

Disasters and Their Impact on Child Development: Introduction to the Special Section

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Disasters touch the lives of millions of children every year in many forms. These include natural disasters such as earthquakes, hurricanes, tornadoes, fires, or floods; human-made disasters of armed conflict, genocide, industrial accidents, or terrorism; and disease outbreaks. Interest in the impact of disasters on children among scientists dates back decades to the beginnings of research into risk and resilience in development (Garmezy, 1985; Garmezy & Rutter, 1983). For many years, only a small number of scattered studies of disasters were published on young people, often in the wake of a major catastrophe, such as the Buffalo Creek disaster (Erikson, 1978; Green et al., 1991; Newman, 1976), World War II and the Holocaust (Freud & Burlingham, 1943; Moscovitz, 1985), or a major fire (McFarlane, 1987). In the beginning of the 21st century, with the rise in international terrorism, concerns about flu pandemic, an alarming sequence of natural and human-designed disasters around the world, and globalization of media coverage, there is increasing attention to the consequences of disaster for children and youth (La Greca, Silverman, Vernberg, & Roberts, 2002; Masten & Obradović, 2008; Osofsky, Osofsky, & Harris, 2007; Sagi-Schwarz, Seginer, & Abdeen, 2008). Research into disasters has accelerated despite inherent difficulties in conducting research in the context of catastrophic events. Given the importance of understanding how different types of disasters may impact development for children and families, it was timely to devote a special section of this journal to the impact of disasters on child development.

The goal of the special section on disasters and child development was to provide an opportunity for researchers around the world to examine how disasters of nature and human design might affect children of different ages, experiences, cultures, and contexts, as well as how exposure to a disaster may alter developmental processes or developmental trajectories. Potential contributors were invited to submit a letter of intent by January 15, 2008, and 67 letters for different possible contributions were received. We invited 39 potential contributors to submit full manuscripts for review by May 1, 2008. The 15 articles comprising this special section represent 22% of the submitted letters of intent and 45% of the manuscripts that were submitted for review.

The process of review was complicated by the diversity of the submissions in terms of disaster types and contexts, ages of disaster victims, nationality of authors, disciplinary approach, methods, and focus of the articles (e.g., empirical, conceptual, review, commentary). As editors for this special section, we strove to capture a broad representation of contemporary international scholarship from among the submissions that would reflect the diversity in the field. We were well aware of the challenges of conducting research in the context of disaster (discussed further below) and the constraints posed by ethical and practical dilemmas. In some cases, a study represents rare data obtained by methods that may not meet typical standards of scientific rigor because of the study context (e.g., naturalistic studies in the field or remote locations after a disaster). In all cases, we based the editorial decisions on our judgment of the potential value and unique contribution of the article in the context of current knowledge.

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The articles in the special section collectively provide a picture of the state of the research into disaster and development in children and adolescents. The diversity of the articles is striking, spanning a broad array of disaster situations, including war and child soldiers, political conflict and terrorism, hurricanes and tsunami, as well as earthquakes and floods. Specific disasters occurring in nine different countries are represented. The articles include many age groups from early childhood through adolescence. Longitudinal studies continue to be rare in this domain of science as are studies that address developmental processes. Most of the articles focus on a behavioral level of function and analysis, although several articles address other levels of analysis, including biological function, relationships, and the recovery context.

In the following sections, we highlight key issues and findings arising from the special section. In the conclusion, we comment on the implications of the special section for future developmental research and applications for improving disaster response and preparedness for the well-being of young people.

Challenges of Research Into Disasters and Child Development

Research in the context of disaster is not for the faint of heart. It is extraordinarily challenging from ethical, conceptual, methodological, and practical perspectives. It can be stressful and sometimes dangerous for the investigators as well as the participants. Special ethical issues must be considered when research is conducted among groups of traumatized survivors. The authors of these articles can be commended for their courage and persistence in the face of such obstacles, as well as their sensitivity and success in executing their work.

