Resilience and Vulnerability

Adaptation in the Context of Childhood Adversities

Childhood resilience is the phenomenon of positive adaptation despite significant life adversities. While interest in resilience has burgeoned in recent years, there remains considerable uncertainty about what exactly research has taught us about this phenomenon. Integrated in this book are contributions from leading scientists who have each studied children's adjustment across risks common in contemporary society. Chapters in the first half of the book focus on risks emanating from the family; chapters in the second half focus on risks stemming from the wider community. All contributors have explicitly addressed a common set of core themes, including the criteria they used to judge resilience within particular risk settings, the major factors that predict resilience in these settings, the limits to resilience (vulnerabilities coexisting with manifest success), and directions for interventions. In the concluding chapter, the editor integrates evidence presented throughout all preceding chapters to distill (a) substantive considerations for future research and (b) salient directions for interventions and social policies based on accumulated research knowledge.

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For my children,

Nik and Nina

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Foreword

Dante Cicchetti

For more than three decades, researchers interested in children who develop well in the context of significant adversity have endeavored to enhance understanding of the pathways to psychopathology, to elucidate the processes that eventuate in normal development, and to inform preventive interventions and social policies that could improve the lives of vulnerable children and families (see, e.g., Cicchetti & Garmezy, 1993; Garmezy, 1971; Luthar & Cicchetti, 2000; Luthar, Cicchetti, & Becker, 2000; Masten, 2001; Masten, Best, & Garmezy 1990; Werner & Smith, 1982, 1992). Investigations in the area of risk and resilience have caused scientists to rethink their prior assumptions about the causes and course of psychopathology and have resulted in a reformulation of the deficit models that characterized earlier viewpoints about the development of children who have experienced disadvantage and great adversity (Garmezy & Streitman, 1974; Luthar & Zigler, 1991; Masten & Garmezy, 1985; Rutter, 1985).

Studies conducted on high-risk and mentally disordered populations across the life span frequently portrayed the developmental course as deterministic, inevitably resulting in maladaptive and pathological outcomes. Investigations ranging from genetic and biological predispositions, to psychopathology, to assaults on development associated with inadequate caregiving, traumatic occurrences within the home, and exposure to community violence graphically convey the multiplicity of risks that can eventuate in disordered outcomes.

Before investigations on resilience could occur, a significant and illustrative history of research detailing the precursors to, as well as the contemporary patterns of, stress resistance had to take place (see, e.g.,

Garmezy & Rutter, 1983; Luthar & Zigler, 1991). In many of these early studies, researchers had discovered evidence of adaptive behavior; however, the nomenclature for labeling these results as indicative of resilience had not yet emerged. Despite this state of affairs, the historical roots of resilience can be traced to early programs of research on individuals with schizophrenia and on persons exposed to extreme stress and poverty, as well as on the functioning of individuals who experienced traumatic occurrences earlier in their lives (Cicchetti & Garmezy, 1993; Luthar et al., 2000; Pavenstedt, 1965). The seminal work of Garmezy and his colleagues (Garmezy, 1971, 1974; Garmezy, Masten, & Tellegen, 1984; Garmezy & Streitman, 1974) is among the earliest examples of efforts to emphasize the importance of examining protective factors in high-risk populations. This research laid the groundwork for contemporary investigations in the area of resilience (Masten & Curtis, 2000).

Following publication of the early research on resilience, scholarly interest in this topic has burgeoned. In two recent reviews of the scientific literature on resilience, it was concluded that continued examinations of the construct of resilience had the potential to affirm, challenge, and expand extant developmental theory, to suggest useful avenues for preventive interventions to promote competent functioning and resilient adaptation, and to foster the implementation of social policies that could decrease the vast erosion of human potential that mental disorder, maladaptive functioning, and economic misery engender (Luthar & Cicchetti, 2000; Luthar et al., 2000). However, an important conclusion that emanated from the aforementioned reviews was that it was essential for resilience researchers to enhance the scientific rigor of their investigations. Luthar and her colleagues (2000) reasoned that because studies in the area of resilience bear directly on matters of social policy import, researchers must have high standards of evidence and engage in self-scrutiny in their work.

In this timely and important volume, edited by Suniya Luthar, one of the world's premier theorists and researchers on the topic, contributors were given the charge of critically examining resilience, the more optimistic component of the psychopathology–risk equation. Resilience is operationally defined in this volume as a dynamic developmental process reflecting evidence of positive adaptation despite significant life adversity (cf. Egeland, Carlson, & Sroufe, 1993; Luthar et al., 2000; Masten, 2001). Resilience is not believed to be an individual child attribute operating in isolation; rather, it is viewed as a phenomenon,

a hypothetical construct, that must be inferred from an individual's manifesting competent functioning despite experiencing significant adversity (Luthar et al., 2000; Masten & Coatsworth, 1995). In keeping with the myriad familial and exosystemic influences that have been demonstrated to be protective factors or mechanisms in the development of resilience, the majority of the chapters in this volume address these risks through the contributors' coverage of an array of mental disorders and adverse conditions that have been the subject of substantial scientific investigation.

