In this chapter, we discuss the principles inherent to a developmental psychopathology perspective. We want to underscore that, if taken in isolation, many aspects of a developmental approach to psychopathology can be found in other fields that focus on the study of individuals with high-risk conditions and mental disorders. Nonetheless, the incorporation and integration of previously discrete concepts serve to set developmental psychopathology apart from other disciplines. In particular, a focus on the interplay between normality and pathology, the growing acceptance of the importance of a multiple-levels-of-analysis and multidomain approach, and an emphasis on the utilization of a developmental framework for comprehending adaptation and maladaptation across the life course are among those elements that are central to a developmental psychopathology approach. Whereas traditional viewpoints conceptualize maladaptation and disorder as inherent to the individual, the developmental psychopathology framework places them in the dynamic relationship between the individual and the internal and external contexts (Cicchetti, 1987; Sameroff, 2000). Rather than competing with existing theories and facts, the developmental psychopathology perspective provides a broad, integrative framework within which the contributions of separate disciplines can be finally realized in the larger context of understanding individual development and functioning. It is our conviction that the principles of developmental psychopathology provide a much-needed conceptual scaffolding for facilitating this multidisciplinary integration.

To begin, we describe principles that have guided the field of developmental psychopathology. We then examine the historical origins of the field. We next explicate the definitional parameters of the discipline and discuss issues that are integral to research conducted within a developmental psychopathology framework. We conclude by describing some important future directions for prevention, research on interventions, and research on developmental psychopathology.

WHAT IS DEVELOPMENTAL PSYCHOPATHOLOGY?

Developmental psychopathology is an evolving scientific discipline whose predominant focus is elucidating the interplay among the biological, psychological, and social-contextual aspects of normal and abnormal development across the life span (Cicchetti, 1993; Cicchetti & Toth, 1998; Rutter & Sroufe, 2000; Sameroff, 2000). In their seminal article, Sroufe and Rutter (1984, p. 18) proposed that developmental psychopathology could be defined as “the study of the origins and course of individual patterns of behavioral maladaptation, whatever the age of onset, whatever the causes, whatever the transformations in behavioral...
manifestation, and however complex the course of the developmental pattern may be." Relatedly, the Institute of Medicine (1989) produced a report, entitled *Research on Children and Adolescents with Mental, Behavioral, and Developmental Disorders*, written from the integrative perspective of developmental psychopathology and highly influential in the development of the National Plan for Research on Child and Adolescent Mental Disorders (National Advisory Mental Health Council, 1990; see also Jensen et al., 1993). In its report, the Institute stated that a developmental psychopathology approach should take into account "the emerging behavioral repertoire, cognitive and language functions, social and emotional processes, and changes occurring in anatomical structures and physiological processes of the brain" (p. 14).

Given the intimate relation between the study of normality and psychopathology, theoreticians and researchers who predominantly focus on normal processes also espouse similar perspectives about the nature of development. For example, Cairns (1990, p. 42) conceptualized the study of normal development as necessitating a holistic, synthetic science: "Maturational, experiential, and cultural contributions are inseparably coalesced in ontogeny. Hence, developmental studies should be multilevel, concerned with ontogenetic integration, and employ person-oriented as well as variable-oriented analyses."

In a related vein, Gottlieb (1991, p. 7; see also Gottlieb, Wahlsten, & Lickliter, 1998) depicted individual normal development as characterized by

an increase of complexity of organization (i.e., the emergence of new structural and functional properties and competencies) at all levels of analysis (e.g., molecular, subcellular, cellular, organismic) as a consequence of horizontal and vertical coactions among the organisms' parts, including organism-environment coactions.

For Gottlieb (1992), horizontal coactions take place at the same level of analysis (e.g., gene-gene, cell-cell, person-person, environment-environment), whereas vertical coactions occur at a different level of analysis (e.g., cell-tissue, organism-environment, behavioral activity-nervous system) and are reciprocal. As such, vertical coactions are capable of influencing developmental organization from either lower-to-higher or higher-to-lower levels of the developing system (Gottlieb, 1992). Thus, epigenesis is viewed as probabilistic rather than predetermined, with the bidirectional nature of genetic, neural, behavioral, and environmental influence over the course of individual development capturing the essence of Gottlieb's conception of probabilistic epigenesis. In an earlier period, the influential psychiatrist Adolf Meyer proffered a psychobiological orientation to normality and psychopathology that bore striking similarity to Gottlieb's more contemporary position. For Meyer (1950, 1957; see also Rutter, 1988), the psychobiological approach depicted humans as integrated organisms such that their thoughts and emotions could affect their functioning all the way down to the cellular and biochemical level, and conversely, that occurrences at these lower biological levels could influence thinking and feeling.

In one of the initial statements concerning the goals of developmental psychopathology, Cicchetti (1990, p. 20) remarked, “Developmental psychopathology should bridge fields of study, span the life cycle, and aid in the discovery of important new truths about the processes underlying adaptation and maladaptation, as well as the best means of preventing or ameliorating psychopathology.” Cicchetti further commented, “This discipline should contribute greatly to reducing the dualisms that exist between the clinical study of and research into childhood and adult disorders, between the behavioral and biological sciences, between developmental psychology and psychopathology, and between basic and applied science” (p. 20).

Theorists and researchers in the field of developmental psychopathology aim to bring together, within a life span framework, the many contributions to the study of individuals at high risk for developing mental disorders and those who have already manifested such disorders. Developmental psychopathologists do not espouse or adhere to a particular theory that could account for all developmental phenomena (Cicchetti & Sroufe, 2000; Rutter & Sroufe, 2000). Rather, they seek to integrate knowledge across scientific disciplines at multiple levels of analysis and within and between developmental domains (Cicchetti & Blender, 2004; Cicchetti & Dawson, 2002; Cicchetti & Posner, in press; see also Cicchetti, Bemiston, Sheridan, & Mcclintock, 2000, and Kosslyn et al., 2002).

Developmental psychopathologists strive to engage in a comprehensive evaluation of biological, psychological, social, and cultural processes and to ascertain how the interaction among these multiple levels of analysis may influence individual differences, the continuity or discontinuity of adaptive or maladaptive behavioral patterns, and the pathways by which normal and pathological developmental outcomes may be achieved (Cicchetti & Dawson, 2002; Cicchetti & Sroufe, 2000). In practice, this entails comprehension of and appreciation for the developmental transformations and reorganizations that occur over time; an analysis of the risk and protective factors and mechanisms operating within and outside the individual and his
or her environment over the course of development; the investigation of how emergent functions, competencies, and developmental tasks modify the expression of a disorder or lead to new symptoms and difficulties; and the recognition that a particular stressor or set of stressful circumstances may eventuate in different biological and psychological difficulties, depending on when in the developmental period the stress occurs (Cicchetti & Aber, 1986; Cicchetti & Cannon, 1999; Cicchetti & Walker, 2001, 2003; Gunnar, Morison, Chisholm, & Shchuder, 2001; Institute of Medicine, 1989; Rutter, 1988; Sanchez, Ladd, & Plotsky, 2001). Moreover, various difficulties will constitute different meanings for an individual depending on cultural considerations (Garcia Coll, Akerman, & Cicchetti, 2000), as well as an individual’s experiential history and current level of psychological and biological organization and functioning. The integration of the experience, in turn, will affect the adaptation or maladaptation that ensues.

Developmental psychopathologists stress that disordered individuals may move between pathological and nonpathological forms of functioning. In addition, even in the midst of psychopathology, individuals may display adaptive and maladaptive processes so that it becomes possible to delimit the presence, nature, and boundaries of the underlying psychopathology. Furthermore, developmental psychopathology is a perspective that is especially applicable to the investigation of transitional points in development across the life span (Rutter, 1990; Schulenberg, Sameroff, & Cicchetti, 2004). Development extends throughout the entire course of life, and adaptive and maladaptive processes emerge over the life span. From infancy through senescence, each period of life has its own developmental agenda and contributes in a unique manner to the past, present, and future organization of individual development. Rutter has conjectured that key life turning points may be times when the presence of protective mechanisms could help individuals redirect themselves from a risk trajectory onto a more adaptive developmental pathway (Elder, 1974; Quinton & Rutter, 1988). Likewise, Toth and Cicchetti (1999) have suggested that these periods of developmental transition may also be times when individuals are most amenable to profiting from therapeutic interventions.

With respect to the emergence of psychopathology, all periods of life are consequential in that the developmental process may undergo a pernicious turn toward mental disorder at any phase (Cicchetti & Cannon, 1999; Cicchetti & Walker, 2003; Moffitt, 1993; Post, Weiss, & Leverich, 1994; Rutter, 1996; Zigler & Glick, 1986). Many mental disorders have several distinct phases (Rutter & Sroufe, 2000). The factors that are associated with the onset of a disorder may be very different from those that are associated with the cessation of a disorder or with its repeated occurrence (Courchesne, Townsend, & Chase, 1995; Post et al., 1996). In contrast to the often dichotomous world of mental disorder/nondisorder depicted in psychiatry, a developmental psychopathology perspective recognizes that normality often fades into abnormality, that adaptive and maladaptive may take on differing definitions depending on whether one’s time referent is immediate circumstances or long-term development, and that processes within the individual can be characterized as having shades or degrees of psychopathology.