Disasters, by their nature, pose great challenges to researchers. They often occur with little advance warning and devastation on a scale that generates many issues for research, ranging from the ethical to the pragmatic. In the immediate aftermath of a catastrophe, survival and basic needs take precedence over research and significant issues arise about the competence of recently traumatized individuals to provide informed consent to research. In addition, research conducted in sites of mass destruction with traumatized people can be both dangerous and traumatizing to those carrying out research. There can be many other kind of dangers, known and unknown, related to ongoing violence

or aftershocks, exposure to contagious diseases, lack of supplies, electricity, housing, and many of the modern tools researchers often take for granted, such as offices, computers, mobile telephones, and refrigeration. Migration, chaos, and instability may follow disaster, creating enormous difficulties in tracking individuals for longitudinal studies and often resulting in substantial missing data. These issues, as well as ongoing difficulties in obtaining funding after the immediate impact of the disaster and for follow-up, may contribute to the paucity of longitudinal studies in this area.

Ideally, disaster research would include pre-disaster assessments, but this standard poses an enormous challenge given the unpredictability of most disasters. In a small number of studies in the literature, investigators have been able to capitalize on research already underway prior to a disaster. In the special section, a study of Kenyan children in a preschool serving 100 children was begun 4 months prior to the eruption of political violence (Kithakye, Morris, Terranova, & Myers, 2010). Follow-up data were obtained 3 months after the onset of violence for 84 of the 92 participants of the preschool study. However, in most cases, the articles of the special section focus on data collected post-disaster, as is typical in most of the extant literature.

Additional design issues confront investigators. Representative samples are difficult to access following disasters and most of the studies focus on samples of convenience or subpopulations. As indicated earlier, samples also may change over time related to instability in the disaster-affected region, leading to missing data. Epidemiological data are rare in this field, for understandable reasons. Therefore, the data provided by Becker-Blease, Turner, and Finkelhor (this issue) offer much-needed information on the prevalence and incidence of disasters in a nationally representative sample of younger children and adolescents for the United States. Data were drawn from the Developmental Victimization Survey conducted in the winter of 2002–2003 to assess the prevalence of various traumatic experiences among American children ages 2–17. About 14% of the young people had experienced some disaster event in their lifetime and around 4% in the past year. Within and across each age group studied (children ages 2–9 by parent report and youth ages 10–17 by self-report), age was associated with higher disaster exposure.

Another challenge is posed by the reality that disasters often unfold in contexts and cultures where research has not been common. One of the most important issues for developmental science in

general is the fact that a disproportionate amount of research has been concentrated in more economically advanced societies and contexts convenient to scientists, such as cities and towns, particularly those near academic centers. As a result, investigators trying to study disasters and child development often are faced with challenging issues of measurement and the lack of a database on normative development in many cultures and regions of the world. Additionally, participants in developing countries may not be able to read or have no written language. There may be no relevant instruments in the language or culture of the exposed population, along with a shortage of interpreters, and limited or nonexistent validity data on the value of the tools. This situation also may be confounded by cultural differences in knowledge or support for research as well as differences in the understanding of fundamental concepts of psychological well-being and health. Cultural differences can pose other barriers of access, relevance, and understanding.

These challenges of disaster research have shaped the nature of international research on child development and disasters, and their influence is evident in the special section. It is all too easy to critique the design and methods of disaster research or to underestimate what has been achieved in an investigation if one ignores the reality of these challenges. The special section represents diverse approaches to this array of challenges, with some remarkable examples of success under extraordinarily difficult research conditions. Some investigators worked with local nongovernmental organizations (NGOs) to facilitate data collection. For example, Catani et al. (this issue) partnered with German and Sri-Lankan organizations to train 1,000 teachers in Sri Lanka before they conducted a series of epidemiological surveys of Tamil children before and after the tsunami of December 2004. Also in Sri Lanka, Fernando, Miller, and Berger (this issue) enlisted an NGO partner for their study of disaster-survivors of the tsunami and political violence. Betancourt et al. (this issue) partnered with the International Rescue Committee (IRC) to conduct their ground-breaking longitudinal study of child soldiers of Sierra Leone. This partnership made the study possible; however, the death of the IRC country director midstudy and suspension of their program also brought data collection to a halt before it was completed. In the United States, Vigil, Geary, Granger, and Flinn (this issue) conducted a study of adolescents dislocated by Hurricane Katrina beginning 3 weeks after a government trailer camp opened near Baton Rouge and 2 months

after the hurricane. Their study included sampling of saliva from adolescents living in this trailer-park community, as well as a comparison group, providing a rare study of disaster in youth that included biological as well as behavioral levels of assessment. In New Orleans after Katrina, the Osofsky team was able to begin research immediately after school reopened in St. Bernard parish, just 2½ months post-hurricane, because the investigators were local and returned to the disaster area immediately to work on recovery (Kronenberg et al., this issue; Osofsky et al., 2007).