Contributors to this volume were asked to address four themes of significance to resilience research: (1) providing operational definitions of the chosen risk condition and of the methods utilized in its investigation; (2) elucidating salient vulnerability and protective mechanisms; (3) articulating limits to resilient adaptation; and (4) addressing the implications of findings on resilience for intervention and policy formulation. These issues are consistent with a developmental psychopathology perspective, and attention to them will be critical for making the construct of resilience relevant to researchers, social policy formulators, and intervenors.

The authors of the chapters in this volume have done an admirable job of providing accessible, thoughtful, and scholarly discussions of the state of resilience research in their respective areas of expertise. It is apparent that in spite of the challenges linked with examining this dynamic construct, research on resilience has become more sophisticated over the decades since its inception. Moreover, it is clear that the ongoing investigation of resilient trajectories proffers considerable potential for refining the understanding of the processes that contribute to normal and pathological development.

Despite the contributions it has made to date, the field of resilience currently possesses at least two major limitations. First, there has been a paucity of investigations that have included biological and genetic variables as potential protective factors or mechanisms in the development of resilience. Second, and a corollary of the first limitation, few investigators on resilience have conducted their studies at multiple levels of analysis. The editor of the present volume clearly possessed insight into these shortcomings of the extant resilience literature. Luthar had the prescience to solicit chapters from experts in the fields of neuroscience and genetics. With the goal of transcending the current focus on psychosocial indices of resilience, the authors of these chapters were asked to discuss

the implications that research conducted in the neurosciences and genetics can have for elucidating the pathways to resilience and for suggesting means of promoting competent functioning in individuals experiencing substantial adversity.

It is unfortunate that we possess such limited information on these aspects of resilience. Indeed, one of the basic mechanisms of resilience, that of self-righting, has its roots in embryology and genetics (Waddington, 1957). Moreover, much of the research in the area of resilience is found in the interdisciplinary science of developmental psychopathology, a field that advocates the integration of multiple levels of analysis in the study of risk and resilience within individuals over time (Cicchetti, 1993; Cicchetti & Cannon, 1999; Cicchetti & Dawson, 2002; Cicchetti & Sroufe, 2000).

There are historical parallels in other areas that attest to the advances in understanding a phenomenon that can be obtained by integrating efforts that had been previously separate and distinct. Cowan, Harter, and Kandel (2000) and Kandel and Squire (2000) have described the unprecedented growth and achievements in the fields of neuroanatomy, neurophysiology, and neurochemistry that have occurred during the past several decades. Despite the successes of research in these isolated areas, the current excitement engendered by neurobiological research stems from the integration of several previously independent disciplines into the interdisciplinary framework known as *neuroscience* (Cowan et al., 2000; Kandel & Squire, 2000). Although a number of landmark discoveries took place during the latter part of the 19th century and the first half of the 20th, none of these findings transcended traditional disciplinary boundaries, the defining feature of the contemporary field of neuroscience.

Similarly, although 20th-century biology triumphed because of its focus on the intensive analysis of the individual components of complex biological systems, Lander and Weinberg (2000) have asserted that in the 21st century, the discipline will need to focus increasingly on the examination of entire biological systems. By endeavoring to comprehend how component parts work together to create a whole, scientists will move beyond reductionist approaches to collaborative multidisciplinary investigations that seek to gain a holistic view of cells, tissues, and complex neural systems.

Research in the area of resilience must follow these interdisciplinary, multiple levels of analysis perspectives. There are a number of ways that the incorporation of biological and molecular genetic techniques and the utilization of multiple levels of analysis approach could augment

knowledge on pathways to resilient adaptation. For example, we know that experience and neurobiological development are mutually influencing. It has been demonstrated that experience exerts actions on the brain by feeding back upon it to modify gene expression and brain structure, function, and organization (Kandel, 1998). Furthermore, it has been discovered that alterations in gene expression induced by learning and by social and psychological experiences produce changes in patterns of neuronal and synaptic connections and thus in the function of nerve cells (Kandel, 1998). These modifications not only play a prominent role in initiating and maintaining the behavioral anomalies provoked by social and psychological experiences, they also can contribute to the biological bases of individuality as well as to individuals' being differentially affected by similar experiences.

