics research, and the allelic association strategy in particular, have led to identification of multiple polymorphisms linked with temperament variability: A given allele is considered to be associated with a particular temperament characteristic if "it occurs at a different frequency across different levels of a trait, or in groups of individuals who score high versus low" (Saudino & Wang, 2012, p. 311). Genes associated with the neurotransmitters dopamine and serotonin, implicated in reward/approach situations and regulations of mood, respectively, have been examined most widely in this context. Alleles of the dopamine receptor gene (DRD4) and the serotonin transporter gene (5-HTT) have been shown to exhibit the most consistent and strongest links with a large array of temperament tendencies, including activity level, impulsivity, negative emotionality, shyness, attention, effortful control, harm avoidance, reward dependence, and sensory processing sensitivity (Chen et al., 2011; Licht, Mortensen, & Knudsen, 2011; see Saudino & Wang, 2012 and Depue & Fu, 2012 for reviews). Tempering enthusiasm for this approach, there have been a large number of failures to replicate findings, as well as frequent inconsistencies in the direction of effects obtained in this research. Saudino and Wang (2012) suggest that this may be due to the relatively small effect sizes associated with genetic polymorphisms, as well as differences between studies in sample characteristics and methodology. These authors advocate for studies with large and varied samples and with more precise attention to conceptual and operational definitions to build a more thorough understanding of how individual genes are associated with temperament traits. In contrast, Chen et al. (2011) argued that the small effect sizes are due primarily to psychometric weaknesses of the personality and temperament constructs.

A number of recent studies (e.g., Taylor et al., 2006; for a review see Homberg & Lesch, 2011) suggest that much of the inconsistency in the earlier research involving the 5-HTT gene may have been due to the search for associations with purely negative traits because of the initial associations of 5-HTT with depression; however, this association later was found to be inconsistent as well. More recently, the focal variants of the gene have been associated with the effect of differential susceptibility (Belsky & Pluess, 2009) through a variety of cognitive tasks (Homberg & Lesch, 2011), suggesting that under adverse conditions these variants lead to negative outcomes, whereas under positive conditions, they lead to positive outcomes. A significant association was found between the 5-HTT allele and the HSP Scale scores (Licht, Mortensen, & Knudsen, 2011), supporting the interpretation of this allele as indicative of an overall stronger response to the environment, with SPS as a measure of this responsiveness. Links between SPS and dopamine-related alleles have been reported as well. For example, Chen et al. (2011) considered the entire system of dopamine genes, which has 98 polymorphisms, and investigated in 480 subjects a trait "deeply rooted in the nervous system" (i.e., SPS), along with stressful life events and parental warmth.

Using a stepwise analysis of variance (ANOVA) followed by regression analysis, these authors found 10 polymorphisms that accounted for 15% of the variance on the HSP Scale through main effects and interactions (2% was added by stress life events, which subsumed parental warmth).

Psychophysiological research addressing activation of the nervous system also has provided considerable evidence for the importance of the biological underpinnings of temperament. Respiratory Sinus Arrhythmia (RSA) represents a cardiac indicator of parasympathetic activation that has been linked to emotional reactivity and regulation in childhood. Variability in heart rate in response to respiration is mediated primarily by activity of the vagus nerve. Vagal influence diminishes during inhalation, resulting in heart rate acceleration, and increases during exhalation, causing heart rate deceleration. The characteristic respiratory rhythm of RSA (Richter & Spyer, 1990) provides a noninvasive, reliable, and valid measure of cardiac vagal tone (e.g., Bazhenova, Plonskaia, & Porges, 2001), which is a neurophysiological substrate of affective responses and regulation (Porges, 1995, 1997, 2011). Both the baseline level and changes in RSA have been associated with aspects of temperament. In infants, higher levels of baseline RSA have been associated with lower negativity and less calming needed from parents (Huffman et al., 1998). In older children, high baseline RSA, and RSA maturation (operationalized as the degree of change in the RSA over a 2-week period), have also been linked to better social skills, more efficient mental processes, and better behavioral regulation (Doussard-Roosevelt, Porges, Scanlon, Alemi, & Scanlon, 1997). Changes in cardiac vagal tone in response to challenge also have been examined as indicators of the vagal brake, through which rapid inhibition and disinhibition of vagal tone to the heart (i.e., the sinoatrial node, which is the heart's pacemaker) can rapidly mobilize or calm an individual (see Porges, Doussard-Roosevelt, Portales, & Greenspan, 1996). Infant research has demonstrated the involvement of the vagal brake in regulation of social and attentional behaviors that require an awareness of the environment and the ability to engage or disengage with the elements of the environment (Bazhenova et al., 2001; Huffman et al., 1998). In sum, baseline RSA appears to be relatively reflective of reactive tendencies, whereas decreases in RSA during challenging encounters are considered markers of attention-based regulation of emotion and behavior (Porges, 2011; Porges et al., 1996).

Activity of the stress-sensitive hypothalamic–pituitary–adrenocortical (HPA) system has been examined in temperament research as well, with the primary focus on the role of the HPA axis in modulating the effects of exposure to stress (e.g., Gunnar, Sebanc, Tout, Donzella, & van Dulmen, 2003). Activation of the HPA axis results in the release of cortisol from the adrenal glands into the bloodstream (e.g., Kirschbaum, Bartussek, & Strasburger, 1992), and minimally invasive procedures allow for its measurement through saliva samples, making cortisol the most frequently studied component of the psychobiology of stress responsiveness. In a classroom-based study, Gunnar et al. (2003) demonstrated that higher surgency and lower effortful control were associated with elevated cortisol, with aggressive behaviors and peer rejection mediating this relationship for preschool-age children: More Surgent children with lower effortful control tended to exhibit more aggression, which translated into peer rejection, which in turn was linked with higher cortisol levels. Low positive emotionality was also significantly associated with higher morning cortisol in preschool children, and with a maternal history of depression (Dougherty, Klein, Olino, Dyson, & Rose, 2009).

Although laboratory-induced stressors have been used most widely in research assessing cortisol levels of older children and adults, studies including young children have often addressed changes in the diurnal cortisol rhythm in response to stressors encountered in everyday life; for example, the beginning of the school day (Turner-Cobb, Rixon, & Jessop, 2008). The HPA axis displays a diurnal rhythm: Higher levels of cortisol typically occur in the morning, and decrease by bedtime, often to near zero (Kirschbaum, Ehlert, Piedmont, & Hellhammer, 1990). The Spinrad et al. (2009) study represents one notable exception, wherein salivary cortisol was examined before and after the administration of a frustrating task. The task administration resulted in an elevation of cortisol for a portion of the preschool sample (52%), and it also resulted in higher cortisol reactivity scores, which reflected the difference between cortisol levels at pre-test and at the end of the laboratory visit (approximately 40 min post-test). These results were associated with greater mother-reported effortful control.

Stressful experiences, such as child maltreatment, likely influence the development of the stress-responsive neurobiological systems, especially if the stressful experiences occur during periods of rapid brain development (Loman & Gunnar, 2010;

Shannon, Champoux, & Suomi, 1998). Evidence indicates that lower socioeconomic status (SES) is related to both higher and lower levels of cortisol in children and adolescents (Dowd, Simanek, & Aiello, 2009), suggesting that either form of altered HPA axis functioning (i.e., either higher or lower levels of cortisol) may indicate an inflexible stress response system (Blair et al., 2011; Bruce, Fisher, Pears, & Levine, 2009; Lupien, King, Meaney, & McEwen, 2001). Parenting likely mediates the impact of poverty-related adversity on HPA axis functioning. For example, maternal negativity accounted for the effect of cumulative family risk factors on lowering morning cortisol levels for preschool children (Zalewski, Lengua, Kiff, & Fisher, 2012).