Since the field of developmental psychopathology has emerged as a new science that is the product of an integration of various disciplines, the efforts of which had been previously distinct and separate (Cicchetti, 1984b, 1990), it has contributed to dramatic knowledge gains in the multiple biological and psychological domains of child and adult development (Cicchetti & Cohen, 1995a, 1995b; Cicchetti & Sroufe, 2000; Rutter & Sroufe, 2000). Notably, there has been an emphasis on increasingly specific process-level models of normal and abnormal development, an acknowledgment that multiple pathways exist to the same outcome and that the effects of one component’s value may vary in different systems, and an intensification of interest in biological and genetic factors, as well as in social and contextual factors related to the development of maladaptation and psychopathology (Caspi et al., 2002, 2003; Cicchetti & Aber, 1998; Cicchetti & Cannon, 1999; Cicchetti & Posner, in press; Cicchetti & Rogosch, 1996; Cicchetti & Tucker, 1994; Cummings, Davies, & Campbell, 2000; Gottesman & Hanson, 2005; Plomin & McGuffin, 2003; Plomin & Rutter, 1998; Rutter et al., 1997; Sameroff, 2000).

Although process-oriented research continues to be underrepresented in the field, there are a number of notable exceptions. Moreover, there is increasing recognition of the dynamic interplay of influences over developmental time. Perhaps the most dramatic example of this is the work on experience-dependent brain development (Black, Jones, Nelson, & Greenough, 1998; Greenough, Black, & Wallace, 1987). The viewpoint is now widely shared that neurobiological development and experience are mutually influencing (Cicchetti & Tucker, 1994; Eisenberg, 1995; Nelson & Bloom, 1997). Brain development impacts behavior, of course; however, the development of the brain itself is impacted by experience. Specifically, it has been demonstrated that social and psychological experiences can modify gene expression and brain structure, functioning, and organization. Alterations in gene expression influenced by social and psychological experiences produce
changes in patterns of neuronal and synaptic connections (E. R. Kandel, 1998, 1999). These changes not only contribute to the biological bases of individuality, but also play a prominent role in initiating and maintaining the behavioral anomalies that are induced by social and psychological experiences.

Although not in the vocabulary of psychopathologists until the past several decades, concepts of pathways to psychopathology are now prominent in the field (Cicchetti, 1990; Cicchetti & Rogosch, 1996; Sroufe, 1989), having been in use in biology (Mayr, 1964; von Bertalanffy, 1968). It is now common knowledge that subgroups of individuals manifesting similar problems arrived at them from different beginnings (known as equifinality) and that the same risk factors may be associated with different outcomes (known as multifinality). This understanding has proven to be critical, not only because it has the potential to bring about important refinements in the diagnostic classification of mental disorders, but also because it calls attention to the importance of continuing to conduct process-oriented investigations (cf. Bergman & Magnusson, 1997; von Eye & Bergman, 2003). Investigators have shifted the emphasis of their questions from, for example, “What is the antecedent of conduct disorder?” to “What are the factors that initiate and maintain individuals on pathways probabilistically associated with Conduct Disorder and related outcomes?” and “What differentiates those progressing to Antisocial Personality Disorder from those progressing to depression and those being free from maladaptation or a handicapping condition?” As researchers increasingly conceptualize and design their investigations at the outset with the differential pathway concepts of equifinality and multifinality as a foundation, we will come progressively closer to achieving the unique goals of the discipline of developmental psychopathology—to explain the development of individual patterns of adaptation and maladaptation (Cairns, Cairns, Xie, Leung, & Heane, 1998; Cicchetti & Rogosch, 1996; Sroufe & Rutter, 1984).

Likewise, as we have drawn the distinction between factors that initiate pathways and factors that maintain or deflect individuals from pathways, there is a growing recognition of the role of the developing person as a processor of experience. The environment does not simply create an individual’s experience; rather, individuals also actively create their experiences and their own environments in a changing world (Cummings et al., 2000; Scarr & McCartney, 1983). Individuals select, integrate, and actively affect their own development and the environment in a dynamic fashion (Bergman & Magnusson, 1997; Cicchetti & Tucker, 1994; Rutter et al., 1997; Wachs & Plomin, 1991).

The principle of contextualism conceptualizes developmental processes as the ongoing interaction between an active, changing individual and a continuously unfolding, dynamic context (Cicchetti & Aber, 1998; Cummings et al., 2000). Thus, maladaptation and psychopathology are considered to be products of the transaction among an individual’s intraorganismic characteristics, adaptational history, and the current context (Boyce et al., 1998; Sroufe, 1997). Moreover, we now know that social contexts exert effects not only on psychological processes, but also on biological structures, functions, and processes (Boyce et al., 1998; Cicchetti, 2002; Cicchetti & Tucker, 1994; Eisenberg, 1995; Nelson & Bloom, 1997).

There also has been a veritable explosion in our knowledge of developmental neurobiology, that area of neuroscience that focuses on factors regulating the development of neurons, neuronal circuitry, and complex neuronal organization systems, including the brain (Ciaramello et al., 1995). In addition, advances in the field of molecular genetics (see Lander & Weinberg, 2000; Lewin, 2004) have contributed to the understanding of neurological disease, allowing scientists for the first time to understand the genetic basis of certain disorders without requiring foreknowledge of the underlying biochemical abnormalities. These accomplishments have helped to engender renewed excitement for the potential contributing role that the field of molecular genetics can play in comprehending the development of psychopathology (Caspi et al., 2002, 2003; Cicchetti & Blender, 2004; Kaufman et al., 2004; Plomin & McGuffin, 2003; Plomin & Rutter, 1998; Rutter & Plomin, 1997; Waldman, 2003).

Developmental psychopathologists have begun to recognize that the milieu in which an individual develops is likely to profoundly influence the course of epigenesis (Boyce et al., 1998; Cicchetti & Aber, 1998; Garcia Coll et al., 2000; Garcia Coll & Vasquez Garcia, 1996; Hoagwood & Jensen, 1997; Richters & Cicchetti, 1993). The dynamic interplay of risk and protective processes may have differential impact depending on the cultural norms, practices, values, and beliefs. Cultures may be characterized on a continuum ranging from sociocentric (emphasizing community, family, and interconnectedness) to individualistic (emphasizing individuality, autonomy, and personal achievement; Garcia Coll et al., 2000; Shweder, 1991). The ideal self correspondingly varies with respect to the degree to which the self is defined in terms of relatedness to others versus in terms of autonomy and achievement. As such, cultural groups will differ in their socialization goals for
desired outcomes for well-functioning members of the culture. Norms for appropriate and inappropriate behavior will have different thresholds, and discipline strategies will vary in accord with what behaviors are regarded as desirable or unacceptable.

For example, Canino and Guarnaccia (1997) noted that psychiatric epidemiological studies have shown that Puerto Rican adolescents exhibit lower rates of Conduct Disorder and substance abuse than adolescents in mainland United States; this difference may be attributable to greater monitoring and supervision of teenagers in the culture, consistent with a more sociocentric emphasis and a more authoritarian parenting orientation, fostering deference to adults and social institutions. Conversely, the high rate of teen pregnancies among Puerto Rican youth (Garcia Coll & Vazquez Garcia, 1996) may suggest that these girls assume more adult-like responsibilities earlier in their lives, thereby decreasing the likelihood of their involvement in conduct disorder and substance-abusing behaviors.

To provide a further illustration of how an individual’s cultural milieu may influence the developmental course, Luthar and McMahon (1996) discovered that inner-city youth whose peer relationships were aggressive nonetheless were popular with their peers. Thus, in addition to the more typical pathway to peer popularity (i.e., prosocial behaviors, academic success), Luthar and McMahon identified a less typical pathway characterized by disruptive and aggressive behaviors and poor academic functioning. They hypothesized that within the crime-, violence-, and poverty-laden disenfranchised communities where these youth reside, aggressive behaviors that are viewed as deviant by the mainstream may be associated with prestige and high status among particular socioeconomic groups (cf. Richters & Cicchetti, 1993).

Moreover, risk and protective processes and the manner in which they transact may vary depending on priorities of the culture. Consequently, the individual’s response to an event, as well as the reactions of other members of the culture, will influence the salience of the event and how it is responded to. Culture also may influence the mode of symptom expression. Cultural values, beliefs, and practices may tend to suppress manifestation of distress in one domain (e.g., socioemotional), while tolerating the expression in another domain (e.g., physical; Weisz, Weiss, Aliche, & Klotz, 1987). For example, Serafica (1997) noted a tendency for physical manifestations of distress to be tolerated among Asian American families, as compared with less acceptance of psychological expression.

