Published in final edited form as:

J Child Psychol Psychiatry. 2009 January ; 50(1-2): 16–25. doi:10.1111/j.1469-7610.2008.01979.x.

The Past Achievements and Future Promises of Developmental Psychopathology: The Coming of Age of a Discipline

Dante Cicchetti, Ph.D. and

Institute of Child Development, and Department of Psychiatry, University of Minnesota

Sheree L. Toth, Ph.D.

Mt. Hope Family Center, University of Rochester

Abstract

Over the past decades, developmental psychopathology has coalesced into a discipline that has made significant contributions toward the understanding of risk, psychopathology, and resilience in individuals across the life course. The overarching goal of the discipline has been to elucidate the interplay among biological, psychological, and social-contextual aspects of normal and abnormal development. In addition to directing efforts toward bridging fields of study and aiding in elucidating important truths about the processes underlying adaptation and maladaptation, investigators in developmental psychopathology have been equally devoted to developing and evaluating methods for preventing and ameliorating maladaptive and psychopathological outcomes. Increasingly, efforts are being made to conduct investigations at multiple levels of analysis and to translate basic research knowledge into real world contexts. In this article, the contributions, challenges, and future directions of the field are highlighted.

Keywords

developmental psychopathology; interdisciplinary; multiple levels of analysis; translational research

Special Issues of scientific journals often signify noteworthy junctures in the development and maturation of a discipline. The publication of this Special Issue commemorating the 50th anniversary volume of the *Journal of Child Psychology and Psychiatry* provides us with an occasion to reflect upon the scientific discoveries, advances, and challenges that have occurred and that have brought us to our current state of knowledge in the field of developmental psychopathology. As we contemplate these historical events in the context of the future that awaits us, we are provided with a unique and enviable opportunity for reflection, creativity, and prognostication regarding the issues that are likely to exert a major impact upon determining the future foci of the field of developmental psychopathology.

Although precise definitional divergence exists, developmental psychopathology can be conceptualized as an evolving interdisciplinary scientific field that seeks to elucidate the interplay among the biological, psychological, and social-contextual aspects of normal and abnormal development across the life course. Because psychopathology unfolds over time in a developing organism, it is critical to adopt a developmental perspective in order to understand the processes underlying individual pathways to adaptive and maladaptive outcomes (Sroufe, 1989, 2007). A “developmental analysis” presupposes change and novelty, highlights the critical role of timing in the organization of behavior, underscores multiple determinants, and cautions against expecting invariant relations between causes and outcomes. Moreover, a developmental analysis is as applicable to the study of the gene or

cell as it is to the investigation of the individual, family, or society (Cicchetti & Pogge-Hesse, 1982).

Despite its relatively recent crystallization as a coherent framework for examining and conceptualizing the links between the study of psychopathology and development, developmental psychopathology owes its ascendance and coalescence as a scientific discipline to many historically based endeavors within a variety of areas, including embryology, epidemiology, genetics, neuroscience, philosophy, psychiatry, psychoanalysis, clinical, developmental, experimental, and physiological psychology, and sociology (Cicchetti, 1990). Before developmental psychopathology could emerge as an integrative discipline with its own integrity, the efforts of those working in the aforementioned related fields had been separate and distinct (Cicchetti, 1984). In part, the lack of integration across disciplines stemmed from long-standing tensions between the philosophical traditions underlying academic training and clinical practice and between basic and applied research.

Principles Inherent to a Developmental Psychopathology Perspective

An ongoing goal of developmental psychopathology has been to become a science that not only bridges fields of study and aids in the discovery of important new truths about the processes underlying adaptation and maladaptation across the life course, but also to provide the best means of preventing and ameliorating maladaptive and pathological outcomes (Cicchetti, 1990; Sroufe & Rutter, 1984). Moreover, the field of developmental psychopathology has continuously sought to reduce the dualisms that exist between empirical research and the clinical study and treatment of childhood and adult high-risk conditions and mental disorders, between the behavioral and biological sciences, and between basic and applied research (Cicchetti, 1990; Masten, 2006; Toth & Cicchetti, 1999).

The essence and uniqueness of a developmental psychopathology perspective lies in its focus on both normal and abnormal, adaptive and maladaptive, developmental processes. A basic theme in the writings of the early systematizers in the field is that because all psychopathology can be conceived as a distortion, disturbance, or degeneration of normal functioning, it follows that, if one wishes to comprehend psychopathology more fully, then one must understand the normal functioning with which psychopathology is compared (Cicchetti, 1984, 1990, 1993; Rutter, 1986; Sroufe, 1990). Not only is knowledge of normal biological, psychological, and social processes exceedingly useful for assessing, diagnosing, understanding, preventing, and treating psychopathology, but also the deviations from and distortions of normal development that characterize pathological processes indicate in exciting ways how normal development may be better investigated and understood.