Many of the investigators had to create or translate measures that would be appropriate to the language, culture, and disaster context, relying on bootstrapping methods to demonstrate psychometric reliability or validity. A number of the investigators describe the challenges of translating and back-translating measures, while striving for cultural equivalence, or adapting measures for new contexts (e.g., Betancourt et al., this issue; Catani et al., this issue; Fernando et al., this issue; Kithakye, Morris, Terranova, & Myers, this issue; Klasen et al., this issue; Layne et al., this issue). Betancourt et al. describe the strategies used to create their measures through multiple stages of local consultation, youth focus groups, translation back and forth, and psychometric analyses. Fernando et al. conducted several "comprehensibility checks" with students in pilot schools to refine the survey instruments for their study. Layne et al. enlisted the aid of doctoral students in psychology at the University of Sarajevo to help them review their measures for cultural relevance and language accuracy for their study of Bosnian adolescents who experienced war and political violence following the collapse of the former Yugoslavia.

Most of the studies are cross-sectional rather than longitudinal, with notable exceptions (Betancourt et al., this issue; Kilmer & Gil-Rivas, this issue; Kithakye et al., this issue; Kronenberg et al., this issue). The study by Betancourt et al. represents one of the first longitudinal studies of child soldiers ever reported in the literature. The first prospective longitudinal data on a cohort of male and female child soldiers, this study constitutes a major contribution to a limited literature. Two studies of recovery and resilience among children who experienced Hurricane Katrina by Kronenberg et al. and by Kilmer and Gil-Rivas both include longitudinal data.

The challenges posed for research during the crisis phase of disaster or ongoing conflicts highlight the significance of diverse approaches to important questions for policy, humanitarian assistance,

disaster planning, and intervention. These questions include the following: What is the range of human response and how does this vary by development and situation? What can and should be done to help? What works best for whom in which context? What can be harmful? One approach to the conundrum of executing meaningful research under emergency conditions to address such questions is to draw on the expertise of people with extensive field experiences. Ager, Stark, Akesson, and Boothby (this issue) have drawn on the expertise of leaders in humanitarian agencies with extensive disaster and crisis experience to generate data for a "Delphi" consensus analysis on the best practices for care and protection of young people in such crisis situations. Their strategy is more structured and systematic but similar to the convening of consensus panels to identify best practices for diagnosis or intervention (see Hobfoll et al., 2007, for results of a consensus panel on mass trauma intervention). Ager et al. note the congruence of the consensus findings on best practices with the developmental literature on ecosystems of development and resilience.

Highlights of Findings in the Special Section

The conceptual frameworks for the articles in the special section draw heavily on developmental systems theory and many of them focus on concepts of cumulative risk and resilience (Masten & Obradović, 2008). Response to disaster is often linked to the severity of exposure, described as a "dose-response gradient," to previous experiences of trauma or to the conditions of the recovery environment. Congruent with the general risk literature, symptoms or problems often are related to greater cumulative exposure, defined in terms of severity (intensity) or a piling up in time of multiple traumatic experiences. At the same time, striking variability may be observed in the range of behaviors observed in individuals following similar levels of trauma exposure, suggesting that other influences play a role in adaptation to disaster. These include individual differences, as well as differences in the supports or recovery context. Promotive or protective influences that foster resilience hold particular significance for efforts to prepare for disaster and recovery more effectively (Layne et al., 2009; Masten & Obradović, 2008).

Results converge on several important themes for understanding the effects of disaster on development. These include the significance of exposure in terms of nature and dose, the importance of pre- and postdisaster context for understanding disaster

response and recovery, protective effects associated with better recovery, and the possible role of age and gender differences both for exposure and response patterns.