Immersion in the mainstream culture by immigrating adolescents from other cultures is likely to generate significant difficulties in adaptation, particularly if the values of the home culture are in conflict with those in the mainstream culture (Canino & Guarnaccia, 1997). Acculturation pressures may generate stress for youths as they bridge two cultural worlds. Similarly, individuals from existing subcultures nested within the broader American culture may experience conflicts when the meaning they attribute to behaviors and events is at odds with the mainstream cultural prescriptions. Thus, culture must be incorporated into how developmental psychopathologists conceptualize causal processes influencing the developmental course and how adaptation and psychopathology are defined (Flores, Cicchetti, & Rogosch, 2005; Garcia Coll et al., 2000; Hoagwood & Jensen, 1997).

**HISTORICAL ROOTS OF DEVELOPMENTAL PSYCHOPATHOLOGY**

The field of developmental psychopathology first came into ascendance during the 1970s, predominantly through being highlighted as an important perspective by researchers conducting prospective longitudinal studies of children at risk for becoming schizophrenic (Watt, Anthony, Wynne, & Rolf, 1984). Also instrumental in the field’s emergence were epidemiological investigations of families exhibiting discord, disharmony, and disruption but where there was no parental mental disorder (Rutter & Quinton, 1984) and studies of the links between cumulative risk factors and developmental outcome (Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987). Likewise, research on the causes, correlates, and consequences of secure and insecure attachment (Ainsworth, Blehar, Waters, & Wall, 1978; Sroufe, 1983; Sroufe, Carlson, Levy, & Egeland, 1999), investigations of children with a variety of handicapping conditions (Cicchetti & Pogge-Hesse, 1982; Cicchetti & Sroufe, 1976, 1978; N. O’Connor & Hermelin, 1978), and studies in life span developmental psychology (Baltes, Reese, & Lipsitt, 1980) were influential in furthering interest in developmental psychopathology.

It was not until the last several decades of the twentieth century that the discipline of developmental psychopathology began to exert a major impact on the manner in which researchers studied children and adults with high-risk conditions and mental disorders (see, e.g., Cicchetti, 1984a; Cicchetti & Richters, 1997; Rutter, 1986; Rutter & Garney, 1983; Sroufe & Rutter, 1984; Zigler & Glick, 1986). Conceptualizations of the nature of mental disorder, etiological models of risk and psychopathology, the scientific questions that were posed, and the design and data analytic strategies were reexamined, challenged, and

The field of developmental psychopathology owes its emergence and coalescence to a number of historically based endeavors in a variety of disciplines, including embryology, genetics, the neurosciences, philosophy, sociology, and clinical, developmental, and experimental psychology (see Cicchetti, 1990, for an elaboration). As is the case in tracing the pathways to discovery in clinical medicine, the influences of these diverse disciplines on the field of developmental psychopathology illustrate the manner in which advances in our knowledge of developmental processes and within particular scientific domains mutually inform each other. Notably, a number of the major theoretical systematizers in these diverse scientific fields depicted psychopathology as a distortion or exaggeration of the normal condition and reasoned that the study of normal biological, psychological, and social processes could be more clearly understood through the investigation of pathological phenomena (Cicchetti & Cohen, 1995c).

A basic theme appears in the writings of these earlier thinkers: Because all psychopathology can be conceived as a distortion, disturbance, or degeneration of normal functioning, it follows that, if one wishes to understand pathology more fully, then one must understand the normal functioning against which psychopathology is compared (Cicchetti, 1984b). Not only is knowledge of normal biological, psychological, and social processes very helpful for understanding, preventing, and treating psychopathology (Cicchetti & Hinshaw, 2002; Cicchetti & Toth, 1992; Toth & Cicchetti, 1999), but also the deviations from and distortions of normal development that are seen in pathological processes indicate in exciting ways how normal development may be better investigated and understood (Baron-Cohen, Tager-Flusberg, & Cohen, 1993; Cicchetti, 2003; Freud, 1965; Sroufe, 1990). Similarly, information obtained from investigating psychopathology can augment the comprehension of normal development (Cicchetti, 1984b, 1993, 2003; Rutter, 1986; Rutter & Garmezy, 1983; Sroufe, 1990; Weiss, 1969).

Since the nineteenth century, research in embryology has provided a rich empirical foundation for the emergence of organismic theories of development that possess great significance for comprehending the emergence and course of adaptive and maladaptive functioning (see, e.g., Cairns, 1983; Fishbein, 1976; Sameroff, 1983; Waddington, 1957; Weiss, 1969). From the research programs of such major embryologists as Hans Spemann (1938; Kuo, 1939, 1967), the principles of differentiation in development, a dynamically active organism and of a hierarchically integrated system that were later used in the investigation of the processes contributing to abnormal development within the neurosciences, psychology, and experimental psychopathology were derived (Cicchetti, 1990). Within the field of neurology, Santiago Ramon y Cajal (1893, 1937) utilized embryos to study the developing nervous system; he demonstrated that nerve cells possess terminal structures that contact with other nerve cells but do not fuse with them (i.e., that the nerve fibers are contiguous rather than continuous), thereby providing additional empirical support for the existence of a hierarchically integrated nervous system.

One of the most dominant ideas that contributed to the blossoming of the developmental perspective was Herbert Spencer’s (1862/1900) “developmental hypothesis,” in which ontogenesis was depicted as a uniform process that was governed by universal laws and principles (see also J. A. Glick, 1992; Kaplan, 1967). Throughout the ensuing period, the maturation of developmental psychology as a discipline has exerted a profound effect on the field of developmental psychopathology. The advances made in our knowledge of basic neurobiological, perceptual, cognitive, linguistic, representational, social, social-cognitive, emotional, and motivational domains have provided a firm empirical basis against which developmental psychopathologists could discover new truths about the processes underlying adaptation and maladaptation, as well as the best means of preventing and treating psychopathology (Cicchetti & Toth, 1998). Moreover, the influences of clinical psychology, psychiatry, and developmental psychopathology can be seen increasingly in the research ideas of developmental psychologists (Parke, 2004).

Writing in the late 1970s, Eisenberg (1977) urged his psychiatric colleagues to adopt a developmental framework, presenting it as a helpful unifying perspective that would enable clinical investigators to frame the difficulties they encounter in investigating and treating psychopathology. Eisenberg believed that the concept of development could serve as “the crucial link between genetic determinants and environmental variables, between . . . psychology and sociology, [and between] . . . ‘physiogenic and psychogenic’ causes” (p. 225). Moreover, he proposed that the term development be used in a broad sense and that it include “not only the roots of behavior in prior maturation as well as the residual of earlier stimulation, both internal and external, but also the modulations of that behavior by the social fields of the experienced present” (p. 225).
As developmental psychology has evolved toward becoming an ever more applied area of specialization (Shonkoff, 2000), field placements, research opportunities in diverse settings, and exposure to a range of cultural, racial, and ethnic groups are becoming more commonplace in doctoral training programs. Moreover, the growing recognition of the need to integrate developmental psychology with other scientific fields has contributed to the influx of training opportunities in settings as diverse as day care centers, family court, detention centers, mental health clinics, early intervention programs, and schools (Zigler, 1998).

An outgrowth of the attention to applied and policy-relevant issues that has obvious connections with a developmental psychopathology perspective is that scientists have developed an appreciation for the diversity of patterns of individual and family development that exist across cultures and settings (Cicchetti & Aber, 1998; Crick & Zahn-Waxler, 2003; Davies & Cicchetti, 2004; Garcia Coll et al., 1996, 2000; Swanson et al., 2003). Diversity based on ethnicity, gender, race, culture, handicap, and psychopathology was long ignored by researchers in mainstream academic developmental psychology. Now that we are accruing more knowledge about diversity in development, we are learning that the same rules of normal ontogeny do not necessarily exist for, or apply to, all children and families (see, e.g., Baldwin, Baldwin, & Cole, 1990; Davies & Cicchetti, 2004; Garcia Coll et al., 1996; Karmiloff-Smith, 1998; Rutter & Sroufe, 2000). Without a sophisticated understanding of the range of diversity in normal development, we would be severely hampered in our attempts to elucidate the pathways to adaptation and maladaptation in high-risk and disordered individuals of varying backgrounds. Thus, developmental psychology has been integral to fostering the emergence of developmental psychopathology.