Brain activation studies have also been investigated in relation to temperament. Early research of this type frequently relied on electroencephalogram (EEG) measurement techniques, particularly in the assessment of hemispheric activity. According to Fox's (1994) model of differential activation, asymmetric patterns of frontal activity are indices of individual differences in emotion reactivity and regulation. Activation of the right hemisphere during a resting baseline condition is linked with withdrawal behaviors and emotions (e.g., fear), whereas activation of the left hemisphere is associated with approach behaviors and emotions (e.g., joy, anger). Fox and Davidson (1987, 1988) reported left frontal asymmetry during approach behaviors (e.g., positive vocalization, facial expressions of joy) in infants, along with greater relative right-frontal activation for the same children during withdrawal (e.g., distress, gaze aversion).

Applying this model to individual differences, infants who present with resting right frontal EEG asymmetry (i.e., greater relative right frontal activation) cry more frequently and demonstrate avoidance of novelty relative to those demonstrating left frontal EEG asymmetry (Calkins, Fox, & Marshall, 1996; Hane, Fox, Henderson, & Marshall, 2008). Thus, the patterns of resting frontal EEG asymmetry appear not only to serve as markers of the current emotional state but also reflect individual differences in behavioral and emotional predispositions. Buss and colleagues (2003) have also found greater right frontal EEG asymmetry during stranger approach for infants who demonstrated greater fear and sadness. Diaz and Bell (2012) reported similar right frontal asymmetry results in response to nonsocial and social stimuli. There have also been longitudinal reports of early consistencies in frontal EEG asymmetry being associated with later approach and withdrawal behavior patterns (Smith & Bell, 2010). That is, children with stable left frontal EEG asymmetry during infancy received higher externalizing problem ratings from their mothers, whereas children with stable right frontal EEG asymmetry were rated higher in internalizing behaviors at 30 months of age. Results were interpreted as suggesting a potential value in using stability in frontal asymmetry as a means of identifying children potentially at-risk for behavioral difficulties or problems.

More recent investigations of neural activation have relied on functional magnetic resonance imaging (fMRI), which can only be used with older children and adults. In one study, compared to low scorers on the HSP Scale, high scorers showed greater activation in areas of the temporal lobe, claustrum, and cerebellum associated with visual attention and oculomotor processes when asked to detect minor changes in visual scenes, suggesting more elaborate processing of details by highly sensitive individuals (Jagiellowicz et al., 2011). Acevedo et al. (2014) obtained fMRI data from high and low scorers on the HSP Scale who viewed photos of happy, unhappy, and neutral expressions of their spouses or strangers. Greater activation was observed in the conditions presenting photos of spouses and photos of positive facial expressions, with most notable activation identified in the mirror neuron system and the insula, but not the amygdala, even in responses to negative affect photos. Jagiellowicz (2013), in a study using emotionally evocative pictures, found greater brain activation for high SPS participants (compared to low SPS participants) for positive pictures than for neutral pictures, and they also found that high SPS participants who reported a positive childhood environment also reported more arousal to positive pictures relative to neutral pictures. The stronger responses to positive images exhibited by participants reporting higher levels of SPS could be explained by their particular susceptibility to positive experiences more generally, as discussed below (Pluess & Belsky, 2013).

Another example of applying imaging techniques comes from studies conducted by Kagan on behavioral inhibition. In the 1980s Kagan had proposed (e.g., Kagan et al., 1988) that the neural mechanism underlying behavioral inhibition was a lower threshold for limbic system activation in response to novelty. However, he was unable to test this proposal directly until years later. When adults who had been identified as inhibited as young children

were exposed to photos of faces they had never seen, they demonstrated greater fMRI responsiveness in the amygdala than adults who had been categorized as uninhibited as toddlers (Schwartz, Wright, Shin, Kagan, & Rauch, 2003).

Gender Differences in Temperament

A number of gender differences in temperament have been reported for older children and adults, with markedly fewer found for children younger than 1 year of age (Bates, 1987; Rothbart, 1989). Differences in infancy have been limited in large part to activity level and fear/behavioral inhibition. Higher activity level and approach have been reported for boys in the first year of life (Campbell & Eaton, 1999; Gartstein & Rothbart, 2003; Maziade, 1984), with girls exhibiting greater hesitation in approaching novel objects, as assessed in samples from multiple cultures, and as measured both in the laboratory and through parent report (Carey & McDevitt, 1978; Gartstein & Rothbart, 2003; Hsu, Soong, Stigler, Hong, & Liang, 1981; Maziade, 1984; Martin, Wisenbaker, Baker, & Huttunen, 1997; Rothbart, 1988). Notably, Schwartz et al. (2012) reported that amygdalar activation to novelty was greatest in the adult males classified as "high reactive" in infancy, in comparison with "low reactive" males and "high reactive" and "low reactive" females. Schwartz, Kunwar, Greve, Kagan, and Snidman (2012) suggested that increased amygdalar activation in the "high reactive" males could be related to the tendency for males to demonstrate greater conditioned responses in fear conditioning paradigms relative to females, and they speculated that this result may be due to estrogen effects.

Campbell and Eaton (1999) used meta-analysis to summarize 46 studies addressing activity level in infancy, and they estimated the size of the gender difference at .2 standard deviations. Temperament differences between girls and boys tend to increase with age: A recent meta-analysis documented large effects indicating greater effortful control in girls, and moderate effects for higher surgency in boys (Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006). Although sex differences are interesting and important in their own right, the moderating role of gender in factors implicated in social-emotional development is critical to address (Crick & Zahn-Waxler, 2003). Potential research questions involve the degree to which girls and boys differ in the factors that contribute to their social-emotional functioning and adjustment.

An example of the moderating role of gender on the expression of temperament can be found in the context of cultural expectations for certain temperament traits being appropriate for a given gender, but not the other. There are variations in emphasis on sex roles, and in patterns of sex differences, across different cultures (e.g., Costa, Terracciano, & McCrae, 2001; Williams & Best, 1990a, 1990b), suggesting that there are particular culturally influenced views of what constitutes ideal temperament for boys versus girls (Rothbart, 2011). The influence of culture on gender-related expectations may be evident as early as infancy, wherein parents from different cultures rate their male and female children's temperament differently. For example, a significant culture-by-gender interaction was identified in comparisons conducted for mothers of infants from the United States and Italy (Montirosso, Cozzi, Putnam, Gartstein, & Borgatti, 2011). Results of this study indicated that Italian males, but not females, received higher ratings on "cuddliness" (defined as expression of enjoyment and molding of the body to being held by a caregiver), relative to their U.S. counterparts. Cultural views of sensitivity could also vary as a function of gender. Zeff (2010) found that among men scoring high on the HSP Scale, those from India and Thailand, and to some degree from Denmark, fared the best in boyhood in having friends and not being teased, whereas those in the United States and Canada reported few friends and more teasing. Although females were not included in this study, it is possible that women high in SPS would report different experiences across these five countries, compared to men.

Cross-cultural Differences in Temperament

Although a broad range of temperaments is observed across infants, Margaret Mead (1935/1965) commented that only a narrow band within this range is considered ideal in a given culture, and that ideal is reinforced in "every thread of the social fabric—in the care of the young child, the games the children play, the songs the people sing, the political organization . . . " (p. 284). Cross-cultural differences in temperament and personality have been identified, starting with infancy and into adulthood, although the nature of these differences has not always been consistent, and multiple explanations for observed patterns of variability exist. Cross-cultural temperament research with infants and toddlers has not been as common as personality studies, which have demonstrated the robustness of the five-factor model from childhood to adulthood

across languages, cultures, and political systems (De Fruyt, De Bolle, McCrae, Terracciano, & Costa, 2009; Kohnstamm, Halverson, Mervielde, & Havill, 1998; McCrae et al., 2004). However, it should be noted that the three-factor framework consistent with the psychobiological approach (i.e., Surgency/Extraversion, Negative Emotionality, and Regulatory Capacity/Effortful Control) has been supported by cross-cultural investigations (Gartstein, Knyazev, & Slobodskaya, 2005; Montirosso et al., 2011).