Dose Effects, Threshold Effects, and Unpacking Trauma

One of the widely supported findings in the literature on trauma and its consequences is the dose-response effect: As the level of extreme adversity exposure rises or accumulates, there is an increase in symptoms of trauma, behavior problems, mental anguish, and many other kinds of problems observed in children as well as in adults (Norris et al., 2002; Pine, Costello, & Masten, 2005). Similar risk gradients have been observed in diverse studies of cumulative risk and adversity in the developmental literature (Obradović, Shaffer, & Masten, in press; Shonkoff, Boyce, & McEwen, 2009).

Dose-response effects were observed in various forms in the studies of the special issue. Catani et al. (this issue) found that children in Sri Lanka exposed to the 2004 tsunami showed worse adaptation after the disaster in relation not only to more severe exposure but also as a function of higher exposure to other adversities, including the ongoing war, family violence, and other psychosocial risks. Similar findings are reported by Fernando et al. (this issue) in their study of tsunami survivors. Celebi Oncu and Wise (this issue) found differences in stories by children who were directly exposed to the 1999 Kocaeli earthquake 2 years after the disaster compared with children from a distant town in Turkey. Kronenberg et al. (this issue) found that youth with better patterns of mental health 2 and 3 years following Katrina had lower initial trauma exposure and also less recovery adversity. Additionally, the study of political conflict in Kenya, by Kithakye et al. (this issue), indicated that the severity of the disaster experience was associated with more negative and fewer prosocial behaviors.

Dose-response effects were also observed in relation to parent function by Chemtob et al. (this issue) in their study of children following 9/11 in New York City. Preschool children of parents with more symptoms of mental health problems had more problems. These results are consistent with developmental theory suggesting that children who are not protected at the time of disaster by effective caregivers may be particularly vulnerable to disaster effects. One of the mediating pathways by which disasters can harm children is via their effects on parents and parenting quality, particularly among very young children (Masten & Obradović, 2008;

Osofsky, 2004; Osofsky et al., 2007; Pine et al., 2005). Parents have a key role in the protection of children in life-threatening circumstances through actions they take related to preparedness and safeguarding their children, their communications about safety or danger, their instructions or training of children about what to do, and other means, such as their role modeling of adaptive behavior. As a consequence, an important part of disaster preparedness for children involves preparing parents to carry out these roles effectively under very trying circumstances.

It also is important to note that dose–response effects were not always found or sometimes were minimal. The absence of dose–response gradients observed after some time has elapsed since the disaster could reflect recovery processes instead of the absence of dose effects. In their study of adolescents and mothers about 15 months after the 9/11 World Trade Center disaster, Gershoff, Aber, Ware, and Kotler (this issue) found only small effects in one domain (depression) for a dose–response gradient in mental health among the youth in relation to variations in exposure.

There also is some evidence that the dose–response relation may change at very high levels of severe or chronic exposure. For example, results from the study of former child soldiers in Uganda (Klasen et al., this issue) did not show a link between the severity of trauma exposure during their abduction and period of forced service and their postabduction outcomes. It is conceivable that exposure could be so high in some groups that dose no longer is correlated with symptoms because everyone has crossed a threshold that evokes response or overwhelms coping capacity. Beyond this level, differences in vulnerability or protection (moderating influences, such as stress-reactivity or caregiving quality) or differences in the recovery environment may play a role while exposure level may not. Klasen et al. found that posttraumatic outcomes in these child soldiers were associated with lower exposure to adversities after their return, as well as better socioeconomic origins, perceived spiritual support, and less motivation to seek revenge.

The importance of unpacking dose, as well as the nature of the trauma exposure, is underscored by several studies. In their study of young people exposed to war conditions in Bosnia, Layne et al. (this issue) demonstrate that it is feasible and more informative for intervention and theory to disaggregate risk gradients in order to identify differential relations among various risks, promotive factors, or types of trauma exposure and various aspects of outcome. As they note, their results add to a growing

body of work focused on differential effects of risks and extreme adversities with an eye toward identifying processes that underlie dose–response patterns and explain how trauma and disaster affect the course of individual functioning and development (Obradović et al., in press). The work of Catani et al. (this issue) highlights the importance of considering the context of the people exposed to disaster, as many of the people of Sri Lanka faced the devastating tidal wave of December 2004, in the context of ongoing war or family violence and economic adversity. Fernando et al. (this issue), in their study of the tsunami survivors of Sri Lanka, argue that it is important to consider the explanatory role of daily stressors as well as disaster exposure.