These naturally occurring conditions, including populations of children reared in institutions, children who have experienced abuse and neglect, persons with brain damage, and individuals with mental disorders, have provided an entrée into the study of system organization, disorganization, and reorganization that is otherwise not possible due to the ethical constraints associated with conducting experimental research with human participants (Cicchetti, 2003; Rutter, 2007). Because there are limits to experimental manipulations that can be invoked with humans, and because the investigation of a system in its smoothly operating normal or healthy state does not afford the opportunity to comprehend the interrelations among its component subsystems, utilization of samples of individuals who are experiencing difficulties frequently is the only way to examine developmental processes in their full complexity.

If we decide to bypass or ignore the study of these atypical phenomena, then the eventual result is likely to be the construction of theories that are contradicted by the revelation of

critical facts discovered through research on maladaptation and psychopathology (cf. Lenneberg, 1967). However, when extrapolating from atypical populations with the goal of informing developmental theory, it is essential that a range of high-risk conditions and mental disorders be investigated. The examination of a single pathological or risk process may eventuate in spurious conclusions if generalizations are made solely on that condition or disorder. However, if a specific biological or behavioral pattern is viewed in the light of an entire spectrum of disordered modifications, then it may be possible to attain significant insight into the processes of development not generally achieved through sole reliance on studies of relatively nondisordered populations.

Investigators in the field of developmental psychopathology also are invested in comprehending individual pathways to competent adaptation despite exposure to significant adversity or prolonged trauma (i.e., resilience – see Luthar, Cicchetti, & Becker, 2000; Masten, 2001). Moreover, developmental psychopathologists emphasize the importance of understanding the functioning of individuals who, after having diverged onto deviant developmental pathways, resume positive functioning and achieve adequate adaptation (Cicchetti & Rogosch, 1997; Masten, 2006; Zigler & Glick, 1986).

The field of developmental psychopathology transcends traditional disciplinary boundaries and provides fertile ground for moving beyond descriptive facts to a process-level understanding of adaptive and maladaptive, normal and abnormal, trajectories of individual development. Research conducted within a developmental psychopathology framework may challenge assumptions about what constitutes health or pathology and may redefine the manner in which the mental health community operationalizes, assesses, classifies, communicates about, and treats the adjustment problems and functional impairments of infants, children, adolescents, and adults (Cicchetti & Toth, 1998). Thus, one of developmental psychopathology's potential contributions lies in the heuristic power it holds for translating facts into knowledge, understanding, and practical application (Cicchetti & Toth, 2000, 2006). Accordingly, such a developmental perspective may aid in the prevention and reduction of the individual and societal burden of mental disorder, alleviate the onus of suffering that mental illness engenders in individuals, their families, and the communities in which they reside, and contribute toward eliminating the stigma commonly associated with the presence of mental disorder (Hinshaw, 2007; Hinshaw & Cicchetti, 2000).

What Have We Learned Thus Far?: Some Illustrations

During the four-plus decades since the emergence of the field, substantial progress has taken place. Indeed, remarkable advances have occurred in understanding the complexity of causality, the interaction of risk and protective factors, the probabilistic rather than the causal status of risk and protective factors, the heterogeneity of mental disorder, and the importance of developmental processes and mechanisms in elucidating pathways to adaptation and maladaptation (Kraemer et al., 1997; Rutter & Sroufe, 2000; Sroufe, 1997). Although they had been in use in biology for nearly three decades before they emerged in the vocabulary of psychopathologists, concepts of developmental pathways, multifinality and equifinality, now are prominent in the field (Cicchetti, 1990; Cicchetti & Rogosch, 1996; Sroufe, 1989).

It is known that a variety of developmental progressions may eventuate in a given disorder (i.e., equifinality), rather than expecting a singular primary pathway to the disorder. For example, Sroufe (1989) discovered that there were multiple, alternative causal pathways to attention deficit hyperactivity disorder (ADHD), one predominantly biological, the other largely attributable to insensitive caregiving. Likewise, Cicchetti and Rogosch (1997) demonstrated that there were different developmental pathways for resilient maltreated and

resilient nonmaltreated children. Ego overcontrol, or a more reserved, guarded approach, appeared to be better suited for maltreated children in adapting to their particular environments. Restraining from emotional reactivity in volatile family circumstances was thought to serve a protective function for maltreated children, but may be problematic for nonmaltreated children.

Additionally, the same risk and protective factors may lead to or be associated with different outcomes (i.e., multifinality). For example, the development of an insecure attachment relationship with one's primary caregiver in childhood may eventuate in any number of outcomes for children, depending on the context of their environments and their individual competencies and coping strategies (Greenberg, Speltz, & DeKlyen, 1993). One such outcome may be conduct disorder, in a child who has the genetic and neurobiological diathesis, who has an insecure representational model of the self, and who faces extremes of additional stress in the form of a violent home and/or community environment in conjunction with minimal support or nurturance from caregivers (Richters & Cicchetti, 1993). Likewise, not all sexually abused children develop psychopathology, let alone the same type of mental disorder (Kendall-Tackett, Williams, & Finkelhor, 1993).

