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Children's Disaster Reactions: the Influence of Exposure and Personal Characteristics

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Abstract This paper reviews children's reactions to disasters and the personal and situational factors that influence their reactions. Posttraumatic stress disorder (PTSD) and posttraumatic stress reactions are the most commonly studied outcomes, though other conditions also occur including anxiety, depression, behavior problems, and substance use. More recently, traumatic grief and posttraumatic growth have been explored. New research has delineated trajectories of children's posttraumatic stress reactions and offered insight into the long-term consequences of their disaster experiences. Risk factors for adverse outcomes include pre-disaster vulnerabilities, perception of threat, and loss and life disruptions post-disaster. Areas in need of additional research include studies on the timing and course of depression and anxiety post-event and their interactions with other disorders, disaster-related functional and cognitive impairment, positive outcomes, and coping.

Keywords Adolescents · Anxiety · Children · Coping · Depression · Disaster · Exposure · Mental health · Posttraumatic growth · Posttraumatic stress · Posttraumatic stress disorder (PTSD) · Recovery · Resilience · Terrorism · Trauma · Traumatic grief

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Introduction

Children have been recognized as especially vulnerable to disasters [1]. A nationally representative survey conducted in the USA established a lifetime rate of disaster exposure at 13.9 % in children and adolescents [2]; almost one fourth of those who experienced a lifetime disaster reported more than one disaster. In another nationally representative US survey of adolescents, exposure to natural or human-caused disasters was 14.8 %, second only to unexpected death of a loved one at 28.2 % as the most common potentially traumatic event [3]. Rates in other parts of the world, especially in less developed regions, are likely to be higher due to less durable infrastructures, rapid expansion of populations and industrialization, and political conflict.

This paper reviews children's emotional and behavioral reactions to disasters with a focus on recent studies that have explored an expanded range of outcomes, trajectories of response and long-term disaster effects, and nuances of exposure and children's personal characteristics that affect their recovery. A companion paper reviews the environmental influences, such as family and community factors, on children's reactions [4••].

Children's Reactions to Disasters

The literature describes a range of disaster outcomes in children from transient emotional distress and behavior changes to enduring psychopathology and impaired functioning [5, 6]. Many children, while experiencing distress in association with their disaster experiences, do not develop psychopathology, but instead adapt to their experiences and environment. Commonly studied post-disaster outcomes are internalizing reactions and conditions such as posttraumatic stress disorder (PTSD) and posttraumatic stress reactions, anxiety, and depression. Externalizing behavior problems including substance use, cognitive effects, and traumatic grief have also been investigated. Some children are resilient, and some experience posttraumatic growth. Recent studies have illustrated the trajectory of children's reactions over time, but few long-term follow-up studies have been conducted.

Rates of PTSD and posttraumatic stress in children post-disaster vary depending on the samples assessed, the specific outcomes measured, and the research methodology used. For example, rates of significantly elevated symptom severity have been estimated to be below 30 % [7], and the rate of moderate posttraumatic stress symptoms in the acute post-disaster period has been estimated at 50 % [6]. A recent meta-analysis of studies of children and adolescents from countries around the world revealed that overall, 15.9 % of youth exposed to a traumatic event developed PTSD, which reflects 9.7 % of children exposed to non-interpersonal trauma, such as accidents and natural disasters, and 25.2 % of youth exposed to interpersonal trauma [8]. Posttraumatic stress symptoms appear to be common in the first months post-event with a decline over the first year or longer [7].

Depression and anxiety are common reactions to disasters often comorbid with PTSD or posttraumatic stress [7, 9]. Depression may occur secondary to loss and grief, unresolved trauma and posttraumatic stress, and/or secondary adversities [9]. Depression also may precede posttraumatic stress symptoms [10]. Lai and colleagues [10] found comorbid posttraumatic stress and depression in their hurricane study in which loss of life was relatively low with 10 and 7 % of children evidencing comorbid posttraumatic stress and depression symptoms 8 and 15 months post-disaster, respectively; recovery was slower in those with comorbid posttraumatic stress and depression. A recent review study reported elevated prevalence rates for post-disaster depression ranging from 2 to 69 % in children relative to cited general population rates from 1 to 9 % [11••]. Another review of depression in children after natural disasters revealed prevalence rates in children ranging from 7.5 to 44.8 % across studies [12•]. Given these high rates, more empirical work is warranted to explore the varied etiologies and time course of depression as well as its relationship to other disorders.

Disaster exposure may initiate a path to the development of anxiety disorders such as specific phobias, panic disorder, and separation anxiety [6]. Studies have documented increases in children's generalized anxiety in relation to disaster exposure [7], but post-disaster anxiety may represent the continuation of pre-event anxiety or trait anxiety [13•]. Not all longitudinal studies have confirmed an increase in anxiety symptoms post-event, though this may simply reflect an absence of the normal decline in rates over the course of development [14]. Thus, additional work is needed to clarify findings related to post-disaster anxiety in children, to identify predisposing influences, and to explore the progression of anxiety symptomatology and its relationship to other disaster reactions.