Betancourt et al. (this issue) describe specifically “toxic” experiences that had lasting and distinctive effects on the child soldiers in this study, including the tragically common experiences of rape and killing others. Young people who perpetrated killing during their time as child soldiers had increasing hostility during the study, whereas those who had experienced rape had more anxiety and hostility, yet also showed more confidence and prosocial attitudes during the course of the longitudinal study. Moreover, they note that female child soldiers who experienced sexual violence face greater stigma than males when they return to the community because of perceptions that these young women are sexually “impure” or “promiscuous.” This differential stigma is especially important because Betancourt et al. found that community acceptance was a key protective factor for adjustment of child soldiers after their return to the community.

Results of studies in this issue also emphasize the significance of the adversities in the recovery context or aftermath of disaster. Klasen et al. (this issue), in their study of former child soldiers from Uganda, found that experiences after the children returned were important, with additional exposure to violence (often in the form of domestic or community violence) related to worse outcomes. Kronenberg et al. (this issue) emphasized the role of the postdisaster environment, and particularly the presence of ongoing adversities in the family and community, in their study of students 2–3 years after Hurricane Katrina. The issue of stigma observed for sexually traumatized girls by Betancourt et al. (this issue) represents another form of adversity in the recovery context. However, the significance of the recovery context is not limited to adversity. The special section also underscores the importance of positive features of the recovery context and other protective factors for disaster.

Promotive and Protective Factors

A number of the studies in this section examined variation in the adaptive behavior of the young people studied, often within a resilience framework. Disaster research has played a central role in the history of resilience science, as noted earlier. Studies with a resilience focus typically aim to assess positive as well as negative patterns of adaptation after disaster and also seek to identify the factors or conditions that appear to promote or protect good function during the crisis or recovery period following disaster. Promotive factors predict better outcomes at all levels of risk or adversity (a main effect), whereas protective factors have a greater effect or play a special kind of role when risk or adversity is high (moderating or interaction effect; see Masten, in press).

Moderating effects in response to disaster also can be conceptualized in terms of vulnerability rather than resilience. This distinction can be arbitrary in that it is usually unclear whether the attribute is operating to worsen or improve the outcome, or both. However, when a group of individuals with a particular attribute appear to be particularly susceptible to negative effects of adversity, that attribute is typically described as a vulnerability factor that exacerbates risk. In their commentary in the special section, Peek and Stough (this issue) discuss the vulnerability of children with disabilities in relation to disaster, and concomitantly the vulnerability of communities that do not prepare adequately for meeting the needs of such children during a disaster. Although data are scarce on risk and protective factors for children with disabilities and their families who encounter disasters, children with various disabilities may be particularly endangered by threats encountered in disasters because of specific functional difficulties or sensitivities posed by physical impairments or emotional reactivity related to a disability. They may also be more vulnerable due to lack of planning for children with disabilities during and following disasters. Peek and Stough also note that children with disabilities and their families may be more dependent on special educational or community supports that are disrupted by disaster and therefore more dependent on the community recovery. Yet, it is also conceivable that parents of children with disabilities may develop especially effective strategies and systems for protecting their children in response to the challenges of rearing and protecting a vulnerable child.

Disasters are defined in part by the scope of their impact on the lives of those affected and

disasters often threaten the most fundamental adaptive systems for human development (Masten & Obradović, 2008). Children would not be expected to fare well if a tsunami kills their parents and no one is available to care for them, or if they suffer a devastating head injury that impairs subsequent learning and cognition. Extreme psychosocial stress also has the potential to undermine brain development and related cognitive skills, such as memory and executive function through biological stress processes. There is considerable interest in the processes by which psychological or physical adversity experiences become embedded in child development, through a variety of pathways, ranging from the effects of elevated cortisol on the developing brain to the effects of maternal deprivation on attachment, emotional security, mastery motivation, the development of self-regulation, and later relationships (Feder, Nestler, & Charney, 2009; Gunnar & Herrera, in press; Shonkoff et al., 2009).