The knowledge that there are multiple pathways to similar manifest outcomes and that there are different outcomes of the same pathway ultimately may contribute to the implementation of important refinements in the extant diagnostic classification of mental disorders (Richters & Cicchetti, 1993; Sroufe, 1997). Moreover, the incorporation of pathways concepts also strongly calls attention to the importance of conducting process-oriented studies and of reframing the questions asked in research on the antecedents and consequences of mental disorder. Specifically, rather than searching for the indicators or predictors of later maladaptation or disorder, the central focus of developmental psychopathology has shifted to investigating and describing the interactive processes that lead to the emergence and course of disturbed behavior. Question such as "what are the various factors that initiate and maintain individuals on pathways probabilistically associated with a particular disorder and a family of related outcomes?" and "what differentiates those individuals progressing to disorder 'X' from those progressing to disorder 'Y' and those who do not develop maladaptively or do not develop a mental disorder?" have increasingly come to the fore. Although some researchers emphasize one set of initiating and maintaining conditions, whereas other researchers accentuate divergent factors, the answer to questions such as those posed above require the utilization of developmental studies. As scientists increasingly conceptualize and design their investigations with the pathways concepts of equifinality and multifinality as a foundation, we will move progressively closer to attaining the unique goals of developmental psychopathology, first explicated by Sroufe and Rutter (1984), -- to explain the development of individual patterns of adaptation and maladaptation.

Our knowledge of developmental biology, the area of neuroscience that focuses on factors regulating the development of neurons, neuronal circuitry, and complex neuronal systems, including the brain, also has burgeoned. A rapid growth in sophisticated techniques that allow for anatomical and physiological imaging of the brain to occur has taken place (Thomas & Cicchetti, in press). These new neuroimaging methods have been used to enhance our understanding of normal and abnormal neurobiological development and of the processes linking neurodevelopmental factors and later disordered outcomes (Cicchetti & Cannon, 1999).

There also has been increasing recognition of the dynamic interplay of influences over developmental time. One of the most dramatic examples of this has been the research on experience-dependent brain development (Greenough, Black & Wallace, 1987). It is now widely recognized that neurobiological development and experience are mutually

influencing (Cicchetti & Tucker, 1994; Eisenberg, 1995). Rather than adhering to a unidimensional belief in the deterministic role that unfolding biology exerts on behavior, it is now widely believed that brain function and its subsequent influence on behavior possesses self-organizing functions that can, in fact, be altered by experiences incurred during sensitive periods of development that occur across the life course (Cicchetti & Tucker, 1994; Nelson & Bloom, 1997).

Experience-dependent synapse formation involves the brain's adaptation to information that is unique to the individual (Black, Jones, Nelson, & Greenough, 1998). Experience-dependent synaptogenesis is localized to the brain regions involved in processing information arising from the event experienced by the individual. For example, children endowed with normal brains may encounter a number of experiences (e.g., extreme poverty, early and chronic child abuse and neglect, etc.) that can exert deleterious impacts upon neurobiological development. Pathological experience may become part of a vicious cycle, as the pathology induced in brain structure may distort the child's experience, with subsequent alterations in cognition or social interactions causing additional pathological experience and added brain pathology (Black et al., 1998; Cicchetti & Tucker, 1994).

We increasingly recognize that the mechanisms of neural plasticity are integral to the very anatomical structure of cortical tissue, and that they cause the formation of the brain to involve an extended malleable process that presents developmental psychopathologists with new avenues for understanding the vulnerability of the brain as a basis for the emergence of mental disorder. Perturbations that take place in the developing brain can trigger a cascade of growth and function changes that lead the neural system down a path that deviates from that usually taken in normal neurobiological development, leading to the development of aberrant neural circuitry that contributes to these early developmental abnormalities eventuating in relatively enduring forms of psychopathology (Cicchetti, 2002).

Furthermore, advances in molecular biology and molecular genetics, including the completion of the DNA sequencing of the human genome and the publication of the map of human haplotypes that provides valuable information about individual genetic variation, have helped to engender renewed interest in the contribution that investigations on gene-environment (G×E) interaction can make to unraveling the complex pathways to normality, psychopathology, and resilience (Cicchetti & Curtis, 2006; Moffitt, Caspi, & Rutter, 2006). The empirical contributions of a molecular genetic approach make the search for the intermediate developmental mechanisms in the (Gene→Brain) × E interconnection more accessible than ever before (Gottesman & Hanson, 2005). Moreover, progress in molecular genetics and on G×E research on psychopathology raises hopes of developing interventions to prevent and remediate mental disorder and to promote resilience (Cicchetti & Curtis, 2006; Moffitt et al., 2006).