The distribution of personality traits across cultures has been shown to be a function of geography, with European and American cultures differing from Asian and African cultures on two distinct dimensions linked to extraversion and neuroticism (Allik & McCrae, 2004). Studies of personality based on peer and self-reports showed that for extraversion, U.S. adults scored higher than Japanese and Russian participants, whereas for neuroticism, differences were in the opposite direction, and for conscientiousness, results were equivocal (McCrae et al., 2004; Schmitt, Allik, McCrae, & Benet-Martinez, 2007). Recently reported data showed that mean personality scores in samples of countries correlated significantly and substantially with Hofstede's dimensions of culture and a number of socioeconomic indicators (Hofstede & McCrae, 2004). Extraversion was positively related to individualism (thought to reflect self-interest over group interest) and negatively related to power distance (defined as acceptance of social status differences). Neuroticism was associated with uncertainty avoidance (reflecting intolerance for ambiguity) and masculinity, and conscientiousness was positively related to power distance and national poverty.

Cross-cultural temperament research with children has also revealed a number of mean-level differences in fine-grained traits between contrasting cultures. On the basis of observational techniques, Chinese infants were found to be more fearful, timid, and more likely to cry intensely when separated from mothers than Caucasian infants (Kagan, Reznick, & Snidman, 1986), and Chinese toddlers were observed to have higher levels of behavioral inhibition than Canadian toddlers (Chen et al., 1998). In a study using parent ratings, Taiwanese infants were described as less active, approachable, and adaptable, and more negative in mood than U.S. infants (Hsu et al., 1981); Japanese preschoolers were found to be more withdrawal-oriented, less flexible, and to express less positive affect than U.S. children (Windle, Iwawaki, & Lerner, 1988);

and Russian infants were found to have lower levels of smiling and laughter, high and low intensity pleasure, perceptual sensitivity, and vocal reactivity, and higher levels of distress to limitations compared to their U.S. counterparts (Gartstein, Slobodskaya, & Kinsht, 2003). In a comparison with infants from Russia, Japan, Poland, and Italy, U.S. infants were rated higher on aspects of extraversion/surgency and regulatory capacity and lower on aspects of negative emotionality (Gartstein, Slobodskaya, Zylicz, Gosztyla, & Nakagawa, 2010; Montirosso et al., 2011). Cross-cultural differences in temperament were investigated between infants, children, and adults from the United States and Finland (Gaias et al., 2012). Across all ages, U.S. participants received higher ratings on temperamental fearfulness than Finnish participants, and they also demonstrated higher levels of other negative affect at several time points. During infancy and adulthood, Finns tended to score higher on positive affect and elements of temperamental effortful control.

The implications of temperament traits for social-emotional adjustment also vary across cultures. For example, Chen, Rubin, and Sun (1992) compared school children in Shanghai and Canada on their liking to play with "shy" or "sensitive" peers, finding that these children were the most preferred by their classmates in China, but not Canada. Indeed, in Mandarin, shy can be translated as "good" or "well behaved," and sensitive as "having good understanding," a term of praise. In Canada, these children were among the least preferred.

There are two possible explanations for the observed cross-cultural differences in mean levels of personality and temperament traits. One biological explanation emphasizes heritability and the genetic transmission of temperament predispositions as the underlying mechanism, and rests on the idea that the distributions of temperament genotypes differ among populations that vary in ethnicity, giving rise to cross-cultural differences in temperament and personality traits (Allik &McCrae, 2004). In contrast, environmental pathway models stress the role of cultural values and corresponding patterns of childrearing that tend to be relatively stable, socializing children into phenotypical presentations of temperament that are desirable, appropriate, or at least tolerable within cultural norms (Kohnstamm, 1989; Rothbart, 2011). Additional genetically sensitive developmental research is needed to examine the effect of interactions between genes, environment, and sociocultural values on temperament and personality outcome variables (Rothbart, 2012).

Super and Harkness (1986) conceptualized the interface between the child and culture as the "developmental niche," described as a function of (a) customs, especially those related to childrearing, (b) settings available to the child, and (c) caregiver psychosocial characteristics. Of the latter, Super and Harkness viewed parental ethnotheories, or parental belief systems based on cultural values and norms, as particularly critical to the development of temperament and personality, as these shape parents' attitudes about development and behavioral responses to children, differentially structuring children's daily lives. These parenting practices, in turn, are likely to shape children's temperament, as well as caregivers' evaluations of their children's attributes. All three aspects of the developmental niche are influenced by culture and cause children growing up in a particular cultural group to acquire similar characteristics in the process of their development.

Despite a number of criticisms (e.g., Brewer & Chen, 2007; Miller, 2002), individualism-collectivism represents the most commonly applied construct in explaining cultural differences (Triandis & Suh, 2002). Socialization in collectivistic cultures has been described as focusing on emotional warmth and proximity that fosters acceptance of the group's norms and values (Keller et al., 2004). Caregivers in more collectivistic societies often respond to their infants' needs in an anticipatory manner, blurring the self–other distinction, whereas caregivers in individualistic cultures tend to encourage the expression of positive emotions and focus on early flexible self-regulation (Greenfield, Keller, Fuligni, & Maynard, 2003; Keller et al., 2004).

Beyond the individualist–collectivist distinction, it is of interest that differences in the developmental niches between cultures, not viewed as particularly different from one another (i.e., representing Western industrialized nations such as the Netherlands and the United States), have been identified (Super et al., 1996). U.S. parents, for example, often emphasized the importance of stimulation, seeking a wide variety of experiences for their children in order to promote cultural ideals regarding independence. In contrast, parents in the Netherlands were more likely to incorporate children into their daily activities in familiar settings, placing strong value on the importance of rest and regularity. Culture and genetics also can be viewed as operating together in a feedback loop, according to culture-gene coevolutionary theory (e.g., Chiao & Blizinsky, 2010). This framework posits that behavior is affected by cultural knowledge that shapes selection pressures acting on our genome, which, in turn, influences brain development in a manner enhancing the transmission of cultural knowledge, enabling it to expand further (Chudek & Henrich, 2011). For example, the short allele of the serotonin transporter gene (5HTTLPR), which is linked with increased negative emotion, symptoms of anxiety, and depression, is at least twice as common in Asian countries as in non-Asian countries. Theory and some global-prevalence data indicate that collectivist cultures support the differences that occur when one carries the short allele. Chiao and Blizinsky (2010) provided data indicating that collectivist Asian cultures have fewer of the problems—depression and anxiety—associated with the short allele than do non-Asian, individualistic cultures, in which the behaviors associated with the allele are probably not supported by culture. These data seem consistent with the research cited above: High sensitivity, which correlates with this allele, is more appreciated in China, even when school children rate each other.

Previous fMRI research (Hedden, Ketay, Aron, Markus, & Gabrieli, 2008) considered the effect of culture on performance of simple visuospatial tasks emphasizing judgments that were either context independent (typically easier for Americans) or context dependent (typically easier for Asians). Each group exhibited greater activation for the culturally non-preferred task in frontal and parietal regions of the brain associated with greater effort in attention and working memory. The participants also had been administered the HSP Scale, and in a subsequent analysis (A. Aron et al., 2010), the overall effect of culture was found to be significantly moderated by individual differences in SPS. That is, highly sensitive individuals showed little difference as a function of culture, whereas low scorers showed strong cultural differences. This interaction suggests that in people with this trait, a strong sensitivity to subtle cues may override a more general tendency to struggle with these cues when they oppose their own cultural bias.