Several of the articles in the special section address questions on resilience. Generally, the results are consistent with the broader literature on resilience in young people (Luthar, 2006; Masten, 2001, 2007, in press). Kithakye et al. (this issue), in one of the few studies with data on predisaster adjustment, found that self-regulation skills in preschoolers were associated with prosocial behavior in general and had a moderating effect on the relation of exposure severity with prosocial outcomes. The interaction pattern was consistent with other findings in the resilience literature suggesting a protective role of self-regulation skills (Masten, 2007). As indicated previously, community acceptance was important for resilience observed over time in child soldiers by Betancourt et al. (this issue), corroborating other reports on recovery of child soldiers (Boothby, Crawford, & Halperin, 2006). Klasen et al. (this issue) found posttraumatic resilience in former Ugandan child soldiers was associated with fewer guilty cognitions, less desire for revenge, better socioeconomic situation in the family, and greater perceived spiritual support.

In one of the most innovative studies in the special section, Vigil et al. (this issue) examined the potential interacting role of two biological systems—hypothalamic-pituitary-adrenal axis (assessed indirectly by salivary cortisol) and sympathetic nervous system (SNS, assessed indirectly by salivary alpha-amylase)—in relation to function after disaster. Their results are consistent with the possibility that a combination of high cortisol and SNS activity is associated with resilience.

The role of schools in the recovery environment for children has been widely reported in the resilience literature, particularly for war and disaster (Masten & Obradović, 2008), and this perspective is corroborated in the special section. Prompt reestablishment of schooling was one of the most highly endorsed best practices emerging from the consensus study based on the expertise of humanitarian agency leaders with extensive disaster experience (Ager et al., this issue). This theme is also emphasized by Kronenberg et al. (this issue) in the aftermath of Katrina and Betancourt et al. (this issue) in the context of war in Sierra Leone. In the Kronenberg et al. study, schools played a key role in the rebuilding of the community and supporting recovery. In the latter case, staying in school was associated with improved prosocial attitudes and behaviors.

Results also reflect the rising interest in posttraumatic growth in the aftermath of trauma and disaster (see Bonanno, 2004; Kessler, Galea, Jones, & Parker, 2006; Masten & Obradović, 2008; Pat-Horenczyk & Brom, 2007). While the developmental meaning and significance of “better” function during or after disaster remains uncertain, there is growing attention to this kind of phenomenon among young people and adults. In most situations, pretrauma functioning is unknown; therefore, it is unclear how to distinguish normal growth and development from posttrauma growth, and the meaning of better functioning and its long-term possible cost for a child is unknown. The study by Kilmer and Gil-Rivas (this issue) addressed the complex questions of posttraumatic growth in children. While the findings from the Kilmer and Gil-Rivas study are preliminary (and, typical of most disaster studies, did not include predisaster data), these authors suggest the potential benefit of working with children to support relevant competencies and cognitive processes that may foster posttraumatic growth. Their observation that rumination and distressing thoughts were associated with posttraumatic growth raises the intriguing possibility that discomfort in combination with reflective processes could lead to positive changes in the aftermath of trauma.

Gender and Age Differences

The literature on disaster exposure and response in children and adolescents presents a complex picture of gender and age effects, and the studies of this special section do as well. Numerous methodological issues arise in the interpretation of both

gender and age effects. Parents and teachers typically are the informants for young children, whereas adolescents often self-report on their own symptoms or well-being, which confounds response with the respondent and most likely gender of the informant with gender of target as women are more likely than men to be the informants for young children. Mothers, for example, may report more of some symptoms in children than objective observers might report and different symptoms than a child himself or herself was able to report. Similarly, when female adolescents report more symptoms than adolescent males, it is not clear whether they experience more symptoms or simply are more willing to admit them.

Following disasters, it is often difficult to find a comparable comparison group, limited measures are available with norm-referenced data on the affected population, and there is rarely any predisaster assessment on the study sample. This situation makes it difficult to know if reported gender or age differences observed among the disaster-exposed group differ from what one might have found in nonexposed young people.