Finally, developmental psychopathology has played a significant role in contributing to the development of clinical initiatives directed toward the prevention and treatment of mental disorders. By elucidating developmental mechanisms that are linked with the initiation or avoidance of maladaptation and psychopathology, theoretically-informed interventions have been developed and evaluated (Izard et al., 2002; Toth, Rogosch, Manly, & Cicchetti, 2006). For example, Fisher, Gunnar, Dozier, Bruce, and Pears (2006) report the results of two randomized controlled preventive trials involving infants, toddlers, and preschoolers in foster care. These interventions were able to exert positive effects on many areas of functioning that have been shown to be negatively affected by early stress – including hypothalamic-pituitary-adrenal (HPA) axis activity, behavior, and attachment to caregivers (see also Cicchetti & Gunnar, in press). Importantly, developmentally-informed prevention

and intervention strategies also have contributed to refinements in developmental theory (Cicchetti & Hinshaw, 2002).

Future Perspectives

In a relatively brief period of time, the field of developmental psychopathology has demonstrated that it can play a significant role in increasing our understanding of risk and psychopathology and in bridging the schism that has for too long separated the worlds of basic research and clinical practice. In order to sustain this momentum and to foster new advances, a number of challenges that lie ahead must be addressed. Perhaps most significantly, there must be continued striving toward and progress made to attain enhanced fidelity among the elegance and complexity of the theoretical models extant in the field, the definitional parameters inherent to a developmental psychopathology perspective, and the design, measurement, and data analytic strategies employed in our investigations of risk, disorder, and adaptation across the life course.

Multiple-Levels-of-Analysis

In order to continue to foster the advances that have occurred in understanding developmental processes in both normal development and psychopathology, it is essential that a multiple-levels-of-analysis approach and an interdisciplinary perspective be increasingly incorporated into the field. Because one of the major goals of developmental psychopathology is to comprehend individual patterns of adaptation and to understand the “whole organism” (Sroufe & Rutter, 1984; Zigler & Glick, 1986), calls for interdisciplinary research and a multiple-levels-of analysis approach have been gaining momentum in scientific laboratories across the country (Cicchetti & Dawson, 2002; Cicchetti & Posner, 2005; Pellmar & Eisenberg, 2000).

Although some problems are best addressed with the methods and concepts of a single discipline, other issues require interdisciplinary integration in order to fully comprehend the complexities that are present. This is particularly true when grappling with psychopathology. Thus, investigators and investigative teams must direct their collective energies toward an examination of multiple-levels-of analysis within the same individual. The sophisticated and comprehensive portrayals of adaptation and maladaptation that ensue will serve not only to advance scientific understanding, but also to inform efforts to prevent and ameliorate psychopathology.

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. Although growing attention has been directed toward discovering the processes through which individuals at high risk for psychopathology do not develop maladaptively, until quite recently the empirical study of resilience has focused exclusively on detecting the psychosocial determinants of the phenomenon (Charney, 2004; Curtis & Cicchetti, 2003; but see Cicchetti & Curtis, 2007). To understand psychopathology and resilience in their full complexity, 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. Therefore, no component, subsystem or level of organization possesses causal privilege in the developmental system (Thelen & Smith, 1998). Because levels of organization and processes are reciprocally interactive, it is difficult, if not impossible, to impute ultimate causation to one level over another. It is the mutual relationship between at least two components of the developmental system that influences developmental organization or disorganization (Gottlieb, 1992).

Since different levels of analysis constrain other levels, as developmental psychopathologists 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 of inquiry. 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. As is true in systems neuroscience, it is essential that an integrative framework that incorporates all levels of analysis about complex systems in the development of psychopathology or in the promotion of resilience be utilized. Rather than adhering to a single domain or unitary disciplinary focus, striving for a multi-domain, multi-level synthesis may impel researchers to broaden their visions and thereby lead to the formulation of integrative developmental theories that can elucidate both normal and abnormal forms of ontogenesis across developing systems.

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 focused on addressing 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.

In contrast with the viewpoint that mental illnesses should be conceived as “brain disorders” or “brain diseases,” a multiple-levels-of analysis approach suggests that mental disorders can better be conceptualized in a more dynamic fashion that reflects the probabilistic, bidirectional, and transactional nature of genetic, neurobiological, social, psychological, and pre- and postnatal environmental influences over the life course. Whereas the brain is clearly involved in all forms of mental disorder, many other levels contribute and transact with the brain in dynamic fashion to bring about experience-dependent brain development. Although many types of mental disorder may be characterized by strong psychobiological predispositions, the “brain disorder” concept may connote primacy or exclusivity for the biology and fail to adequately capture the transactional processes that are operative between biology and the broader psychological and social environments. An alternative to the “brain disorder” viewpoint would be to conceptualize mental illnesses as involving dysfunction among multiple and transacting developmental processes.

Beyond the calls for research programs incorporating multiple levels of analysis seen in recent overviews of the field, such research must actually be supported by funding agencies, some of whom continue to view multiple-levels-of-analysis approaches to research questions as too broad and risky to merit financial support. In addition, journal editors need to encourage such research by increasing their willingness to publish papers that investigate a phenomenon across multiple levels of analysis, some of which might fall somewhat outside the purview of the particular journal. Furthermore, research in developmental psychopathology that is driven by broadly based theory incorporating multiple levels of analysis must increasingly be encouraged by faculty in the context of graduate training.