Thus, although brain development is guided and controlled to some extent by genetic information, a significant portion of brain structuration and neural patterning is thought to occur through interactions of the individual with the environment. Changes in the internal and external environments may lead to improvements in the ability of the individual to grapple with developmental challenges, including the experience of significant adversity. Consequently, although historical factors canalize and constrain the adaptive process to some degree, plasticity is possible as a result of adaptive neural and psychological self-organization (Cicchetti & Tucker, 1994). Moreover, because the mechanisms of plasticity cause the brain's anatomical differentiation to be dependent upon stimulation from the environment, it is now clear that the cytoarchitecture of the cerebral cortex is shaped by input from the social environment. Because the human cortex is only diffusely structured by the genetic plan, and because its eventual differentiation is highly reactive to the individual's active coping in a particular environment, we may expect that both abnormal and resilient outcomes following the experience of significant adversity would encompass a diverse range of cortical network anatomies and personalities.

Future research on the determinants of resilient adaptation in individuals subjected to acute and chronic adversity should examine the biological stress responses of such individuals to ascertain whether their patterns of neuroendocrine regulation differ from those of nonresilient, stress-affected individuals. Persistent overactivation of the stress system (i.e., the limbic-hypothalamic-pituitary-adrenal [LHPA] axis) affects the morphology of the hippocampus and subsequent stress sensitivity (Cicchetti & Walker, 2001a). Likewise, because activation of the stress system impacts

other physiological systems, investigations of systemic immune functioning may yield insights into resilience. Moreover, investigators should utilize structural and functional neuroimaging techniques (e.g., magnetic resonance imaging, functional magnetic resonance imaging, spectroscopy), brain event–related potentials, and indices of autonomic nervous system functioning to ascertain whether individuals designated as resilient by psychological assessments manifest different biological profiles than do their nonresilient counterparts. Sophisticated longitudinal research designs will be needed to answer these complex questions, as resilience is not a static construct. Rather, as discussed by a number of contributors to this volume, an individual may be more or less resilient during various periods of development.

Changes in the LHPA axis mediate the longer-term structural and functional changes in the brain that may arise due to stressful experiences. The impact of hormones on behavior is partially a consequence of their effects on gene expression (McEwen, 1994; Watson & Gametcheu, 1999). It is the glucocorticoid receptors in the cell's nucleus that are responsible for the influence of stress hormones on the expression of genes (Cicchetti & Walker, 2001b). Because stress hormones can exert such direct effects on the genes that control brain structure and function, research that strives to identify stress-sensitive neural processes in developing individuals is important.

Recently, there has been great progress in the understanding of how to study gene expression. These advances offer exciting new opportunities for enhancing knowledge not only of the genesis and epigenesis of psychopathology, but also of resilience. Molecular genetic methods now exist that enable researchers to investigate the expression of particular genes or of large numbers of genes simultaneously (*gene profiles*). Through the utilization of DNA microarrays, researchers can determine the type and quantity of messenger RNA (mRNA) being produced by a given cell, thereby indicating which genes are *turned on* (i.e., activated) (Hacia & Collins, 1999; Mirnics, Middleton, Lewis, & Levitt, 2001; Raychaudhuri, Sutphin, Chang, & Altman, 2001). DNA microarrays can be used to index changes in the expression of genes that are essential for brain function (Greenberg, 2001; Walker & Walder, in press). By examining concurrent environmental, behavioral, psychological, hormonal, gene expression, and neurobiological changes longitudinally in individuals who have experienced great adversity, researchers may be in a stronger position to elucidate the development of resilient adaptation. For example, such

multilevel investigations may reveal the mechanisms responsible for inhibiting the expression of genes that are probabilistically associated with maladaptive developmental outcomes and psychopathology. Likewise, these interdisciplinary approaches may proffer insights into the mechanisms that turn on genes that may serve a protective function for individuals experiencing adversity. Furthermore, a particular condition may not pose risk in the context of another *protective* condition. As Suomi (2001) has discovered, a defect in the serotonin transporter gene conveys no detectable liability (e.g., impulsiveness, distractibility) for rhesus monkeys reared by nurturant foster mothers. In fact, such monkeys become leaders of their peer group.

As evidenced in this volume, the examination of resilience also possesses vast potential for contributing to the development of interventions. For example, Cicchetti and Rogosch (1997) found different predictors of adaptive outcome in maltreated versus nonmaltreated school-age children. Whereas relationship features and ego resilience contributed to positive outcomes in nonmaltreated youngsters, self-system processes, ego resilience, and ego overcontrol were predictive of resilient functioning in maltreated children. Thus, interventions designed to foster self-determination in children who have experienced maltreatment emerge as an exciting research-informed intervention strategy.