There also have been a number of landmark publications that have given great momentum to the developmental perspective on psychopathology. Included among these are Anna Freud’s (1965) *Normality and Pathology in Childhood*, Santostefano and Baker’s (1972) and Kohlberg, LaCrosse, and Rick’s chapters in the *Manual of Child Psychology* (Wolman, 1972), Garmezy’s (1974a, 1974b) articles on high-risk research in the *Schizophrenia Bulletin*, and Achenbach’s (1974) textbook, *Developmental Psychopathology*. In addition, Santostefano’s (1979) book, *A Biodevelopmental Approach to Clinical Child Psychology*, Rutter’s (1980) volume, *Scientific Foundations of Developmental Psychiatry*, Rutter and Garmezy’s (1983) chapter in the *Handbook of Child Psychology*, and the special issue on developmental psychopathology, considered by many to mark the modern-day emergence of the field, published in *Child Development*, the premiere journal on normal development (Cicchetti, 1984a), all played a major role in advancing the developmental psychopathology perspective. Over the past several decades, a symposium series on developmental psychopathology was initiated (Cicchetti, 1989), a journal devoted to theory and research on developmental psychopathology, *Development and Psychopathology*, published its inaugural issue in 1989, and numerous special issues have been devoted to topics in developmental psychopathology. Finally, the publication of the first edition of the present volumes (Cicchetti & Cohen, 1995a, 1995b) and the inclusion of a chapter on developmental psychopathology in each of the past two editions of the *Handbook of Child Psychology* (Cicchetti & Toth, 1998, in press) attest to the significant growth of the discipline.

**DEFINITIONAL PARAMETERS OF DEVELOPMENTAL PSYCHOPATHOLOGY**

Multiple theoretical perspectives and diverse research strategies and findings have contributed to the emergence of the field of developmental psychopathology. A wide range of content areas, scientific disciplines, and methodologies have been germane (Cicchetti & Hinsaw, 2003; Cicchetti & Richters, 1997). Risk factors and protective factors have been established at multiple levels of analysis and in multiple domains. Various researchers have convincingly demonstrated that risks may be genetic, biochemical, physiological, cognitive, affective, experiential, intrafamilial, socioeconomic, social, or cultural (Caspi et al., 2002, 2003; Cicchetti & Aber, 1986; Cicchetti & Blender, 2004; Cicchetti & Sroufe, 2000). Contributions to the field of developmental psychopathology have come from many areas of the social and biological sciences.

It cannot even be stated a priori that a particular piece of research is or is not relevant to a developmental psychopathology perspective. An investigation of a single age group—even adults, for example—may be useful for resolving a perplexing methodological conundrum or revealing a new approach that brings about a series of critical new developmental studies. Likewise, some longitudinal studies of infants, children, adolescents, and adults may be so poorly conceived that they shed little light on development or psychopathology. In essence, we eschew an orthodoxy that states that some types of studies are part of the domains of developmental psychopathology, whereas others are not. Thus, we believe that a “big tent,” multidisciplinary approach to the investigation of the relation between normality and psychopathology offers the most promise for
advancing our knowledge of normal and abnormal developmental processes.

At the same time, a core identity for the field can be defined, manifest in a set of issues and perspectives, that makes it possible to set research directions. Central, of course, is the emphasis given to discovering processes of development, with the goal of comprehending the emergence, progressive unfolding, and transformation of patterns of adaptation and maladaptation over time. Based on this perspective, it is possible to evaluate our current understanding of psychopathology in general, as well as more particular problems of functioning. Although it is hazardous to say a particular study is or is not an example of developmental psychopathology (because one must consider the longer, more programmatic view of the research), it is possible to look at work in the field in terms of progress toward a developmental understanding. We can ask, for example, how evolved is our developmental understanding of child maltreatment, conduct problems, depression, Bipolar Disorder, or Schizophrenia. We can examine work with regard to promoting such a developmental understanding, and we can suggest the kinds of studies needed to move us toward an understanding of developmental processes.

Developmental psychopathology refers not simply to the search for the indicators or predictors of later disturbance, though these are of interest, but also to the description of the interactive processes that lead to the emergence and guide the course of disturbed behavior. In trying to understand why individuals react as they do, some researchers will emphasize one set of initiating and maintaining conditions, whereas others will argue that such factors must be examined in developmental studies, not simply be taken as givens. Increasingly, interdisciplinary multiple-levels-of-analysis investigations must assume ascendancy in the field of developmental psychopathology.

CONCEPTUAL ISSUES AND PRINCIPLES

To elaborate more completely on the definitional parameters that undergird the field of developmental psychopathology, we now turn to an in-depth explication of its major conceptual issues and principles. Our delimitation of the principles is not presented in any presumed order of importance, nor is it meant to be an all-inclusive list.

Risk and Protective Factors

It is instructive to consider the role of risk factor research in answering etiological questions about the emergence of psychopathology. Depending on the stage of research, an association between a factor or characteristic and a psychopathological outcome will indicate increasing levels of specificity regarding the degree to which the factor suggests or constitutes causal processes contributing to a psychopathological outcome (Kazdin, Kraemer, Kessler, Kupfer, & Offord, 1997; Kraemer et al., 1997; Kraemer, Stice, Kazdin, Offord, & Kupfer, 2001). Establishing that a putative risk factor operates at the same point in time as a psychopathological outcome allows for the putative risk factor to be regarded as a correlate of the disorder. Because of the concurrent assessment of the putative risk and the outcome, it is not possible to determine if the putative risk contributed to the negative outcome or whether the negative outcome led to the putative risk factor. For example, determining that a substance-abusing adolescent has friends who also abuse drugs tells the researcher only that drug abuse and drug-abusing friends are correlated. It is not possible to differentiate whether drug use is a consequence of associating with drug-using peers or whether individuals who use drugs seek out peers who also use drugs. Similarly, if depression and substance abuse are assessed as co-occurring at a single point in time, then it is not possible to ascertain whether depression contributes to substance abuse or whether substance abuse contributes to depression.

To establish a construct as a risk factor for negative outcome, it is necessary to determine that the putative risk was present prior to the emergence of the negative outcome. Thus, a risk factor allows for prediction of a later outcome. Knowing that a child exhibits a disruptive behavior disorder or that a child’s parent is an alcoholic allows one to predict that there is greater risk for the child to subsequently exhibit drug use problems. The risk factor implies greater potential; it is probabilistic risk, and not all individuals who exhibit the risk factor will develop the negative outcome (see, e.g., Cicchetti & Rizley, 1981; Kraemer et al., 2001; Luthar, Cicchetti, & Becker, 2000; Zubin & Spring, 1977).

Although the determination of risk factor status due to temporal precedence is an advance over knowledge of a variable as a correlate, knowing that a construct serves as a risk factor does not establish that the construct operates to cause the negative outcome. The next phase of research necessary to move toward an etiological understanding of maladaptive psychopathological outcomes is to differentiate between risk indicators and risk mechanisms (T. G. O’Connor & Rutter, 1996). Risk mechanisms specify the processes through which risk factors operate to generate an outcome. Kraemer and colleagues (1997) strove to further define risk factors as either markers or causal risk factors. Markers are risk factors that are not causally involved in
determining outcomes. Markers are either fixed (factors that cannot be changed, such as sex or premature birth) or variable (features that spontaneously change, such as age, or that may be modified, such as through intervention). If changing a variable marker results in change in the potential for a negative outcome, then the variable marker is implicated as a causal risk factor.

Despite the fact that markers are not involved in causing a negative outcome, they are valuable in terms of elucidating potential processes that do have causal impact on outcomes. A marker may contribute to delineating a third factor that contributes directly to both the marker and the negative outcome. Discovering causal factors that contribute to the marker may result in identifying causal risk factors that operate to produce the psychopathological outcome. Markers thus have a spurious relation to outcomes yet may be valuable in clarifying causal mechanisms. For example, if dropping out of school is related to subsequent increases in drug use, then dropping out of school would be implicated as a risk factor for drug use. If an intervention were applied to decrease dropping out of school and no differential impact on drug use was obtained, then the association between school dropout and increased drug use would be spurious, and dropping out of school would be regarded as a variable marker. Some other factor contributing to both school dropout and drug use may be implicated. For example, Conduct Disorder could potentially be a third variable that contributes to both school dropout and drug use, thereby accounting for the spurious relation between school dropout and increased drug use.

In contrast, if an intervention to reduce school dropout decreases subsequent drug use, then dropping out of school would be implicated as a causal risk factor for drug use. The research process thus would have moved further to identifying a cause of drug use. Nevertheless, the identification of a causal risk factor does not imply that the cause of a negative outcome has been ascertained. The causal mechanism (or one of them) remains to be identified. However, school dropout would be involved in some way with the causal mechanism. A delineation of other causal risk factors could provide direction for the causal source through determining the ways multiple causal risk factors are interrelated. In so doing, a common element may be ascertained that may carry more explanatory power as the causative risk mechanism. Thus, it is necessary for research to proceed in stages to progressively isolate risk mechanisms from myriad correlates, risk factors, markers, and causal risk factors.