An important segment of cross-cultural research addressing temperament and personality has focused on measurement-related issues. Cross-cultural applications of the measurement tools addressing individual differences in temperament and personality require validation of these instruments with samples from different cultures. In our own work, we have done so with parent-report questionnaires addressing temperament in infancy and early childhood. Internal

consistency, structural invariance, and construct validity with respect to developmental changes have been examined across cultures for the Infant Behavior Questionnaire (Rothbart, 1981), the Infant Behavior Questionnaire-Revised (Gartstein & Rothbart, 2003), the Early Childhood Behavior Questionnaire (Putnam et al., 2006), and the Children's Behavior Questionnaire (Rothbart et al., 2001). Adult personality measures have been more widely examined in the cross-cultural context, with multiple studies addressing psychometric properties of these instruments (Church, 2010).

Although a number of investigations suggest that temperament and personality traits can be adequately operationalized via questionnaires across cultures, concerns with such applications of these instruments also have been raised. For example, although McCrae and colleagues have shown that the NEO-PI-R (Costa & McCrae, 1992) yields a comparable five-factor structure across multiple cultures (McCrae, 2001; McCrae et al., 2004), Huang, Church, and Katigbak (1997) identified differential item functioning between samples from the United States and the Philippines for 40% of the items on the NEO-PI. This result suggests that temperament and personality instruments need to be applied with care in the cross-cultural context; gathering data from large samples enables analyses that address item-level invariance.

Temperament, Personality, Adaptation, and Adjustment

Given that temperament develops over time, and that the nature of environmental demands and expectations shifts with development, it is not surprising that the challenges related to adaptation and adjustment change as well. In infancy, problems with sleeping and feeding represent primary areas of difficulty, often addressed in visits with pediatricians or family doctors. After about 3–4 months of age, most infants have gained sufficient self-regulation to learn how to fall asleep without direct support from parents (Schieche, Rupprecht, & Papoušek, 2008). Sleep problems often result from a combination of child temperament and parent factors, such as when an infant who is prone to distress and is difficult to soothe is raised by a parent who is strongly invested in preventing the child from crying and fussing. Other factors, such as parent's confidence, knowledge, and coping strategies are likely to play a part as well (Schieche et al., 2008). A number of interventions have been developed for infancy sleep problems, typically involving a gradual decrease in

parental involvement, with some evidence of efficacy (Anders & Eiben, 1997; Mindell, 1999).

Another important area of adaptation and adjustment in infancy has to do with the development of secure attachment, which has been linked with more sensitive and responsive parent–child interactions (Ainsworth, Blehar, Waters, & Wall, 1978), and has been shown to predict a number of important child outcomes, such as social competence (Goldsmith & Harman, 1994). Multiple intervention approaches for enhancing sensitivity and responsiveness in parent–child interactions are available. Some of these approaches target infants high in negative emotionality in particular, as these children have been shown to be at an increased risk for insecure attachment (Calkins & Fox, 1992). An early example of such an approach was implemented by van den Boom (1995), who selected irritable infants on the basis of the NBAS (Brazelton, 1973) and then delivered a brief intervention to enhance their mothers' sensitivity and responsiveness to infant cues. This intervention not only increased the security of attachment for participating infants, it resulted in lasting benefits, with improved cooperation and peer interactions in later years (van den Boom, 1995).

Cooperation becomes a key milestone of social-emotional development in the preschool period, as the ability to comply with caregivers' instructions becomes an essential task for the child to negotiate. Child cooperation is a cornerstone of a positive relationship with caregivers, and it significantly contributes to the overall family climate. Importantly, failure to learn to cooperate with caregivers in the home often generalizes to the school environment, setting the stage for difficulties with teachers and peers. Not surprisingly, children described as exhibiting a "difficult temperament," those who show high levels of negative affectivity (anger and frustration in particular), and who are more poorly regulated, tend to struggle with cooperation both at home and in the school setting (Stifter, Spinrad, & Braungart-Rieker, 1999; Wachs, Gurkas, & Kontos, 2004). The flexibility and volition-driven nature of effortful control, which develops rapidly after 2 years of age, enables children to cooperate with their caregivers and to pursue their own agenda without getting into trouble with authority figures (Rothbart, 2011). Child cooperation has been targeted by multiple intervention strategies, most notably parent management oriented programs such as Parent–Child Interaction Therapy. In Parent–Child Interaction Therapy, parents are first

instructed to engage in child-centered play and to refrain from directing or criticizing the child. They then are taught to use effective discipline techniques (Nixon, Sweeney, Erickson, & Touyz, 2003; Rayfield, Monaco, & Eyberg, 1999). More recently, a promising modification—a temperament parent-education component—has been added to this program, resulting in decreased child problem behaviors (Pade, Taube, Aalborg, & Reiser, 2006).

Later in childhood, educational and relationship goals continue to be important. Self-concept also becomes more clearly delineated and consolidated by adolescence. Older children and adolescents have greater self-regulatory abilities that enable them to observe the reactions of the self and others, analyze these, and implement different strategies accordingly. Effortful control is also likely involved in the increased ability to view oneself more objectively and to practice actions that are consistent with one's values (Rothbart, 2011). Although a comprehensive discussion concerning the development of self-concept is beyond the scope of this chapter, it should be noted that the first "structures of meaning" concerning the world and the self are shaped by temperament, especially its earlier developing reactive components (Rothbart, 2011). Later, self-related thoughts and evaluations are overlaid upon the basic structure of temperament and the experiences that were, in part, evoked by one's temperament attributes. Ausubel and Sullivan (1970) observed that self-devaluing cognitions can occur as early as 2 to 4 years of age, and it can be expected that children higher in negative emotionality or sensitivity would be more likely to experience these cognitions and be influenced by them (Rothbart, 2011).

Relationships and Physical Health

Psychosocial adaptation and adjustment are intricately linked with interpersonal relationships and physical health in childhood and adulthood. Suggesting contributions of temperament to important life events, Jocklin, McGue, and Lykken (1996) found that heritable characteristics contributed to 30% of the divorce risk in women and 42% of the risk in men. Jocklin et al. (1996) suggested that "genetic effects common to divorce and personality act largely by initially influencing variation in personality" (p. 296). Subsequently, variability in traits likely affects the probability of divorce through multiple social processes. Supporting this proposition, Jocklin et al. (1996) found that personality traits known to be somewhat heritable explained much of the genetic variance for marital dissolution, with

positive and negative emotionality associated with a higher likelihood of divorce, and the element of constraint lowering the risk of divorce. The negative effects of positive emotionality are probably attributable to reward-oriented impulsivity and high sensation seeking. Persons high in sensation seeking are known to be more easily bored in a relationship and more likely to have an affair (Seto, Lalumière, & Quinsey, 1995). Chronic negative emotionality may contribute to divorce likelihood through effects on interaction tone between couples, and also through information processing biases leading to low marital satisfaction (Karney & Bradbury, 1997). Constraint may ameliorate divorce risk through contributions to emotion regulation, as well as by promoting tendencies to reflect long and hard before leaving a relationship.

In one of the earliest interaction studies regarding health, W. Thomas Boyce and colleagues (1995) found that children high on autonomic reactivity had more illnesses and injuries compared to non-reactive children if they were exposed to stressful home and school environments, but they had fewer illnesses and injuries when in low stress environments. Gannon, Banks, and Shelton (1989) found similar effects with adolescents. A more recent example of health effects comes from a study conducted with children affected by HIV. At preschool entry, high reactive children showed the greatest increase in problematic immune parameters when the reported family adversity was high, and the greatest decrease when family adversity was low (Thomas et al., 2013). Other studies are found in a special issue of the *Proceedings of the National Academy of Sciences* (Boyce, Sokolowski, & Robinson, 2012); for a discussion of methods in the context of public health, see Mitchell et al. (2013).