Disaster and trauma studies often find that females report more symptoms (Tolin & Foa, 2006). However, female adolescents and adults generally report or disclose more symptoms of distress, regardless of whether they have experienced trauma (Crick & Zahn-Waxler, 2003). In the Kronenberg et al. (this issue) study following Katrina, female students (4th through 12th grade) reported more depression and trauma symptoms than males, although these investigators noted that it is difficult to know whether these gender differences reflect differential reporting or experiencing of these symptoms. Moreover, without a normative or nonexposed reference group, it is difficult to discern if initial post-Katrina scores reflect elevated symptom levels, although the subsequent decline suggested that this might have been the case. The study by Vigil et al. (this issue) was one of the few to compare a disaster-exposed group (adolescents who experienced Katrina) to a comparable group of nonexposed young people (of comparable sociodemographic background). Results were complex in that Katrina-exposed females appeared to report particularly high symptoms of depression while Katrina-exposed males reported particularly low levels of aggression.

In war and disaster, it also is difficult to sort out the meaning of gender differences even when they are found, because the experiences of males and females may differ in significant ways and the

cultural meaning of the experiences may also differ by gender (see Bal, 2008; Barber, 2008; Norris, Perilla, Ibañez, & Murphy, 2001; Pfefferbaum, 1997). As noted earlier, Betancourt et al. (this issue) found that female child soldiers reported more rape experiences than the male child soldiers and that sexual violence held greater stigma for females in the recovery community context.

In the disaster literature, differential vulnerabilities and protective factors have been noted in relation to age for some time (Masten, Best, & Garmezy, 1990). Younger children have been viewed as more vulnerable to the loss or declines in quality of caregiving because of their dependence on care. Young children, on the other hand, are protected in some ways by their lack of exposure to and understanding of disaster as it unfolds, especially when their environment remains relatively stable with support from their families (Osofsky, 2004). Adolescents are viewed as at greater risk of high exposure because of their place in the world, their friends who may have been exposed, and their greater awareness of what is happening and its future significance. Older children and adolescents also are at higher risk of certain dangers (e.g., forced labor, rape, military service). Conversely, older youth have better problem-solving skills, more coping capacity, more social support outside the family, and more capacity to survive on their own than younger children. Thus, the vulnerability and capacity for resilience change over the course of development and also vary with the circumstances of the individual in a disaster.

Age differences in exposure, experiences during and after disaster, and adjustment following disaster were found in several studies in this special section, although the findings are not consistent. Exposure to lifetime disaster was generally higher among older children in the epidemiological survey by Becker-Blease et al. (this issue). Klasen et al. (this issue) observed more trauma and symptoms among the older of the former child soldiers in Uganda, whereas Betancourt et al. (this issue) did not find comparable effects in their study of child soldiers from the conflict in Sierra Leone. Age was unrelated in the latter study to most outcomes, except that older returning soldiers in the Betancourt et al. study experienced less family acceptance than younger children, perhaps because older children evoked less sympathy or more fear. Kronenberg et al. (this issue) found that the younger students (ages 9–11) reported more depression and posttraumatic stress disorder symptoms.

Given the interplay among exposure, development, and individual differences, it is a complex matter to sort out the meaning of observed age-related differences, as noted by Layne et al. (this issue) in their discussion. Indeed, in many respects, the empirical evidence on disaster in relation to development is sparse. Despite numerous signs of progress on multiple fronts in the research on children in disasters, nicely reflected in this collection of articles, developmentally informative data remain limited.

Conclusions

Implications for Research

The special section highlights the challenges, progress, and gaps in research on disaster and child development. Formidable obstacles have impaired progress. These range from the inherent challenges of conducting research under disaster-affected conditions to obtaining rapid funding, especially for those researchers who reside in the disaster-affected areas. However, there is also a profound shortage of suitable standardized and culturally appropriate measures in many of the regions where disasters occur, reflecting a much broader issue in developmental science. There are many more studies and validated measures for developed than developing regions and dominant cultural groups compared with minority groups (Quintana et al., 2006). Building a broader science of child development across cultures and regions would be extremely helpful to research in many domains, and it is critically important for disaster research.