In order to ensure that future generations of scholars in developmental psychopathology are exposed to a broad, dynamic, systems-based, multiple-levels-of-analysis perspective, undergraduate and graduate programs in clinical and developmental psychology need to encourage students to take courses in a broad spectrum of areas. These might include courses on basic molecular biology, neuroendocrinology, neuroscience, and developmental processes, as well as courses that incorporate information on brain-imaging technology, molecular genetic methods, neuroendocrine and immunological assay techniques, and other tools involved in assessing neurobiological and genetic processes. Likewise, students in

basic science areas, such as neuroscience or genetics, should be encouraged to gain exposure to the fundamentals of basic normative and atypical developmental processes. Further, specific interdisciplinary programs, for both students and faculty, spanning interest areas from clinical intervention to basic neuroscience and genetics, would help to foster communication and collaborative research endeavors between these scientific fields and developmental psychopathology.

The Importance of Prevention and Intervention Science to Developmental Psychopathology

Although progress has occurred in recent decades, theory and empirical research on basic developmental processes should increasingly be used to inform prevention and intervention efforts to a greater extent than is the norm (Toth & Cicchetti, 1999). Conversely, the scientific evaluation of randomized clinical prevention and intervention trials can provide unprecedented and essential insights into affirming, challenging, and augmenting existing developmental theories. For example, if the developmental course is altered as a result of the implementation of preventive interventions and the risk for negative outcomes is reduced, then prevention research will be able to contribute to specifying the processes that are involved in the emergence of maladaptive developmental outcomes and psychopathology (Ialongo et al., 2006). As true experiments in modifying the developmental course, prevention trials can provide insight into the etiology and pathogenesis of disordered outcomes.

It is now time to conduct intervention evaluations that routinely incorporate both behavioral and biological measures into their design (Cicchetti & Gunnar, in press). Such multi-level intervention evaluations would enable scientists not only to assess theoretically predicted behavioral changes, but also to ascertain whether abnormal biological structures, functions, and organizations are modifiable or are refractory to intervention. There is growing support in the animal literature that efficacious intervention modifies not only maladaptive behavior, but also the cellular and physiological correlates of behavior. Successful preventive interventions with humans may alter behavior and physiology through producing alterations in gene expression that create a new structural organization in the brain (Kandel, 1999).

Presently, we do not know if the neurobiological difficulties displayed by some persons with mental disorders or individuals who have experienced significant life adversity are irreversible or whether there are particular sensitive periods when it is more likely that neural plasticity will occur. Moreover, it is not known whether some neural systems may be more plastic than other neural systems or whether particular neural systems may be more refractory to change or have a more time-limited window when neural plasticity can occur. The conduct of multi-level interventions at various points in the developmental lifespan has the potential to provide answers to these provocative questions.

Furthermore, the incorporation of a neurobiological framework into interventions seeking to improve maladaptation, promote resilient functioning, or to repair positive adaptations gone awry, may contribute to the ability to design individualized interventions that are based on knowledge gleaned from multiple levels of biological and psychological levels of analysis. It is conceivable that efficacious, resilience-promoting interventions may be conceptualized as experience-dependent plasticity. Cultural Considerations and Developmental Psychopathology

Over the course of the twentieth century, conceptualizations of culture and its role in both normal and atypical human development have changed significantly (Garcia Coll, Akerman, & Cicchetti, 2000). Specifically, with respect to understanding the experience of psychopathology among minority populations, an important paradigm shift has occurred regarding “difference” versus “deficit” approaches (Garcia Coll et al., 1996). Whereas

historically differences between adaptation in majority and minority groups were viewed as reflecting deficits in the minority populations, it is increasingly clear that differences also can function as strengths for members of minority groups. More recent models posit that varied cultures, lifestyles, and developmental outcomes that differ from standards derived from the White middle-class mainstream are legitimate adaptations to contextual demands or are valuable in their own right (Garcia Coll et al., 2000). Although during its infancy developmental psychopathology was considered to be at risk of becoming a monocultural science, as the discipline has matured more integrative approaches to understanding risk, resilience, and psychopathology among minority groups have emerged. In fact, research conceived within a developmental psychopathology tradition has increasingly elucidated varied pathways to adaptation in different racial and ethnic groups. The increased understanding that has emerged as a function of broader and more accurate perspectives on development within specific racial and ethnic groups possesses significant implications for understanding and treating individuals with mental illness. Unfortunately, the stigmatization associated with mental illness among some racial and ethnic groups and continued disparities in accessing high quality and empirically-supported interventions highlights the importance of investigations conceived within a developmental psychopathology framework continuing to incorporate cultural contexts into study designs and treatment evaluations.