Psychopathology and Symptoms

Significant problems with adaptation and adjustment are typically framed as psychopathology, and depending on their pattern, chronicity, and level of severity, they may either represent isolated symptoms or meet criteria for a disorder. Childhood symptoms are typically categorized as "internalizing" and "externalizing," with externalizing problems including hyperactivity, impulsivity, aggression, and noncompliance (Campbell, 1995; Achenbach & Rescorla, 2004), and internalizing difficulties encompassing withdrawal, anxiety, fearfulness, depression, and the inability to form healthy peer relationships (Campbell, 1995; Coie,

Dodge, & Williams, 1998; Hogue & Steinberg, 1995; Oland & Shaw, 2005).

A large body of literature has related temperamental negative emotion to both externalizing- and internalizing-type symptoms (Rothbart, 2011; Rothbart & Bates, 2006; Thomas, Chess, & Birch, 1970). Anger/frustration has been found to predict both internalizing and externalizing problems, with fear and sadness making more substantial contributions to internalizing difficulties (Gartstein, Putnam, & Rothbart, 2012; Oldehinkel, Hartman, De Winter, Veenstra, & Ormel, 2004; Rothbart & Bates, 2006; Lengua, 2006; Nigg, 2006). Oldehinkel et al. (2004), for example, found that fear was linked with internalizing and frustration was linked to externalizing problems in a sample of preadolescents, with generally converging findings emerging for parent and child reports of behavior problems. A number of studies have demonstrated connections between early behavioral inhibition, a construct closely linked to fear, and later internalizing symptoms such as social anxiety (e.g., Schwartz et al., 1999). Low levels of surgency also contribute to behavioral inhibition. Conversely, externalizing problems, frequently associated with high surgency, are often elevated in uninhibited children (Schwartz, Snidman, & Kagan, 1996).

Although components of surgency have been most closely associated with externalizing behavior (Rothbart & Bates, 2006), Fowles (1994) proposed that internalizing problems, particularly those of a depressive nature, are due to low activity in behavioral approach systems, suggesting that low surgency may be linked to internalizing problems. Consistent with this hypothesis, Dougherty, Klein, Durbin, Hayden, and Olino (2010) found that a "Positive Affectivity factor" comprised of sociability, interest, and positive emotion, observed in the laboratory and home at 3 years of age, predicted lower depressive symptoms at age 10, even after taking into account earlier negative affectivity and depressive symptoms. Lonigan, Carey, and Finch (1994) found that measures of low surgency (i.e., low interest and/or low motivation) discriminated between referred children diagnosed with depressive disorders and those diagnosed with anxiety disorders.

Effortful control, the regulation-related temperament factor, has also been found to play a role in shaping both externalizing and internalizing problems, with a stronger influence often reported for externalizing difficulties. For example, Gartstein and Fagot (2003) found that lower effortful control remained a significant predictor of increased externalizing difficulties for preschoolers in a study that controlled for child gender, parental depression and coercive behaviors, as well as marital adjustment, based on mother- and father-report. Oldehinkel et al. (2004) found that effortful control was the primary temperament predecessor to externalizing behavior, with the effect size exceeding .50. Eisenberg and Morris (2002) suggested that, whereas all aspects of effortful control are implicated in the etiology of externalizing problems, predictions of internalizing problems will be more pronounced for questionnaire scales measuring Attentional Focusing and Shifting than behavioral inhibitory control. Consistent with this assertion, Eisenberg et al. (2009) found that deficits in attentional control predicted high and increasing levels of internalizing problems from 6 to 10 years of age.

In addition to independent contributions of temperament factors, potential moderator effects, as seen in trait-by-trait interactions, have also been found, most typically with the regulation factor moderating the impact of negative emotionality (Nigg, 2006; Rothbart & Bates, 2006). Rothbart and Bates (2006) noted that regulatory or control systems would be expected to moderate the impact of more reactive systems, so that for a child with higher levels of negative emotionality, greater effortful control would enable more flexible, and presumably adaptive, emotional responses, in comparison to a child high in negative reactivity who did not possess high effortful control. Consistent with this theoretical formulation, Eisenberg et al. (2001) found an interaction effect in which greater effortful control buffered the effect of higher anger/frustration on maladjustment. Similarly, Gartstein, Putnam, and Rothbart (2012) reported higher levels of both internalizing and externalizing behaviors in children with low regulatory capacity/effortful control and high negative emotionality, in comparison to negative children with less pronounced regulatory tendencies.

Temperament–gender interactions represent another intriguing possibility for understanding gender differences that have been observed for certain symptom domains and disorders. Depression is linked to gender, particularly after the onset of adolescence, when girls begin to outnumber boys in high ratings of symptom frequency and severity. Hyde, Mezulis, and Abramson (2008) proposed that negative emotionality contributes to the development of depression via two pathways: (a) negative emotionality is a vulnerability in and of itself that, especially in interaction with stress, increases

the likelihood of depression; (b) negative emotionality is likely to be reflected in a negative cognitive style that overemphasizes the processing and gravity of adverse events.

Although there is little evidence for a gender difference in negative emotionality, with the exception of girls' presenting with higher levels of fear and behavioral inhibition (e.g., Carey & McDevitt, 1978; Gartstein & Rothbart, 2003), girls demonstrate greater variability on the negative emotionality factor, producing a distribution with more extreme high scores relative to boys (Else-Quest et al., 2006). Combined with more negative body representations and adverse effects of early puberty, girls face an increased risk for depression as they develop from childhood to adolescence (Hyde et al., 2008).

Temperament–environment interactions also have gained considerable attention in theory and research. These interactions are consistent with the widely cited diathesis-stress model, in which temperament attributes, in combination with environmental stressors, increase the risk for symptoms and disorders. For example, multiple studies suggest that "difficult temperament" (defined for the most part as negative emotionality), can magnify the effects of adverse environments, resulting in poor outcomes across developmental periods (Bates & Pettit, 2007). More focal aspects of temperament also have been implicated in interactional effects. For example, child fearfulness coupled with parental oversensitivity or permissiveness has been shown to lead to the maintenance of high levels of fear (Park, Belsky, Putnam, & Crnic, 1997) which, in turn, increases the risk for anxiety symptoms and disorders (Williams et al., 2009). Kochanska (1995) reported that highly fearful children demonstrated more advanced self-regulatory skills and moral development when their mothers used gentle rather than harsh control. The gentleness of maternal control did not make a difference for the relatively fearless children, for whom attachment security emerged as the primary determinant of conscience.

E. Aron, Aron, and Davies (2005) explored the interaction of the SPS trait and environment retrospectively in three studies and found that high scorers on the HSP Scale who reported a troubled childhood (Study 1) or low parental bonding (Study 2) scored especially high on measures of depression, anxiety, and shyness; however, there also was a tendency for high scorers without such childhoods to score especially low on measures of negative affect. That is, heightened negative emotionality and/or depression appears to develop as a result of this interaction between elevated sensitivity and childhood histories touched by adversity, rather than as a function of sensitivity per se, although prospective designs should be employed in the future to confirm these results. Conversely, sensitive individuals raised in less aversive environments may gain more than others from such environments. Note that, although the measures of troubled childhood were retrospective, the pattern of results was exactly opposite to what might be expected from biased recall or reporting.