Longitudinal data are scarce, particularly with regard to studies with predisaster baselines, despite the need for information on what may be most helpful to whom and when after disaster. Greater attention may need to be directed toward building national and international supports and structures for disaster research, including technical support and collaborations among teams of developmental scientists, humanitarian service providers, and local leaders or disaster responders.

There continues to be very little attention to developmental issues in disaster research beyond the most basic role of age. Research is needed on the role of developmental timing for exposure, vulnerabilities and protective influences, and patterns of response over the near term and long term. In addition, there is a great need for more

developmentally informed and informative research into the effectiveness of prevention and recovery strategies for disaster-affected children and adolescents, especially with regard to considerations of development, gender and cultural differences, and the nature of the disaster exposure. Layne et al. (this issue) provide a compelling argument for research that attempts to unpack the complex interplay among development, trauma exposure, resources, and protective or vulnerability processes, particularly in order to inform intervention. They assert that a more differentiated understanding of “who is at risk for what outcomes via which pathways of influence” (p. 1072) will inform evidence-based clinical decisions. Developmental considerations need to be at the center of the unpacking mission.

Implications for Disaster Preparation and Response

The existing literature on disasters and child development and the broad array of articles in this special section provide important information not only for developmental science but also for efforts to address the needs of children and youth in the context of disaster. While there are many gaps in the research, disasters continue to unfold worldwide, and it is reasonable to consider the implications of current findings from the special section and earlier work for efforts to help the many young victims of disaster. There is some consistency in the findings that may afford helpful guidance in preparing for disaster and promoting resilience in its wake.

By definition, it is not possible to be fully “prepared” for a disaster. Nonetheless, the findings to date, including data from articles in this section, suggest that communities can plan and prepare to support the mobilization of family and community resources to protect children and promote resilience in situations of overwhelming adversity. The lessons for preventive intervention from the growing body of research on disasters and children, as highlighted in the special section, can be summarized in terms of developmental guidelines as follows (see also Hobfoll et al., 2007; Masten & Obradović, 2008; Norris, Steven, Pfefferbaum, Wyche, & Pfefferbaum, 2008; Norris & Stevens, 2007; Osofsky et al., 2007; Pine et al., 2005).

1. Protect and restore the secure base of attachment relationships as soon as feasible. Prepare for evacuations and relocations that include keeping children together with their caregivers. Reunite children and adults who have attachment bonds if they have to be separated.

Provide nurturing caregivers for children who have lost their caregivers.

2. Train first responders in the range of developmental responses to trauma that can be expected for children of different ages.
3. Remember that first responders for children include parents, teachers, and day-care providers in addition to emergency responders.
4. Support normalizing routines, activities, and contexts for children after disasters, including opportunities for them to play and learn, and the restoration of functional schools and other community organizations that serve children and their families.
5. Attend to community resilience and the function of cultural and community practices that support families and their children, including support for spiritual practices.
6. Support and restore meaningful relationships and opportunities to be effective in play, school, work, or recovery activities. Such activities may nurture hope, meaning, and a sense of agency, both in adults who care for children and among older children and adolescents themselves.

Perhaps the most important role for developmental scientists in disaster response, however, is for them to engage more fully in the process of building and applying knowledge. Scientists with developmental knowledge rarely are included in decision making related to recovery and rebuilding following disasters, while scientists, in turn, may not reach out to help as effectively as possible. In the United States, the National Child Traumatic Stress Network (Pynoos et al., 2008) can play an important role in brokering this bidirectional process for disaster planning and response. Internationally, Ager et al. (this issue) have articulated the requirements for developmental scientists to contribute to the humanitarian efforts on behalf of children in disasters. These include research engagement in more diverse cultural settings around the world, including those in crisis, and more effective translational efforts to communicate their findings to practitioners and policymakers.

The work of the scientists who have contributed to this special section on disasters and child development illustrates what can be done under extraordinarily challenging conditions. At the same time, the special section also underscores the limits of present knowledge and potential for further research contributions by developmental scientists in this area. Developmental scholars have a vital

role to play in shaping future science and its applications to reduce the negative effects of disaster on human development and promote adaptive responses and recovery in young people, their families, communities, and societies.

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