Mental disorders are likely to be caused by multiple processes rather than singular causes (Cicchetti & Sroufe, 2000; Institute of Medicine, 1994). Thus, the identification of a causal risk factor will contribute to elucidating only one aspect of a more complex matrix of causes. Within individuals, there are likely to be multiple component processes rather than unitary causes that contribute to psychopathological outcomes (Cicchetti & Blender, 2004). Moreover, different individuals are likely to develop the same mental disorder through different constellations of processes. Thus, attention to identification of multiple risk mechanisms is important. Within individuals, single risk processes may not have sufficient power to eventuate in a mental disorder on their own. However, their impact might become more potent as they are combined with additional sources of risk. Collectively, multiple risk processes may operate additively, amassing greater potential that psychopathology will ensue. Additionally, risk processes may act synergistically with an exponential rather than additive impact on increasing the potential for maladaptive or psychopathological outcomes (cf. Rutter, 1990). Risk factors tend to co-occur rather than occur in isolation (Rutter, 1990; Sameroff et al., 1987). Some risk factors may contribute to the development of other problems that, in turn, become risk factors for other mental disorders as development proceeds.

The operation of risk processes must further be considered in the context of protective factors that the developing individual also may experience. Protective processes function to promote competent development and reduce the negative impact of risk processes (Luthar et al., 2000). Thus, protective factors may counterbalance the impact of risk processes, thereby decreasing the likelihood that the risk process will eventuate in maladaptive or psychopathological outcomes (Cicchetti & Aber, 1986; Luthar et al., 2000). For example, the impact on later substance use of neurodevelopmental anomalies that are consequences of maternal drug abuse may be reduced for children placed in adoptive homes in which structure, active engagement, warmth, and closeness are provided. These protective processes may dilute the potential of the neurodevelopmental anomaly to contribute to a substance abuse outcome. Alternatively, protective factors may operate in an interactive manner: The protective factor may reduce a negative outcome within a high-risk group but have limited impact within a low-risk group. For example, in considering parental alcoholism as a risk factor for adolescent substance abuse, high parental monitoring may be particularly valuable in reducing adolescent substance use in families without an alcoholic parent. In contrast, in families without an alcoholic parent, the degree of parental monitoring may be unrelated (or less strongly related) to adolescent
substance use. Thus, as a protective factor, parental monitoring would be particularly important in reducing negative outcomes only within the group in which the risk processes associated with parental alcoholism have the potential to operate. Consequently, understanding the etiologic role of risk processes on substance abuse outcomes must occur within a wider framework that also incorporates investigation of processes that may protect the individual from negative outcomes through counterbalancing or diluting the impact of risk factors.

It is essential to realize that risk factors do not function in a static manner. Rather, over the course of development, there is an ongoing dynamic progression among the various risk processes involved in shaping the developmental course of the individual and contributing to maladaptive and psychopathological outcomes. Cicchetti (1999; Cicchetti & Lynch, 1993; Cicchetti & Toth, 1998) has drawn attention to the importance of conceptualizing risk and protective factors in an ecological-transactional developmental model. At each level of the ecology, risk and protective factors may operate in tandem, transacting with features of the individual (i.e., the current organization of biological, emotional, cognitive, representational, and interpersonal development). Not only do external factors influence the development of the individual, but also the individual exerts influence on the external levels of the ecology, including family members, peers, and the school environment. Patterns of influence are thus mutual, as development proceeds with ongoing transactions between the individual and the external world.

Additionally, transactions occur among the different internal domains for the individual (i.e., biological, cognitive, affective, representational, and interpersonal). Not only do biological processes (e.g., genetic predispositions, neurodevelopmental anomalies) influence domains of psychological functioning, but also psychological experience, in turn, influences biological structure and function (Cicchetti & Tucker, 1994; Eisenberg, 1995). The quality of the transactions of mutual influence within the individual and between the individual and the external world shapes the character of individual development, and different developmental pathways ensue. Most important, the dynamic balance of risk and protective processes that operate over the course of development structures the developmental pathways in which individuals engage, with a progression of high risk and few protective resources engendering greater vulnerability and incompetence in the individual, contrasting with relative competence attained among individuals who experience fewer risks and numerous protective, growth-enhancing resources. Accordingly, understanding the roots of vulnerability to mental disorder requires moving beyond features of the current context when these problems emerge to articulating the course of development that individuals have experienced and how risk and protective processes have structured the organization of the individual.

Contextual Influences

Developmental psychopathologists have been cognizant of the importance of contextual influences in defining what constitutes abnormality. Clearly, no behavior or pattern of adaptation can be viewed as pathological except in particular contexts (Cicchetti & Schneider-Rosen, 1986; Luthar & McMahon, 1996; Richters & Cicchetti, 1993; Werner & Kaplan, 1963). Further, chronological age and developmental stage or level of biological and psychological organization are important defining features of context for clinicians and researchers interested in chronicling the development of mental disorders.

Although there is a growing awareness that contextual factors play an important role in defining phenomena as psychopathological (Jensen & Hoagwood, 1997; Richters & Cicchetti, 1993; Wakefield, 1992), there are vast differences in how the contexts for human development are conceptualized. Bronfenbrenner’s (1979) articulation of nested levels in the ecology of human development marked a great stride forward to conceptualizing contexts. The macro-, exo-, meso-, and microsystems delimited by Bronfenbrenner clearly and powerfully alert the developmental psychopathologist to important and vastly different sources of contextual influence on individual development.

Situational and interpersonal influences operate at the microsystem level in Bronfenbrenner’s (1979) schema and have been the traditional focus of psychological study. However, it has thus far proven to be far more difficult to conceptualize specific macro-, exo-, and mesosystem influences on development. Part of the difficulty in pinpointing the effects of these more distal contexts is that documenting their impact on individual development requires cross-fertilization with the disciplines that study these macro phenomena: anthropology, demography, sociology, economics, and epidemiology. Parental workplace, school transitions, violent communities, persistent poverty, and unsupportive stress-laden ecologies are all examples of contexts that exert influence on the development of psychopathology in children and adults (Brooks-Gunn, Duncan, & Aber, 1997; Cicchetti & Toth, 1997; Eccles, Lord, & Roeser, 1996; Luthar, 1999; Lynch & Cicchetti, 1998; Richters & Martinez, 1993). Consequently, societal-,
community-, and institutional-level influences on individual development are now beginning to be examined in systematic, rigorous, empirical fashion. Now that the field of developmental psychopathology has begun to incorporate a multiple-levels-of-analysis perspective (Cicchetti & Blender, 2004; Cicchetti & Dawson, 2002), it will become more common for scientists investigating contextual aspects of problem behaviors and mental disorders to include assessments of higher levels of contexts into their research armamentaria (Boyle et al., 1998; Cicchetti & Aber, 1998).

### The Mutual Interplay between Normality and Psychopathology

A focus on the boundary between normal and abnormal development is central to a developmental psychopathology perspective. Such a viewpoint emphasizes not only how knowledge from the study of normal development can inform the study of high-risk conditions and mental disorders, but also how the investigation of risk and pathology can enhance our comprehension of normal development (Cicchetti, 1984b, 1990; Sroufe, 1990).

Before the field of developmental psychopathology could emerge as a distinct discipline, the science of normal development needed to mature, and a broader basis of firm results had to be acquired. As dramatic gains in developmental neurobiology, neuroimaging, and molecular genetics have occurred, in concert with an increased comprehension of hormonal, emotional, social, social-cognitive, and representational processes, we now possess a much stronger ability to utilize knowledge of normative development as a yardstick against which to measure psychopathology.

The central focus of developmental psychopathology involves the elucidation of developmental processes and how they function, as indicated and elaborated by the examinations of extremes in the distribution (i.e., individuals with psychopathology). Developmental psychopathologists also direct attention toward variations in the continuum between the mean and the extremes. These variations may represent individuals who are currently not divergent enough to be considered disordered but who may progress to further extremes as development continues. Such individuals may be vulnerable to developing future disordered outcomes, or developmental deviations may, for some individuals, reflect either the earliest signs of an emerging dysfunction or an already existing dysfunction that is partially compensated for by other processes within or outside the individual.

Because of the interrelations between the investigation of normal and abnormal development, developmental psychopathologists must be cognizant of normal pathways of development within a given cultural context (Garcia Coll et al., 1996), uncover deviations from these pathways, articulate the developmental transformations that occur as individuals progress through these deviant developmental courses, and identify the processes and mechanisms that may divert an individual from a particular pathway and onto a more or less adaptive course (Cicchetti & Aber, 1986; Cicchetti & Rogosch, 1996; Sroufe, 1989).

Developmental psychopathologists have long argued that one gains valuable information about an organism’s normal functioning through studying its abnormal condition. Relatedly, developmental psychopathologists have asserted that theories of normal development can be affirmed, challenged, and augmented by incorporating knowledge about atypical development. As Werner (1948, p. 23) has stated, “A whole series of mental diseases are important to developmental psychology in that they represent the regression, the dissolution, of the higher mental processes, or inhibitions of the genetically advanced levels.” Furthermore, Werner believed that because psychopathology will shed light on the genetic data of other developmental fields... the results of psychopathology... become valuable in many ways for the general picture of mental development, just as psychopathology is itself enriched and its methods facilitated by the adoption of the genetic approach. (p. 33–34)

Despite the fact that developmental psychopathologists emphasize the mutual interplay between normal and atypical development, most contemporary theory and research have focused on the contributions that normal development can make to advancing our knowledge of psychopathological processes. There has been significantly less recognition that the investigation of high-risk conditions and mental disorders can augment our comprehension of normal developmental processes; however, this is beginning to change (see, e.g., Cicchetti, 1996, 2003).