Recently, these types of *crossover interactions*, wherein the same trait can lead to adaptive and maladaptive outcomes as a function of a third, often environmental variable, have been framed in the context of differential susceptibility (Belsky & Pluess, 2009). Although this is a relatively new construct, it parallels some of the original thinking about temperament characteristics and their function as risk or protective factors for psychopathology. Whereas Thomas and Chess found that the groups of children they characterized as "difficult" and "slow to warm" were both more vulnerable to psychiatric illness in comparison with "easy" children (Thomas, Chess, & Birch, 1970), they also suggested that with the right parenting and teaching, their best qualities would emerge. Thus, Thomas and Chess were in a sense the first to suggest what is now known as differential susceptibility (Belsky & Pluess, 2009): a biological sensitivity to context (Boyce & Ellis, 2005) or genetic differential sensitivity to the social environment (Mitchell et al., 2013). However, the vulnerability or diathesis-stress paradigm was so strong that it required decades for the discovery that under the right circumstances these outliers developed unusually well in certain ways. In recent years, multiple studies have found such crossover interactions for children with behavioral, (e.g., irritable, negative emotionality), physiological (e.g., high stress reactivity), and genetic (e.g., s-allele of the serotonin transporter) indices of sensitive temperament (for a review, see Belsky & Pluess, 2009).

Pluess and Belsky (2013) emphasized the positive side of the interaction—the response of temperament outliers to good environments and to interventions—and reviewed these effects where they extend to psychotherapy interventions.

Temperament and Psychotherapy
Temperament has thus emerged as a critical ingredient in conceptualizing the etiology of psychopathology, and it has also found numerous

applications in psychotherapy. Millon's Personalized Psychotherapy Model (e.g., Strack & Millon, 2013) represents a notable example, as it emphasizes the interplay among temperament traits, preferences, behavioral patterns, and coping strategies in developing and implementing a treatment plan. This model views temperament attributes as essential to understanding the entirety of the client's presenting problems, as well as the client's strengths and competencies that can transform the maladaptive patterns that resulted in the need for psychotherapy into healthier ones. Millon argues that individual traits, even domains primarily responsible for dysfunctional outcomes, should be viewed in a holistic context and considered when individualizing the selection of intervention strategies and their sequence of administration for each client (Millon, 1999; Millon & Grossman, 2007a, 2007b, 2007c).

Temperament has also been linked as a moderator of treatment outcomes across the life span. For example, Joyce et al. (2007) conducted a randomized clinical trial to determine the extent to which adult personality factors (traits and/or disorders) affect treatment response to interpersonal and cognitive behavior therapy (CBT) in outpatient treatment for depression. Low persistence predicted a poorer response to CBT, whereas high harm avoidance, low self-directedness, novelty seeking, and reward dependence were associated with worse outcomes in response to interpersonal psychotherapy. The authors concluded that for patients demonstrating certain personality characteristics, for example, avoidant symptoms or high harm avoidance, CBT is likely to result in superior outcomes relative to interpersonal psychotherapy. Blair (2002) examined the effects of the Infant Health and Development Program (IHDP). The IHDP is an intervention that combined a home visiting protocol with an educational day care program that provided stimulation and sensitive/responsive care in child development centers. A group of low birthweight (LBW) preterm infants were tested, and the level of negative emotionality as a moderator of treatment effects was examined. Infants characterized by higher negative emotionality were able to benefit to a greater extent from the intervention program, resulting in a decrease in the occurrence of behavior problems at 3 years of age. This difference was not only statistically significant but also was twofold in magnitude compared with the low negative emotionality group (Blair, 2002). These results were interpreted as indicating that increases in caregiver sensitivity and responsiveness resulting from the intervention served to mitigate risk for behavioral difficulties typically conferred by high levels of infant negative emotionality. Using a child form of the HSP Scale, Pluess and Boniwell (2012) measured sensitivity in two hundred 11-year-old girls from schools in deprived areas of London prior to a resilience-building intervention to prevent later depression. At a 12-month follow-up, only those scoring in the upper tercile demonstrated lower depression scores; there was no effect for the other two thirds of the participants. Moderator effects also have been observed with genetic markers, particularly in relation to the short allele of the serotonin transporter gene discussed above. In a study of orphans in Bucharest (Drury et al., 2012) randomly assigned to high skilled foster care or continued institutionalization, only those with the short allele of the serotonin transporter gene demonstrated improvement on a key variable—indiscriminate social behavior—at 54 months of age. Eley et al. (2012) reported a greater effect of CBT for anxiety in children with the s-allele of the serotonin transporter, and they refer to their findings as part of the new field of "therapygenetics" (Hudson et al., 2013).

Not only have temperament risk and protective factors been shown as important to consider with respect to the etiology elements of a case conceptualization, temperament assessment can be used as a "vehicle" for psychoeducation, and temperament constructs can be used directly in the framing of the therapeutic and interpersonal processes. Although research addressing temperament risk and protective factors typically does not involve communicating temperament assessment results to the parents, such feedback procedures have been implemented in several temperament guidance programs with the goal of improving the so-called goodness-of-fit between child characteristics and parental demands and expectations (e.g., Cameron, Rice, Hansen, & Rosen, 1994; Teerikangas, Aronen, Martin, & Huttunen, 1998). Carey (1994) proposed a conceptual model for prevention and treatment efforts consisting of three stages:

1. General educational discussions about temperament and related issues to increase parental understanding and awareness.

2. Identification of an individual child's temperament profile using parent-report questionnaires, and providing an organized picture.

3. Provision of interventions that influence the parent–child interactions, tailoring parental efforts more closely to the child's temperament profile.

This model has guided a number of temperament-based intervention efforts: Parents are provided with detailed information about their child's temperament attributes with the expectation that this information will improve goodness-of-fit between the caregivers and offspring via improved parental sensitivity and responsiveness in parent–child interactions, ultimately lowering the risk for development of significant behavioral and emotional difficulties among their children.

Providing temperament guidance as a primary prevention service offers a number of benefits to mothers and children, and it can be further maximized by making such services available in infancy. That is, information conveyed to parents of infants can help them anticipate future challenges (e.g., at the onset of the "terrible 2's"; daycare or preschool entry), resulting in the reduction of the need for more intensive clinical interventions later in childhood. A prevention program of this type, based on the Thomas, Chess, and Birch (1968) conceptualization of "difficult" temperament, has been made available to members of a California HMO, with evaluation providing some evidence of its efficacy (Cameron et al., 1994). Members of Kaiser Permanente in the San Francisco Bay area were provided with information about their child's temperament profile. In addition, they received information in written form and/or in an in-person feedback session, addressing situations noted as challenging in the first year of life (e.g., mealtime, sleep, accident-risk, etc.). In comparison to a control group, boys who participated in this temperament guidance program made fewer behavior-related visits to pediatric and psychiatric services over the subsequent 15 years; however, that effect was not observed for girls (Cameron, Rice, Sparkman, & Neville, 2013). Differential utility of the intervention also was demonstrated, so that parents of infants with more challenging temperament profiles demonstrated the most profound reduction in psychiatric visits (Cameron et al., 2013). Ostergren (1997) implemented a temperament guidance program with a Finnish community sample of caregivers of infants, and reported that participants described guidance materials as useful, with higher ratings of usefulness provided by parents with lower levels of education. A more intensive temperament guidance program, delivered during multiple psychiatric nurse visits over the first 5 years of life, resulted in fewer behavioral and emotional difficulties reported by adolescents whose parents had been involved in the intervention (Teerikangas et al., 1998). These

results provide evidence of feasibility, utility, and efficacy of temperament guidance as a preventive program, albeit in the context of a fairly intensive and costly intervention.