Translational Research

The growth of basic research knowledge in developmental psychopathology has significantly exceeded its application to clinical disorders. To improve the health and well-being of individuals, scientific discoveries must be translated into practical applications (Gunnar & Cicchetti, in press). Translational research involves a subset of interdisciplinary research that integrates information from clinical settings and basic research laboratories. In a report of the National Advisory Mental Health Council (2000, p. v) entitled *Translating Behavioral Science into Action*, the workgroup concluded that “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 policy making.” 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 principles of developmental psychopathology—namely, the reciprocal interplay between basic and applied research and between normal and atypical development.

Translational research is needed to impart more scientific knowledge of genetic, neurobiological, cognitive, social-cognitive and emotional processes to the understanding and treatment of mental disorders. Rather than an all or none approach, the conduct of translational research necessarily must involve a process that includes various steps taken along the way. There must be a recognition and agreement that basic research should be conceived within a conceptual framework that understands the goal of informing future application.

Given the substantial monetary investment in supporting both basic research with relevance to the understanding and treatment of mental illness and in randomized prevention and treatment trials, it is of paramount importance that the knowledge gained from such endeavors be exported into real-world contexts. Researchers must be advocates, not only for the scientific dissemination of knowledge, but also for reaching policymakers and clinicians who may lack the understanding or resources needed to provide interventions that have been found to be efficacious. It would be naïve to suggest that impediments to implementing evidence-supported treatments in nonresearch settings do not exist. However, although

efforts to traverse the path from the university laboratory to the clinical world may cause apprehension, avoidance, and resistance, such a journey must not be avoided. Rather, as a field we need to embrace the diversity among us, equally welcoming potentially elucidating contributions from basic researchers and frontline professionals. Such collaborative endeavors and active efforts to improve the conduct and utilization of research and the scientific base of practice will benefit researchers, practitioners, policymakers, and most importantly, vulnerable children and families.

Conclusion

Despite the significant advances that have occurred in the field of developmental psychopathology, important work lies ahead. Undoubtedly these future developments will build upon the venerable contributions of the past; however, as work in the field becomes increasingly interdisciplinary and technologically sophisticated, it is essential that even more emphasis be directed toward the process of development (Harter, 2006; Sroufe, 2007). Development is always the result of interdependence, co-actions, or co-determination among multiple levels of influence (Gottlieb, 1992; Sroufe, 2007). It is not only genes and environments, but also the cumulative developmental history of the individual, that influence how future development will unfold (Sroufe, 2007).

Much of the momentum generated by the developmental psychopathology framework has emanated from receptivity to and respect for preexisting knowledge in combination with a willingness to question established beliefs, thereby continuing to promote disciplinary growth. Moreover, developmental psychopathologists have incorporated concepts and methods derived from other disciplinary endeavors that are too often isolated from each other, thereby generating advances in knowledge that might have been missed in the absence of cross-disciplinary dialogue. 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 increase the benefits to be derived for society as a whole.

Acknowledgments

Our work on this paper was supported by grants from the National Institute of Drug Abuse (DA017741-01), the National Institute of Mental Health (MH 067792-1), and the Spunk Fund, Inc.

References

- Black, J.E.; Jones, T.A.; Nelson, C.A.; Greenough, W.T. Neuronal plasticity and the developing brain. In: Alessi, N.E.; Coyle, J.F.; Harrison, S.I.; Eth, S., editors. *Handbook of Child and Adolescent Psychiatry*. New York: Wiley; 1998. p. 31-53.
- Cicchetti D. The emergence of developmental psychopathology. *Child Development*. 1984; 55:1-7. [PubMed: 6705613]
- Cicchetti, D. A historical perspective on the discipline of developmental psychopathology. In: Rolf, J.; Masten, A.; Cicchetti, D.; Nuechterlein, K.; Weintraub, S., editors. *Risk and protective factors in the development of psychopathology*. New York: Cambridge University Press; 1990. p. 2-28.
- Cicchetti D. Developmental psychopathology: Reactions, reflections, projections. *Developmental Review*. 1993; 13:471-502.
- Cicchetti, D. How a child builds a brain: Insights from normality and psychopathology. In: Hartup, W.; Weinberg, R., editors. *Minnesota symposia on child psychology: Child psychology in retrospect and prospect*. Vol. 32. Mahwah, NJ: Lawrence Erlbaum Associates; 2002. p. 23-71.
- Cicchetti D. Experiments of nature: Contributions to developmental theory [Special Issue]. *Development and Psychopathology*. 2003; 15(4):833-1106. [PubMed: 14984128]