Understanding how psychopathological conditions evolve and how aberrations of component developmental systems that exist among disordered individuals eventuate may be informative for elucidating critical components of development that are not typically evident (Chomsky, 1968; Cicchetti, 2003; Lenneberg, 1967; T. G. O’Connor, 2003). Often, the examination of a system in its smoothly operating normal or healthy state does not afford us the opportunity to comprehend the interrelations among its component subsystems. In usual circumstances, the integration of component developmental systems may be so well established
that it is difficult to determine how normal functioning is dependent on this confluence. When there is a clear aberration or deficit in a component system within a disordered population, examination of how that atypicality relates to the organization of other component systems can reveal information regarding the interdependency of components not readily apparent under normal conditions (Cicchetti & Sroufe, 1978). Thus, the interest of developmental psychopathologists in the convergences and divergences between normality and psychopathology can be mutually beneficial for understanding development across the range of variation (Cicchetti & Cohen, 1995; Sroufe, 1990). As M. Glick (1997, p. 242) has explicated: “Just as normative developmental principles have been instrumental for elucidating many facets of psychopathology, findings from research with disordered adults and with children and adolescents having special needs have enhanced understanding of normal processes.”

“Experiments of nature” are “naturally arising conditions in which there is a possibility of separating otherwise confounding processes or opportunities to examine processes that for ethical or practical reasons would not have been possible” (T. G. O’Connor, 2003, p. 837). Because they enable us to isolate the components of the integrated system, investigation of these natural experiments sheds light on the normal structure of the system. If we choose to ignore or bypass the investigation of these experiments of nature, we are likely to construct theories that will eventually be contradicted by critical discoveries in research on psychopathology (Lenneberg, 1967). The utilization of diversity of natural experiments is critical because, when extrapolating from nonnormal populations with the goal of informing developmental theory, it is important that a range of populations and conditions be considered. To make generalizations beyond the risk process or mental disorder investigated, it is necessary to examine an entire spectrum of disordered modifications.

Historically, experiments of nature have been utilized in a variety of disciplines to contribute to the normal understanding of the phenomena under investigation (Cicchetti, 1990; for work in basic medicine, see, e.g., McQuarrie, 1944). As Good and Zak (1956) noted, one value of incorporating experiments of nature into our research armamentaria is that these natural experiments enable observations and discoveries that would be extremely difficult, if not impossible, to duplicate in the laboratory setting. Theoreticians and researchers in a number of fields, including genetics, embryology, neurology, neuropsychology, psychiatry, and clinical and developmental psychology, have examined experiments of nature to elucidate theory and research in their respective disciplines (Goldstein, 1939; Inhelder, 1943/1968; Jackson, 1884/1958; Lenneberg, 1967; Luria, 1966/1980; Meyer, 1934, 1957; Shakow, 1967; B. Tizard Hodges, 1978; J. Tizard & Tizard, 1971; Weiss, 1939, 1961). Research in immunobiology likewise has a long history of utilizing experiments of nature to elucidate basic mechanisms in the functioning of the immune system (Good, 1991; Good & Zak, 1956; Sanna & Burton, 2000; Smith, 2000). Moreover, in recent decades, Rutter (1994, 2000; Rutter, Pickles, Murray, & Eaves, 2001) has eloquently articulated ways in which natural experiments are useful for the testing of causal hypotheses on the causes and courses of psychopathology.

The examination of individuals with high-risk conditions and mental disorders can provide a natural entrée into the study of system organization, disorganization, and reorganization that is otherwise not possible due to the constraints associated with research involving human participants. Through investigating a variety of high-risk and mentally disordered conditions, it is possible to gain significant insight into processes of development not generally achieved through sole reliance on investigations of relatively homogeneous nondisordered populations. Research conducted with atypical populations also can elucidate the behavioral and biological consequences of alternative pathways of development, provide important information about the range and variability of individual response to challenge and adversity, and help to specify the limits of behavioral and biological plasticity (Baron-Cohen, 1995; Cicchetti, Rogosch, Maughan, Toth, & Bruce, 2003; Damasio, Grabowski, Frank, Galaburda, & Damasio, 1994; Fries & Pollak, 2004; Gunnar et al., 2001). Finally, findings proffered by experiments of nature also hold considerable promise for informing prevention and intervention strategies (Cicchetti & Hinshaw, 2002).

DEVELOPMENTAL PATHWAYS

Since its inception as an emergent interdisciplinary science, diversity in process and outcome has been conceived as among the hallmarks of the developmental psychopathology perspective. As Sroufe (1990, p. 335) has asserted, “One of the principal tasks of developmental psychopathology is to define families of developmental pathways, some of which are associated with psychopathology with high probability, others with low probability.” Even before a mental disorder emerges, certain pathways signify adaptational failures that probabilistically forebode subsequent psychopathology (Sroufe, 1990). Thus, developmental psychopathologists have articulated the expectation that there
are multiple contributors to adaptive and maladaptive outcomes in any individual, that these factors and their relative contributions vary among individuals, and that there are myriad pathways to any particular manifestation of adaptive and disordered behavior (Cicchetti, 1993; Robins, 1966; Robins & Rutter, 1990; Sroufe & Jacobvitz, 1989). In addition, it is believed that there is heterogeneity among individuals who develop a specific disorder with respect to the features of their disturbance, as well as among individuals who evidence maladaptation but do not develop a disorder. In accord with this view, the principles of equifinality and multifinality derived from general systems theory (von Bertalanffy, 1968) are germane.

Equifinality refers to the observation that in any open system (cf. Mayr, 1964, 1988), a diversity of pathways, including chance events or what biologists refer to as nonlinear epigenesis, may lead to the same outcome. Stated differently, in an open system (i.e., one where there is maintenance in change, dynamic order in processes, organization, and self-regulation), the same end state may be reached from a variety of different initial conditions and through different processes. This is referred to as equifinality, an organismic process that possesses significant implications for biological and psychological regulatory systems and for behavioral and biological plasticity (Cicchetti & Tucker, 1994; Curtis & Cicchetti, 2003). In contrast, in a closed system, the end state is inextricably linked to and determined by the initial conditions. If either of the conditions change or the processes are modified, then the end state also will be modified (von Bertalanffy, 1968).

Initial descriptions of equifinality emanated from work in embryology. For example, the development of a normal organism was shown to occur from a whole ovum, a divided ovum, or two fused ova. Further, it was demonstrated that different initial sizes and different courses of growth can eventuate in the same ultimate size of an organism (von Bertalanffy, 1968; Waddington, 1957). Within the discipline of developmental psychopathology, equifinality has been invoked to explain why a variety of developmental pathways may eventuate in a given outcome, rather than expecting a singular primary pathway to the adaptive or maladaptive outcome.

The principle of multifinality (Wilden, 1980) suggests that any one component may function differently depending on the organization of the system in which it operates. Multifinality states that the effect on functioning of any one component’s value may vary in different systems. Actual effects will depend on the conditions set by the values of additional components with which it is structurally linked. Consequently, the pathology or health of a system must be identified in terms of how adequately its essential functions are maintained. Stated differently, a particular adverse event should not necessarily be seen as leading to the same psychopathological or nonpsychopathological outcome in every individual. Likewise, individuals may begin on the same major pathway and, as a function of their subsequent “choices,” exhibit very different patterns of adaptation or maladaptation (Cicchetti & Tucker, 1994; Rutter, 1989; Sroufe, 1989; Sroufe, Egeland, & Kreutzer, 1990).

A pathways approach builds on knowledge gained from variable-oriented studies; however, attention is shifted to exploring the common and the uncommon outcomes, as well as alternative routes by which outcomes are achieved by different individuals (cf. Cicchetti & Schneider-Rosen, 1986). Thus, what might be considered error variance at the group level must be critically examined for understanding diversity in process and outcome. The emphasis on person-centered observation highlights the transition from a focus on variables to a focus on individuals, and this transition is essential for demonstrating equifinality and multifinality in the developmental course. The examination of patterns of commonality within relatively homogeneous subgroups of individuals and concomitant similarity in profiles of contributory processes becomes an important data analytic strategy. Moreover, the need to examine the totality of attributes, psychopathological conditions, and risk and protective processes in the context of each other rather than in isolation is seen as crucial for understanding the course of development taken by individuals. For example, the presence of a childhood depressive disorder has different developmental implications depending on whether it occurs alone or in conjunction with Conduct Disorder. Similarly, the nature of alcoholism varies considerably depending on differences in the life course of antisociality. Thus, this orientation highlights the importance of an organizational view of development (cf. Cicchetti, 1993; Cicchetti & Sroufe, 1978; Sroufe et al., 1990; Waters & Sroufe, 1983). The meaning of any one attribute, process, or psychopathological condition needs to be considered in light of the complex matrix of individual characteristics, experiences, and social-contextual influences involved, the timing of events and experiences, and the developmental history of the individual.