Although these results are promising, the mechanism underlying their success is elusive, as there was no attempt to demonstrate that this temperament-based guidance resulted in improved parent–child interactions. More conclusive findings regarding parenting factors underlying program success were provided by Sheeber and Johnson (1994), who reported that a similar guidance program, which included a number of meetings with content addressing temperament, parent–child interactions, and goodness-of-fit, was effective in increasing satisfaction with parent–child interactions and perceived parenting competence; improving maternal affect; and lowering levels of family disruptions and mother-rated child behavior problems. In all of these interventions, however, information concerning links between temperament and challenges for caregivers was based on rather limited empirical evidence derived from the NYLS temperament interviews and follow-ups (Thomas & Chess, 1977). A more substantial body of research addressing temperament, parenting, and child outcomes (e.g., behavior problems, social competence, etc.) has not yet been conducted on the temperament-based interventions evaluated to date.

The effectiveness of intervention programs may be enhanced when they promote integration across multiple aspects of a child's environment. "INSIGHTS into Children's Temperament" is a program for parents and teachers to learn about temperament and how it contributes to the interactional dynamics, with the goal of improving the goodness-of-fit: " . . . replacing counterproductive responses with those that foster children's social competence" (McClowry & Collins, 2012, p. 612). The program begins with a largely psychoeducational component encompassing temperament and related concepts, then targets child self-regulation and cooperation, and it offers specific strategies to parents and teachers tailored for children of different temperament types to facilitate their growth. This school-based program was shown to be effective, especially when participants were enrolled in the "collaborative" condition, wherein parents along with teachers were involved in the intervention (O'Connor, Rodriguez, Cappella, Morris, & McClowry, 2012). Children whose temperament profiles were described as "high maintenance" showed the greatest decreases in disruptive behaviors in this condition, with treatment

gains occurring as a function of enhanced parenting efficacy.

Similarly, a personality-based school preventive program was shown to be effective in reducing the risk of behavioral and emotional difficulties for youth (O'Leary-Barrett et al., 2013). The results of that program were impressive, considering that it included only two 90-minute group meetings. These meetings, led by trained school personnel, were targeted to youth who self-reported high levels of personality factors linked with increased risk for conduct disturbance and anxiety (i.e., impulsivity/sensation seeking and anxiety sensitivity), and focused on cognitive distortions linked with each personality profile. Results indicated a significant reduction in the risk for severe conduct problems among youth identified as high on impulsivity-specific factors who received the impulsivity-specific program. There also were modest reductions in anxiety symptoms for youth who had self-reported greater anxiety sensitivity and who had received that respective version of the program (O'Leary-Barrett et al., 2013).

In our professional experience, we have found that making use of temperament concepts in counseling or psychotherapy yields a number of advantages. First, the therapist will be taking into account what is perhaps most basic to the person. Second, there are fewer misdiagnoses and wrong directions taken in treatment. For example, a temperament outlier that is still basically normal, e.g., someone exhibiting high levels of activity, distractibility, or sensitivity, is not mistaken as an individual with a clinically significant disorder. Third, the therapeutic or counseling alliance is rapidly strengthened, and sometimes the treatment itself is shortened, when the counselor can explain the client's temperament in the first few sessions. This may be something the client or parent always has been aware of, but had never clearly articulated before. Fourth, self-esteem is likely to be enhanced when the client (or parent) learns that although he or she (or his or her child) may be a member of a minority in demonstrating high levels of a trait, the characteristic still falls within the normal range of individual differences. Further, as a member of a minority, the client may have experienced cultural prejudices in the form of negative stereotyping by parents, peers, teachers, and those at work ("too sensitive," "scaredy cat," "trouble maker," "drama queen") that can now be reframed. Unfortunately, to date, these potential benefits of incorporating temperament into the therapeutic context with adults have

not been systematically evaluated. Their usefulness, however, is indirectly supported by findings suggesting that more sensitive clients may be both the most in need of counseling and most responsive to it, given the interactions between measures of high sensitivity (genetic or by self-report) and increased gains from psychological interventions (Drury et al., 2012). Beyond the framework incorporated in the Personalized Psychotherapy approach (Millon, 1999; Millon & Grossman, 2007a, 2007b, 2007c), in which individual traits are considered in selecting intervention strategies and their sequence of administration, temperament can be incorporated into every aspect of treatment, beginning with psychoeducation and ending with relapse prevention. Thus far, this comprehensive application of temperament constructs has been articulated most clearly with respect to the characteristic of sensitivity (E. Aron, 2012), which will be the focus of the following discussion. However, future efforts should consider bringing other traits (e.g., low inhibitory control, high levels of different aspects of negative affectivity) into this comprehensive approach, applying them in child psychotherapy as well as adult treatment.

Assessing Temperament for Therapy Contexts

Applying temperament constructs begins with assessment. The choice of instruments to use, however, is not an easy one. On the one hand, parent- or self-report measures based in the stylistic model proposed by Thomas and Chess (e.g., Revised Infant Temperament Questionnaire; Carey & McDevitt, 1978) may be beneficial, as they were designed on the basis of traits that parents identified as salient and relevant to behavior problems observed in their children. On the other hand, these measures often suffer from questionable psychometric properties, such as excessively high intercorrelations between scales and low agreement between items on the same scale (Rothbart & Mauro Alansky, 1990). Alternatively, measures developed in the psychobiological tradition (e.g., the Children's Behavior Questionnaire; Rothbart et al., 2001) assess a large number of traits with high internal consistency. These measures, however, were originally designed for research, and they have not yet been evaluated as clinical tools. In the case of SPS, the research version (E. Aron & Aron, 1997) uses a Likert scale response format, but the true-false version is easier to score (E. Aron, 1996) and can be scored electronically via Internet (www.hsperson.com). Regardless of the

instrument chosen, its use should be augmented by a careful intake interview.

Careful attention to scores on specific components of a measurement is warranted. For example, a child may score relatively high on the broad factor of negative affectivity, but closer examination may reveal that the child struggles less with sadness than with anger or fear. Testing for multiple dimensions of temperament rather than focusing on broad descriptions such as "difficult," is also advantageous, because sometimes one trait affects the presentation of another. For instance, the broad factors of negative affectivity, surgency, and effortful control are largely orthogonal; certain individuals who are high in SPS are also high in novelty seeking or surgency (indeed, 30% are extraverts). Individuals with high levels of opposing traits may naturally describe themselves as operating with "one foot on the brake and one foot on the gas." By attaining a more thorough empirical perspective of their clients' dispositions, counselors may be in a better position to develop a helpful focus for assisting them.

Client's and Therapist's Temperament as Moderators

Most therapists may intuitively adapt their styles to a client's temperament. However, once a framework of temperament is established, the therapist can do this consciously.

The degree to which therapists can be flexible in their approach to clients, however, may be influenced by their own personality. Chapman, Talbot, Tatman, and Britton (2009) examined associations between therapist personality traits of neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness, and ratings of the working alliance provided by clients and their psychotherapy trainee therapists. A higher level of trainee neuroticism was associated with lower ratings of the alliance made by the trainee, but the opposite pattern regarding higher trainee neuroticism was found with client report. Higher trainee agreeableness was linked with lower trainee ratings of the alliance, and greater openness on the part of the trainees was associated with lower client alliance ratings. The authors concluded that moderate levels of neuroticism and openness are likely to facilitate better client perceptions of the alliance, as psychotherapy trainees on average demonstrate low levels of neuroticism and high levels of openness (Chapman et al., 2009).