- Cicchetti D, Cannon TD. Neurodevelopmental processes in the ontogenesis and epigenesis of psychopathology. *Development and Psychopathology*. 1999; 11:375–393. [PubMed: 10532615]
- Cicchetti, D.; Curtis, WJ. The developing brain and neural plasticity: Implications for normality, psychopathology, and resilience. In: Cicchetti, D.; Cohen, D., editors. *Developmental Psychopathology*. 2. Vol. 2. New York: Wiley; 2006. p. 1-64. *Developmental Neuroscience*
- Cicchetti D, Curtis WJ. A multi-level approach to resilience [Special Issue]. *Development and Psychopathology*. 2007; 19(3):627–955. [PubMed: 17972420]
- Cicchetti D, Dawson G. Multiple levels of analysis [Special Issue]. *Development and Psychopathology*. 2002; 14(3):417–666. [PubMed: 12349866]
- Cicchetti D, Gunnar MR. Integrating Biological Processes into the Design and Evaluation of Preventive Interventions [Special Issue]. *Development and Psychopathology*. 20(3) in press.
- Cicchetti D, Hinshaw SP. Prevention and intervention science: Contributions to developmental theory [Special Issue]. *Development and Psychopathology*. 2002; 14(4):667–981. [PubMed: 12549698]
- Cicchetti, D.; Pogge-Hesse, P. Possible contributions of the study of organically retarded persons to developmental theory. In: Zigler, E.; Balla, D., editors. *Mental retardation: The developmental-difference controversy*. Hillsdale, NJ: Lawrence Erlbaum Associates; 1982. p. 277-318.
- Cicchetti D, Posner MI. Integrating cognitive and affective neuroscience and developmental psychopathology [Special Issue]. *Development and Psychopathology*. 2005; 17(3):569–891. [PubMed: 16262982]
- Cicchetti D, Rogosch FA. Equifinality and multifinality in developmental psychopathology. *Development and Psychopathology*. 1996; 8:597–600.
- Cicchetti D, Rogosch FA. The role of self-organization in the promotion of resilience in maltreated children. *Development and Psychopathology*. 1997; 9:799–817.
- Cicchetti, D.; Toth, SL. Perspectives on research and practice in developmental psychopathology. In: Damon, W., editor. *Handbook of child psychology*. 4. Vol. 5. New York: Wiley; 1998. p. 479-583.
- Cicchetti D, Toth SL. Social policy implications of research in developmental psychopathology [Special Issue]. *Development and Psychopathology*. 2000; 12(4):551–885. [PubMed: 11202033]
- Cicchetti D, Toth SL. Translational Research in Developmental Psychopathology. [Special Issue]. *Development and Psychopathology*. 2006; 18(3):619–933. [PubMed: 17152393]
- Cicchetti D, Tucker D. Development and self-regulatory structures of the mind. *Development and Psychopathology*. 1994; 6:533–549.
- Curtis WJ, Cicchetti D. Moving research on resilience into the 21st century: Theoretical and methodological considerations in examining the biological contributors to resilience. *Development and Psychopathology*. 2003; 15:773–810. [PubMed: 14582940]
- Eisenberg L. The social construction of the human brain. *American Journal of Psychiatry*. 1995; 152:1563–1575. [PubMed: 7485618]
- Fisher PA, Gunnar MR, Dozier M, Bruce J, Pears KC. Effects of therapeutic interventions for foster children on behavioral problems, caregiver attachment, and stress regulatory neural systems. *Annals of the New York Academy of Sciences*. 2006; 1094:215–225. [PubMed: 17347353]
- Gottesman II, Hanson DR. Human development: Biological and genetic processes. *Annual Review of Psychology*. 2005; 56:263–286.
- Gottlieb, G. *Individual development and evolution: The genesis of novel behavior*. New York: Oxford University Press; 1992.
- Greenberg MT, Speltz ML, DeKlyen M. The role of attachment in the early development of disruptive behavior problems. *Development and Psychopathology*. 1993; 19:191–213.
- Greenough W, Black J, Wallace C. Experience and brain development. *Child Development*. 1987; 58:539–559. [PubMed: 3038480]
- Gunnar, MR.; Cicchetti, D., editors. *Meeting the Challenge of Translational Research in Child Psychology: Minnesota Symposium on Child Psychology*. Vol. 35. New York: Wiley; in press
- Harter, S. Self-processes and developmental psychopathology. In: Cicchetti, D.; Cohen, D., editors. *Developmental Psychopathology*. 2. Vol. 1. New York: Wiley; 2006. p. 370-418.
- Hinshaw, SP. *The Mark of Shame: Stigma of Mental Illness and an Agenda for Change*. New York: Oxford University Press; 2007.