This attention to diversity in origins, processes, and outcomes in understanding developmental pathways does not suggest that prediction is futile as a result of the many potential individual patterns of adaptation (Sroufe, 1989). There are constraints on how much diversity is possible, and not all outcomes are equally likely (Cicchetti & Tucker, 1994; Sroufe et al., 1990). Nonetheless, the appreciation of
equifinality and multifinality in development encourages theorists and researchers to entertain more complex and varied approaches to how they conceptualize and investigate development and psychopathology. Researchers should increasingly strive to demonstrate the multiplicity of processes and outcomes that may be articulated at the individual, person-oriented level within existing longitudinal data sets. Ultimately, future endeavors must conceptualize and design research at the outset with these differential pathways concepts as a foundation. Is so doing, progress toward achieving the unique goals of developmental psychopathology to explain the development of individual patterns of adaptation and maladaptation will be realized (cf. Sroufe & Rutter, 1984).

Multiple Levels of Analysis

Over the course of the past several decades, it has been increasingly acknowledged that the investigation of developmental processes, both normal and abnormal, is an inherently interdisciplinary enterprise (Pellmar & Eisenberg, 2000). Scientists must utilize different levels and methods of analysis depending on the questions being addressed in their research. Although some problems are best handled with the methods and concepts of a single discipline, other issues require interdisciplinary integration. In fact, history reveals that disciplines themselves often evolve from interdisciplinary efforts. For example, neuroscience developed as scientists working in a number of different fields began to work in concert to solve some of the common scientific mysteries that existed about the nervous system (Cowan, Harter, & Kandel, 2000). As knowledge flourishes and as new questions are posed that must be addressed, additional fields continue to be integrated into the dynamic discipline of neuroscience.

Since its inception, developmental psychopathology has been conceived as an interdisciplinary science (Cicchetti, 1990; Cicchetti & Toth, 1991). A number of influential theoretical perspectives, including the organizational perspective (Cicchetti & Schneider-Rosen, 1986; Cicchetti & Sroufe, 1978; Sroufe, 1979, 1997) and Gottlieb’s notions of probabilistic epigenesis (Gottlieb, 1991; Gottlieb & Halpern, 2002), have long advocated the importance of multidomain, interdisciplinary research.

Nonetheless, most of what is known about the correlates, causes, pathways, and sequelae of mental disorders has been gleaned from investigations that focused on relatively narrow domains of variables. It is apparent from the questions addressed by developmental psychopathologists that progress toward a process-level understanding of mental disorders will require research designs and strategies that call for the simultaneous assessment of multiple domains of variables both within and outside of the developing person (Cicchetti & Dawson, 2002). Similarly, research in the area of resilience must follow these interdisciplinary multiple-levels-of-analysis perspectives (Cicchetti & Blender, 2004; Curtis & Cicchetti, 2003). In some instances, reference to variables measured in other domains is essential to clarify the role(s) of variables of interest for other questions; it is necessary to consider variables from other domains as competing explanations for postulated causal paths. To understand psychopathology fully, all levels of analysis must be examined and integrated. Each level both informs and constrains all other levels of analysis. Moreover, the influence of levels on one another is almost always bidirectional (Cicchetti & Cannon, 1999; Cicchetti & Tucker, 1994).

Because different levels of analysis constrain other levels, as scientists learn more about multiple levels of analysis, researchers conducting their work at each level will need to develop theories that are consistent across all levels. When disciplines function in isolation, they run the risk of creating theories that ultimately will be incorrect because vital information from other disciplines has either been ignored or is unknown. Just as is the case in systems neuroscience, it is critical that there be an integrative framework that incorporates all levels of analysis about complex systems in the development of psychopathology.

One of the major challenges confronting scientific progress involves establishing communication systems among disciplines. For example, despite tremendous technological advances in neuroimaging and molecular genetics, great knowledge gaps remain between scientists who possess competence with the technologies and methods of brain imaging and genetics and those who are comfortable with the complex issues inherent in the investigation of development and psychopathology. Consequently, the field has not yet made optimal use of the advances in technology that have taken place (Posner, Rothbart, Farah, & Bruer, 2001).

RESILIENCE

As stated previously, developmental psychopathologists are as interested in individuals at high risk for the development of pathology who do not manifest it over time as they are in individuals who develop an actual mental disorder (Cicchetti, 1993; Cicchetti & Garmezy, 1993; Cicchetti & Toth, 1991; Luthar, 2003; Luthar et al., 2000; Masten, 1989, 2001; Masten, Best, & Garmezy, 1990; Rutter, 1990; Sroufe & Rutter, 1984). Relatedly, developmental psychopathologists
also are committed to understanding pathways to competent adaptation despite exposure to conditions of adversity (Cicchetti & Rogosch, 1997; Egeland, Carlson, & Sroufe, 1993; Flores et al., 2005; Kim-Cohen, Moffitt, Caspi, & Taylor, 2004; Masten, 2001; Masten et al., 2004). In addition, developmental psychopathologists emphasize the need to understand the functioning of individuals who, after having diverged onto deviant developmental pathways, resume normal functioning and achieve adequate adaptation (Cicchetti & Rogosch, 1997; Masten et al., 1990).

Resilience has been operationalized as the individual’s capacity for adapting successfully and functioning competently despite experiencing chronic adversity or following exposure to prolonged or severe trauma (Luthar et al., 2000; Masten et al., 1990). The roots of work on resilience can be traced back to prior research in diverse areas, including investigations of individuals with Schizophrenia and their offspring, studies of the effects of persistent poverty, and work on coping with acute and chronic stressors (Cicchetti & Garmezy, 1993). By uncovering the mechanisms and processes that lead to competent adaptation despite the presence of adversity, developmental psychopathologists have helped to enhance the understanding of both normal development and psychopathology. We concur with Rutter (1990, p. 210) that resilience does not exist statically in the “psychological chemistry of the moment.” It is a dynamic process, and genetic, biological, and psychological processes exert a vital role in how individuals fare when they are exposed to adversity (Curtis & Cicchetti, 2003; Kim-Cohen et al., 2004).

Within this perspective, it is important that resilient functioning not be conceptualized as a static or traitlike condition, but as being in dynamic transaction with intra- and extraorganismic forces (Cicchetti, Rogosch, Lynch, & Holt, 1993; Egeland et al., 1993). Research on the processes leading to resilient outcomes offers great promise as an avenue for facilitating the development of prevention and intervention strategies (Cicchetti & Toth, 1992; Toth & Cicchetti, 1999). Through the examination of the proximal and distal processes and mechanisms that contribute to positive adaptation in situations that more typically eventuate in maladaptation, researchers and clinicians will be better prepared to devise ways of promoting competent outcomes in high-risk populations (Luthar & Cicchetti, 2000).

**TRANSLATIONAL RESEARCH**

In recent years, the National Institute of Mental Health (NIMH) has become greatly interested in fostering and supporting translational research in the behavioral and social sciences (Cicchetti & Toth, 2000, in press b). As funding decisions at the NIMH increasingly become tied to reducing the burden of mental illness and to the real-world application of research findings, investigators will need to devise and implement policy-relevant investigations. In a report of the National Advisory Mental Health Council on Behavioral Sciences (2000) entitled *Translating Behavioral Science into Action*, strategies for enhancing contributions of behavioral science to society more broadly are proposed. The report of the workgroup concludes, “At present too few researchers are attempting to bridge across basic, clinical, and services research, and not enough are working with colleagues in related allied disciplines to move research advances out of the laboratory and into clinical care, service delivery, and policymaking” (p. v). In this report, “translational research is defined as research designed to address how basic behavioral processes inform the diagnosis, prevention, treatment, and delivery of services for mental illness, and, conversely, how knowledge of mental illness increases our understanding of basic behavioral processes” (p. iii). This formulation of translational research is in direct accord with two of the key tenets of a developmental psychopathology perspective, namely, the reciprocal interplay between basic and applied research and between normal and atypical development (Cicchetti & Toth, 1991, in press a).

The parameters of developmental psychopathology lend themselves to fostering translational research that has implications for society, policymakers, and individuals with mental disorders and their families. The very subject matter of the field, which encompasses risk and resilience, prevention and intervention, the elucidation of precipitants of mental illness, the mediating and moderating processes that contribute to or mitigate against the emergence and maintenance of psychopathology, a multiple-levels-of-analysis approach, and the incorporation of principles of normal development into the conduct of empirical investigations, necessitates thinking clearly about the implications of the work and devising strategies that will remedy the problems being studied.