Existing evidence points to the importance of client temperament as an intervening variable that moderates and mediates treatment processes (e.g.,

Blair, 2002; Joyce et al., 2007). As a moderator variable, in addition to the findings discussed earlier (e.g., that at high harm avoidance levels CBT is likely to be more beneficial than interpersonal psychotherapy), anger was shown to moderate treatment outcome for substance abuse, with patients high in anger showing a poorer response (i.e., more frequent drinking) to more directive therapists (Karno & Longabaugh, 2004). Both impulsivity and novelty seeking were linked with cravings, in turn increasing the risk for alcohol relapse (Evren, Durkaya, Evren, Dalbudak, & Cetin, 2012). Among children with attention deficit hyperactivity disorder (ADHD), Purper-Ouakil et al. (2010) demonstrated that youngsters described as more persistent by caregivers were more likely to experience short-term remission, exhibiting a strong initial medication response.

The Harm Avoidance (HA) dimension of temperament (defined by excessive worrying, pessimism, fearfulness, and self-doubt) was also shown to mediate the response to antidepressant treatment (Abrams et al., 2004; Quilty, Godfrey, Kennedy, & Bagby, 2010). Quilty et al. (2010) showed that HA reduction represents the mechanism responsible for the decrease in depressive symptoms that occur after the initiation of clomipramine treatment. Harm Avoidance also has been implicated in the treatment of eating disorders, as has Persistence (Dalle Grave et al., 2007), and these treatment effects were explained in large part by changes in eating and depressive symptoms. According to Dalle Grave et al. (2007), inpatient CBT for eating disorders resulted in significant decreases in symptoms associated with eating pathology and depression, which in turn accounted for decreases observed in the temperament attributes.

Although client and therapist temperament have been examined independently in relation to therapeutic processes, no research to date has been conducted to address empirical questions about interactions between therapist and client temperament traits. It is likely that different combinations of client–counselor temperament may be productive in enhancing the therapeutic alliance, preventing premature termination in counseling and promoting positive treatment outcomes. In forming hypotheses, however, it is worth considering that providing a good fit does not require having similar temperaments. Therapists with temperaments similar to their clients' may have more experience coping with the problems and taking advantage of the benefits of that constellation of traits; however, a

difference may allow the counselor's respect for, and admiration of, the advantages of the client's temperament to feel more sincere, and the client may learn to appreciate and adapt to someone presenting with quite different features.

As for the content of sessions that would be related to temperament, it is usually helpful to reframe certain past and current life experiences in this light. For example, if a client high in SPS reports performing poorly on exams, during important athletic competitions, or in new social situations, and/or feeling ashamed as a result of these experiences, conveying that these experiences are likely a result of overarousal due to high levels of sensitivity can diminish overly critical self-evaluations and lead to consideration of ways to compensate for this disadvantage of the trait. The counselor can simultaneously point out some of the advantages, such as intuition, creativity, kindness, conscientiousness, awareness, and other therapist observations. Clients benefit from seeing that both advantages and disadvantages are caused by the same underlying phenomenon.

Goodness-of-Fit in Lifestyle Choices

Beyond facilitating acceptance regarding past experiences, therapists can elucidate ways to enjoy one's temperament in the future by enhancing goodness-of-fit between the client and the environments they choose to occupy, in the manner of Holland (1997), who divided individuals into types (Realistic, Investigative, Artistic, Social, Enterprising, and Conventional) in order to assist in vocational choice. Multiple examples of temperament traits affecting job fit could be identified and explored.

Places where temperament has been a challenge should be specifically addressed. Temperament is not fate, and knowing about it can actually lead to greater freedom. For example, because fearful people and those high in SPS are easily overstimulated, they can still perform well in almost any situation. One helpful technique is to over prepare to counteract the effects of over-arousal, which gives the individual confidence and the ability to counteract these physical effects. Other examples of making a performance situation familiar and less stimulating might involve visiting the classroom, theater, or playing field the day before; practicing in similar or even more arousing situations (e.g. in front of friends who perhaps maintain blank expressions or challenge the individual); and having familiar, supportive people present at the actual event. For meeting strangers in over-stimulating social situations, preparation might include having in mind appropriate topics for conversation specific to the setting and the various people they might meet; imagining how they will gracefully enter and exit conversations; and if possible, rehearsing the sorts of situations, such as introductions, that make them most nervous.

In summary, research that indicates links between temperament and a variety of important outcomes can be reflected in clinical practice. Discussions concerning temperament effects across multiple areas of functioning may be generally useful, enhancing the therapeutic alliance, making treatment planning more effective, and leading to briefer counseling with more substantial benefits to the clients and their significant others. Therapists would be well advised to familiarize themselves with key temperament traits, assessing these and implementing this knowledge in psycho-education and other components of treatment. Resources outlined in this chapter are likely to be helpful in this endeavor. A thorough knowledge of what temperament differences look like "in action," and especially how to help clients with these differences, will remain important. Indeed, there is no doubt that in the future therapists will need to be highly fluent in the subject of individual differences in temperament.

Future Directions

Although a number of effective applications of temperament and personality constructs have been documented, a considerable gap in research remains. Specifically, comprehensive empirical evaluations of recommended approaches (e.g., Carey, 1994; Strack & Millon, 2013) are yet to be conducted, along with clinical trials of intervention techniques that emphasize SPS. This work will need to examine moderators as well as mediators of treatment, as the former inform conditions that may enhance or limit the effectiveness of treatment approaches, and the latter reflect the mechanisms responsible for treatment gains. Importantly, future research should consider gender as well as cultural differences, in the context of applying temperament and personality constructs to mental health services.

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Self-Regulatory Processes in Early Development

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Abstract

In this chapter, we focus on the emergence of self-regulatory processes during infancy, as framed in biopsychosocial context. We begin with a brief review of the neurobiological underpinnings of early self-regulatory processes and how self-regulatory systems develop in early childhood. Next, given that infants come into the world highly dependent on caregiver support for their survival, we argue that the emergence of self-regulation occurs primarily in a relational context, and that the capacity for self-regulation reflects both self- and parent–infant co-regulatory processes. We also provide evidence to show that variations in these early self- and parent–infant regulatory processes are linked to children's resilient or maladaptive functioning in later life. We illustrate our arguments with findings from developmental research on self-regulation in at-risk populations and in diverse contextual–cultural settings. After a brief discussion of the implications of this literature for practice, we conclude that the Mutual Regulation Model provides a useful framework for practitioners attending to the quality of the parent–infant relationship.

Key Words: self-regulation, mutual regulation, infancy, biopsychosocial, resilience

Introduction

There is growing consensus among scientists and practitioners that the ability to self-regulate in culturally appropriate ways is foundational for healthy developmental and behavioral functioning across the life span (Charles & Carstensen, 2007; Posner & Rothbart, 2000; Rothbart & Jones, 1998; Thompson, Virmani, Waters, Raikes, & Meyer, 2013; Vohs & Baumeister, 2004). Perhaps for this reason, self-regulation has been intensively studied across disciplines, and there is increasing demand for interventions promoting self-regulation (see Bridgett, Burt, Edwards, & Deater-Deckard, 2015, for a review). Parents, too, acknowledge the importance of self-regulation for positive child outcomes and consistently endorse self-regulation as their most important socialization goal (Kopp, 1982).

Yet self-regulation remains one of the most challenging constructs to define, both theoretically

and operationally (Boekaerts, Pintrich, & Zeidner, 2005; Diaz & Eisenberg, 2015), and despite decades of research, a clear, consistent definition remains elusive (Feldman, 2009). Generally speaking, self-regulation (often referred to as "self-control") is a broad "umbrella" term that encompasses a variety of processes that assist individuals in pursuing and attaining their goals (Fujita, 2011; Mann, Ridder, & Fujita, 2013), including the goal of maintaining self-organization (Tronick, 1989). However, specific conceptualizations of self-regulation and associated research methods to assess it vary markedly across and within disciplines.

In the field of developmental science, many researchers conceptualize self-regulation as a temperament dimension stemming from increasingly differentiated, complex, and hierarchically organized bio-behavioral processes that allow individuals to modulate their arousal, attention, emotions,