In closing, it is gratifying to see this eminent group of scholars striving to utilize rigorous scientific theories and methods in order to ensure that the construct of resilience is empirically grounded. This is critical if work in the area of resilience is to be appropriately applied to intervention and policy arenas. The present volume serves as the bastion of resilience research, elucidating progress and promise, as well as continued challenges facing investigators in this area.

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Preface

This book contains an integrative review of major research findings on resilient adaptation during childhood. As used here, the term *resilience* represents *the manifestation of positive adaptation despite significant life adversity*. Resilience is not a child attribute that can be directly measured; rather, it is a process or phenomenon that is inferred from the dual coexisting conditions of high adversity and relatively positive adaptation in spite of this.

The impetus for this volume stemmed from the widespread and growing appeal of the construct of resilience for scientific researchers, practitioners, and lay people, along with continuing uncertainty about the substantive lessons that derive from research on this construct. Although many believe that research on risk and resilience can yield substantial gains, there have not been concerted efforts to distill salient take-home messages emanating from diverse research programs. It is in an effort at such knowledge integration that this book was compiled. Included here are contributions from several leading scientists, all of whom have studied childhood adaptation across some type of life adversity. The authors are *not* necessarily proponents of the construct of resilience; the central purpose of this book is to integrate findings on children's adjustment in the face of risk rather than to advocate for resilience as a superlative or flawless scientific construct.

CONTENTS AND ORGANIZATION

Compilation of any book of this type inevitably presents difficult choices with regard to breadth versus depth of information, and in this volume

the bias is more toward the latter. Rather than touching briefly upon several disparate risk indices on which relatively little empirical evidence has been obtained so far (e.g., exposure to natural disasters), an effort has been made to integrate existing knowledge on adversity conditions (a) that are relatively common in contemporary society and (b) that have been examined by different research groups via rigorous quantitative research. Thus, there are multiple chapters on each of several discrete themes, such as mental illness in parents and exposure to poverty during childhood. A major goal is to ascertain the degree to which findings on each of these risks are mutually coherent across different studies, as opposed to being largely idiosyncratic, limited to particular investigations or research groups. Such integration of knowledge is critical to allow for meaningful derivation of intervention directions to address problems that commonly affect young people today.

The introductory chapter of this volume presents a brief review of the history of the field of resilience and a description of the pioneering Project Competence initiated by Norman Garmezy, Ann Masten, and their research collaborators. Embedding their own findings within the broader scientific literature, Masten and Powell also present a resilience framework relevant to current efforts in research, practice, and social policy. Following this introductory chapter are the two major parts of this volume, each encompassing a group of environmental risks commonly studied by resilience researchers: those emanating from the *family* and from the wider *community*. In both parts, the chapters contain overviews of available scientific evidence rather than results of single studies. Themes common to all chapters include (a) descriptions of the major risks considered and criteria used to judge successful adaptation in the face of these risks, (b) findings on protective and vulnerability processes, (c) limits to resilience, or the degree to which success in one domain coexists with problems in others, and (d) directions for future research and implications for interventions. The concluding chapters of both parts present research at the interface of science and interventions, elucidating the reciprocal nature of the benefits: Pure science illuminates the nature of protective processes, and intervention research, by changing these, provides a stringent test of whether they are in fact health-promoting.

Following these two major parts are commentaries based on biological and genetics research, areas neglected in existing studies of resilience. John Curtis and Charles Nelson present evidence on brain plasticity, exploring parallels in findings on environmental enrichment among animals as opposed to humans. Drawing upon genetics research,

Sir Michael Rutter – whose writings have enormously shaped the field of resilience since its very inception – delineates issues that need careful attention in future studies in this area. The concluding chapter contains a distillation of salient themes that recur across all chapters in the book, with separate summaries of implications for future research, and for interventions and policies based on the notion of resilience.

The contributors to this volume include some of the most distinguished leaders in developmental science. I am honored to have had this opportunity to work with them, and I am grateful for their forbearance in collaboratively finessing chapters toward a unifying set of themes. For various forms of support over time, I am indebted to my family and several colleagues and students, most especially, P. E. Mow. Deepest appreciation, finally, to the parents and children who, in sharing their lives as participants in our studies, have contributed immeasurably to our understanding of adjustment in the face of adversity. In the years ahead, I hope that the accumulated knowledge within this volume will not only stimulate continued resilience research of the highest caliber but, equally, will be channeled into efforts to improve the life circumstances of vulnerable children and families. Concerted movement in this direction is something that we, in applied developmental science, must treat as our responsibility to them.

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