- Hinshaw SP, Cicchetti D. Stigma and mental disorder: Conceptions of illness, public attitudes, personal disclosure, and social policy. *Development and Psychopathology*. 2000; 12:555–598. [PubMed: 11202034]
- Ialongo, N.; Rogosch, FA.; Cicchetti, D.; Toth, SL.; Buckley, J.; Petras, H., et al. A Developmental Psychopathology Approach to the Prevention of Mental Health Disorders. In: Cicchetti, D.; Cohen, D., editors. *Developmental Psychopathology* (2nd ed.), Vol.1: Theory and Method. New York: Wiley; 2006. p. 968-1018.
- Izard CE, Fine S, Mostow A, Trentacosta C, Campbell J. Emotion processes in normal and abnormal development and preventive intervention. *Development and Psychopathology*. 2002; 14(4):761–787. [PubMed: 12549703]
- Kandel ER. Biology and the future of psychoanalysis: A new intellectual framework for psychiatry revisited. *American Journal of Psychiatry*. 1999; 156:505–524. [PubMed: 10200728]
- Kendall-Tackett KA, Williams LM, Finkelhor D. Impact of sexual abuse on children: A review and synthesis of recent empirical studies. *Psychological Bulletin*. 1993; 113:164–180. [PubMed: 8426874]
- Kraemer HC, Kazdin AE, Offord DR, Kessler RC, Jensen PS, Kupfer DJ. Coming to terms with the terms of risk. *Archives of General Psychiatry*. 1997; 54:337–343. [PubMed: 9107150]
- Lenneberg, E. *Biological foundations of language*. New York: Wiley; 1967.
- Luthar SS, Cicchetti D, Becker B. The construct of resilience: A critical evaluation and guidelines for future work. *Child Development*. 2000; 71:543–562. [PubMed: 10953923]
- Masten AS. Ordinary magic: Resilience processes in development. *American Psychologist*. 2001; 56(3):227–238. [PubMed: 11315249]
- Masten AS. Developmental psychopathology: Pathways to the future. *International Journal of Behavioral Development*. 2006; 31:47–54.
- Moffitt TE, Caspi A, Rutter M. Measured gene-environment interactions in psychopathology: Concepts, research strategies, and implications for research, intervention, and public understanding of genetics perspectives on psychological science. *Perspectives on Psychological Science*. 2006; 1(1):5–27.
- Nelson CA, Bloom FE. Child development and neuroscience. *Child Development*. 1997; 68:970–987.
- Pellmar, TC.; Eisenberg, L., editors. *Bridging disciplines in the brain, behavioral, and clinical sciences*. Washington, DC: National Academy Press; 2000.
- Richters JE, Cicchetti D. Mark Twain meets DSM-III-R: Conduct disorder, development, and the concept of harmful dysfunction. *Development and Psychopathology*. 1993; 5:5–29.
- Rutter M. Child psychiatry: The interface between clinical and developmental research. *Psychological Medicine*. 1986; 16:151–160. [PubMed: 3961041]
- Rutter M. Proceeding from observed correlation to causal inference: The use of natural experiments. *Perspectives on Psychological Science*. 2007; 2:377–395.
- Rutter M, Sroufe LA. Developmental psychopathology: Concepts and challenges. *Development and Psychopathology*. 2000; 12:265–296. [PubMed: 11014739]
- Sroufe, LA. Pathways to adaptation and maladaptation: Psychopathology as developmental deviation. In: Cicchetti, D., editor. *Rochester symposium on developmental psychopathology: The emergence of a discipline*. Vol. 1. Hillsdale, NJ: Lawrence Erlbaum Associates; 1989. p. 13-40.
- Sroufe LA. Considering normal and abnormal together: The essence of developmental psychopathology. *Development and Psychopathology*. 1990; 2:335–347.
- Sroufe LA. Psychopathology as an outcome of development. *Development and Psychopathology*. 1997; 9:251–268. [PubMed: 9201444]
- Sroufe, LA. The place of development in developmental psychopathology. In: Masten, AS., editor. *Multilevel dynamics in developmental psychopathology: The Minnesota Symposia on Child Psychology*. Vol. 34. Mahwah, NJ: Lawrence Erlbaum Associates; 2007. p. 285-299.
- Sroufe LA, Rutter M. The domain of developmental psychopathology. *Child Development*. 1984; 55:17–29. [PubMed: 6705619]

- Thelen, E.; Smith, LB. Dynamic systems theories. In: Damon, W.; Lerner, R., editors. Handbook of child psychology: Volume 1. Theoretical, models of human development. New York: John Wiley & Sons, Inc; 1998. p. 563-634.
- Thomas K, Cicchetti D. Imaging Brain Systems in Normality and Psychopathology [Special Issue]. Development and Psychopathology. 20(4) in press.
- Toth, SL.; Cicchetti, D. Developmental psychopathology and child psychotherapy. In: Russ, S.; Ollendick, T., editors. Handbook of psychotherapies with children and families. New York: Plenum Press; 1999. p. 15-44.
- Toth SL, Rogosch FA, Manly JT, Cicchetti D. The efficacy of toddler-parent psychotherapy to reorganize attachment in the young offspring of mothers with major depressive disorder. Journal of Consulting & Clinical Psychology. 2006; 74(6):1006–1016. [PubMed: 17154731]
- Zigler, E.; Glick, M. A developmental approach to adult psychopathology. New York: Wiley; 1986.

- Developmental psychopathology examines processes underlying the interrelation between adaptive and maladaptive development over the life course.
- A multiple levels of analysis approach and an interdisciplinary perspective must be incorporated into the field.
- Theory and empirical research on basic biological and psychological developmental processes must increasingly be used to inform prevention and intervention initiatives.
- Investigations conceived within a developmental psychopathology framework must continue to incorporate cultural contexts into study designs and treatment initiatives.
- Scientific discoveries emanating from developmental psychopathology must be translated into practical applications.