**PREVENTION AND INTERVENTION**

Now that we have examined some illustrative principles of a developmental psychopathology perspective and their relevance to investigating adaptation and psychopathology, we next discuss how the developmental psychopathology framework can similarly assist in the development and provision of prevention and intervention to individuals who are at high risk for or who have developed psychopathology.
Theory and research on basic developmental processes can and should inform prevention and intervention efforts to a greater extent than is the current norm. Clinical research on treatment and preventive strategies can provide unprecedented and essential insights translatable to the making of further theoretical advances (Cicchetti & Hinshaw, 2002; Cicchetti & Toth, 1999; Kellam & Rebok, 1992; Koretz, 1991).

For example, if the developmental course is altered as a result of the implementation of a randomized preventive intervention trial and the risk for negative outcomes is reduced, then prevention research has contributed to specifying the processes that are involved in the emergence of maladaptive developmental outcomes and psychopathology (Cicchetti & Rogosch, 1996; Coie et al., 1993; Hinshaw, 2002; Kellam & Rebok, 1992). Accordingly, preventive intervention research can be conceptualized as true experiments in modifying the course of development, thereby providing insights into the etiology and pathogenesis of disordered outcomes. The time has come to conduct randomized prevention trials that not only assess behavioral changes, but also ascertain whether abnormal neurobiological structures, functions, and organizations are modifiable or are refractory to intervention. There is growing evidence that successful intervention modifies not only maladaptive behavior, but also the cellular and physiological correlates of behavior (D. B. Kandel, 1998; E. R. Kandel, 1979, 1999).

Prevention research is based on theoretical models of how risk conditions are related to adverse outcomes. As such, it posits processes that link the risk condition to the negative outcome (Institute of Medicine, 1994; Munoz, Mazurek, & Haggerty, 1996; Reiss & Price, 1996). Intervention efficacy may be enhanced by knowledge of developmental norms, appreciation of how a developmental level may vary within the same age group, sensitivity to the changing meaning that problems and disorders have at different developmental levels, attention to the effects of developmental transitions and reorganizations, and an understanding of the factors that are essential to incorporate into the design and implementation of preventive interventions (Cicchetti & Rogosch, 1999; Cicchetti & Toth, 1999; Coie et al., 1993; Institute of Medicine, 1994; Munoz et al., 1996; Noam, 1992; Reiss & Price, 1996; Toth & Cicchetti, 1999).

Inquiries regarding developmental theory and findings on basic developmental processes are all too often quite removed from both clinical practice and clinical research (Cicchetti & Toth, 1998; Kazdin, 1999). Despite rhetoric directed to the principle that developmental theory should inform active clinical intervention with children and adolescents—and the converse contention that treatment research should inform relevant theory—the gap between these two endeavors is still broad. Indeed, in many ways, those who perform basic developmental research and promote developmental theory appear to constitute a different culture from those who pursue related prevention and intervention efforts. At the extremes, clinically oriented investigators and practitioners perceive basic academic developmental science as overly concerned with central tendencies and universal, developmental norms, to the exclusion of the rich variability and nonnormative behavior patterns that they confront on a daily basis. Conversely, theorists and academic scientists appear to construe much of the clinical endeavor as atheoretical and ungrounded in core scientific principles and theories (Cicchetti & Toth, 1991, 1998).

This state of affairs is particularly distressing given the advances that are being made in a host of basic behavioral and biomedical sciences and the urgent clinical needs of large numbers of children, adolescents, and families afflicted by mental and developmental disorders (U.S. Department of Health and Human Services, 1999). Because of the field's still nascent ideas as to the underlying mechanisms of most forms of psychopathology, the need for direct application of basic research advances to enhance clinical efforts can only be described as essential. Yet, despite the increasing call for translational research that can bridge basic and applied efforts, the barriers that exist regarding the application of such basic research advances to clinically relevant work are real (Institute of Medicine, 2000). It is essential that so-called basic investigators receive updated information about fundamental processes that are relevant to clinical disorders.

Another means of closing the schisms that exist between academic researchers and clinicians is to undertake interdisciplinary, collaborative preventive interventions that take into account multiple levels of influence, spanning genes to neighborhoods and individuals to social groups (Cicchetti & Dawson, 2002). Indeed, integrative, multidisciplinary efforts that bridge these different cultures can capitalize on unprecedented opportunities for fostering a mutual perspective. As stated earlier, a central tenet of developmental psychopathology is that the understanding of atypical development can inform the understanding of normal development, and vice versa, as long as consideration is given to contextual variables and developmental principles in the explanation of how development can go awry (Cicchetti & Cohen, 1995a, 1995b). We extend this assertion through our contention that methodologically rigorous prevention and intervention science can provide a unique
lens through which to discern the processes responsible for the development, maintenance, and alteration of both typical and atypical functional patterns (Cicchetti & Toth, 1992; Hinshaw, 2002; Kellam & Rebok, 1992).

There are several reasons prevention and intervention efforts can play an essential role in bridging the world of research and clinical work and in fostering theoretical advances. First, investigations of clinical populations may inform understanding of processes responsible for healthy and atypical development, but again, only so long as careful attention is directed to the underlying mechanisms responsible for pathological outcomes (Hinshaw, 2002). Second, and crucially, whereas much of the work in the field is, of necessity, naturalistic and correlational in nature, given ethical constraints on randomly assigning developing persons to key environmental or psychobiological conditions, the gold standard for clinical intervention and prevention research is the randomized clinical trial. The experimental nature of such investigations provides an unprecedented opportunity to make causal inferences in the field (Cook & Campbell, 1979; Kraemer, Wilson, Fairburn, & Agras, 2002). Although the types of independent variables manipulated in clinical or prevention trials may be several steps removed from crucial, underlying etiologic factors, given that such trials are primarily concerned with the practical, clinical goals of alleviating suffering and promoting competence rather than isolating primary causal variables, careful research design and assiduous measurement of ancillary, process variables through which intervention effects may occur can shed unexpected light on theory-driven mechanisms underlying healthy and pathological development (Hinshaw, 2002; Kraemer et al., 2002).

Finally, as research on the contributors to resilient functioning has evolved, several scientists have suggested, based on knowledge of the extant empirical literature, how to develop preventive interventions aimed at promoting competent adaptation in a variety of high-risk groups (see, e.g., Cowen, 1991, 1994; Luthar & Cicchetti, 2000; Yoshikawa, 1994). A number of recommendations for competence-promoting interventions have been made, including the following: (1) They must be firmly grounded in theory and research; (2) efforts should be directed not only toward reducing maladaptation and psychopathology but also at promoting competence; (3) programs must capitalize on the particular resources and strengths of individual children in specific populations; (4) there should be a focus on vulnerability and protective processes that operate across multiple levels of influence; and (5) they should be guided by a strong developmental-contextual theoretical perspective (Luthar & Cicchetti, 2000). In addition, prevention and intervention should be designed to elucidate the mediators and moderators of resilient outcomes and recovery to adaptive functions.

CONCLUSION

In a relatively brief period, developmental psychopathologists have contributed significantly to our understanding of risk, disorder, and adaptation across the life course. Much of the momentum of developmental psychopathology has stemmed from an openness to preexisting knowledge in combination with a willingness to question established beliefs, thereby continuing to promote disciplinary growth. The integration of concepts and methods derived from areas of endeavor that are too often isolated from each other has resulted in knowledge advances that might have been missed in the absence of cross-disciplinary dialogue.

Numerous challenges lie ahead, and we must have the courage to continue to critically examine the implicit as well as the explicit conceptual and scientific assumptions that exist in the field of developmental psychopathology to sustain our momentum and to foster new advances (Cicchetti & Richters, 1997). Future investigations must strive to attain enhanced fidelity between the elegance and complexity of the theoretical models and definitional parameters inherent to a developmental psychopathology perspective and the design, measurement, and data analytic strategies employed in our investigations (Granic & Hollenstein, 2003; Richters, 1997). Moreover, we believe that the continuation and elaboration of the mutually enriching interchanges that have occurred within and across disciplines interested in normal and abnormal development will enhance not only the science of developmental psychopathology, but also the benefits to be derived for society as a whole.

The impressive array of findings in the more recent psychological developmental literature mentioned earlier, in concert with the concomitant progress made in the neurosciences, genetics, and related disciplines, has led to increasing acknowledgment of the need to conduct collaborative, multidisciplinary, multidomain studies on normal, high-risk, and psychopathological populations. It has now become more widely accepted that research into pathological conditions must proceed hand-in-hand with so-called basic research into human functioning. As progress in ontogenetic approaches to various subdisciplines of developmental psychopathology continues, the common theoretical and empirical threads running through this work will coalesce to establish a foundation on which an increasingly
sophisticated developmental psychopathology discipline can grow. The power embodied by cross-disciplinary collaborations that utilize multiple-levels-of-analysis methodologies promises to significantly strengthen our capacity to decrease the burden of mental illness for society.

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