Behavior problems also have been studied in children in the context of disasters with conflicting results. For example, research has documented both an increase in externalizing conditions [e.g., 15, 16] and improvement in children's behavior post-event with a return to pre-event levels over time [e.g., 17, 18]. Recent work in the Middle East suggests that exposure to chronic terrorism and political violence is linked to behavior problems [e.g., 19]. For example, Pat-Horenczyk and colleagues [19] found that preschool children exposed to ongoing political violence had higher rates of behavior problems as well as PTSD and depression symptoms than children without chronic exposure. Moreover, maternal distress was associated with child distress in the form of externalizing, internalizing, and posttraumatic stress symptoms, and the accumulated and continuous exposure to political violence and danger increased maternal distress which further affected the child [19].

Recent literature has examined substance use in association with disaster exposure in youth [e.g., 20–24]. In a sample of New York City high school students assessed 6 months after the September 11 attacks, increased smoking was associated with prior trauma and PTSD while increased drinking was associated with direct exposure to the attacks [24]. A longitudinal study of adolescents assessed 5 months following a deadly café fire in the Netherlands revealed that students in the affected school had significantly greater increases in excessive drinking than students in unaffected schools [22]. Twelve months later, increases in excessive use of alcohol from baseline to follow-up also were significantly greater in students from the affected school than in the comparison group but the effects had decreased compared to those at 5 months, and there were no differences between the two groups in behavioral and emotional problems or in the use of other substances [23]. Long-term follow-up studies also suggest that problem alcohol [25] and problem substance [26] use may not persist in disaster samples.

Functioning and Cognitive Impairment

While the importance of addressing children's post-disaster functioning in general has been recognized for some time, little research has focused on cognitive effects or on the relationship between functioning and other post-disaster problems. Impairment in children's functioning post-disaster may be most evident in school where they are required to perform both academically and socially, sometimes in altered environments with damaged school facilities and disruptions in schedules and routines. Scrimin and colleagues found difficulties in attention, memory [27, 28], and visual-spatial performance as well as lower grades [28] in children exposed to the Beslan school hostage crisis. In a study examining six domains of school and interpersonal functioning in relationship to alcohol and drug use in middle and high school students attending schools near the World Trade Center at the time of the September 11 attacks, students with increased substance use experienced more impairment in school work and school behavior compared to those without increased substance use 18 months post-incident [20].

Grief, Complicated Grief, and Traumatic Grief

Children who lose loved ones in a disaster suffer grief which may be exacerbated in the context of the family's social and economic adversities such as financial problems and lack of housing [29]. Some children suffer complicated grief—the persistence of acute grief or the development of complications in the context of the grief process [30•]—and/or traumatic grief—the intrusion of trauma symptoms into the bereavement process [31]—in relationship to their loss. Little empirical research has addressed these grief reactions. Dyregrov and colleagues [32] found a high prevalence of complicated grief, posttraumatic stress reactions, and general psychological distress in parents and siblings 1.5 years after a 2011 terrorist attack on a youth camp in Norway that killed 69 youth and adults. Intense contemporaneous exposure through telephone or text messaging with the victims as the event unfolded, extensive media coverage, and the previously peaceful context of the environment were thought to influence reactions [32].

Posttraumatic Growth

Posttraumatic growth includes psychological (e.g., greater appreciation for life, modified values, increased sense of personal strength), interpersonal (e.g., improved relationships), and/or functional (e.g., ways of coping) gains that were not apparent pre-disaster but arose from the disaster experience [33, 34]. Posttraumatic growth and distress are not two ends on a spectrum, and they may co-occur [35]. The traumatic circumstances that cause distress can also mobilize the coping attempts and adaptation that result in growth. For example, posttraumatic stress predicted posttraumatic growth in a study of children from the Gulf Coast 1 year after Hurricane Katrina, demonstrating that distress may spark growth [36].

Trajectories of Response and Long-Term Recovery

Recent research examining trajectories of children's disaster reactions has identified adaptive and maladaptive outcomes [13•, 37, 38••]. For example, La Greca and colleagues [13•] identified three trajectories of posttraumatic stress symptoms in children during the first year (3, 7, and 10 months) after Hurricane Andrew. Approximately 20 % of the sample had a chronic course, 43 % of the sample was characterized as recovering, and 37 % of the sample was described as resilient. Mean posttraumatic stress symptom scores decreased significantly over time in all three trajectories. Removing children with minimal exposure in recalculating their findings, Weems and Graham [38••] found the proportion of resilient children in their sample dropped from 43 % to only 16 %, highlighting the importance of considering exposure in determining resilience. La Greca and colleagues [13•] found that children's disaster exposure—both perceived and actual threat—did not distinguish the recovering and chronic trajectories from the resilient trajectory, but that children who reported perceived life threat and/or more loss and disruption were more likely to fit in the recovering or chronic trajectories rather than the resilient trajectory.

Long-term follow-up studies suggest recovery for most children following disasters. In a 20-year follow-up study, McFarlane and Van Hooff [25] reported no significant difference in PTSD rates in Australian children exposed to a massive bushfire relative to a non-exposed comparison group, and the risk of developing an anxiety disorder was small relative to the controls except in those exposed to multiple traumas. Morgan and colleagues [26] reported that 29 % of the child survivors of a deadly 1966 coal pile collapse had current PTSD 33 years after the disaster though the comparison group from a village nearby in the same economically depressed area of the country also had high rates of psychopathology. Survivors were at no greater risk for developing anxiety, depression, or substance use than controls [26].

The Influence of Exposure on Children's Disaster Reactions

The extant research supports a dose-response relationship between disaster exposure and outcomes, with the severity of outcomes associated with the intensity or severity of exposures [39, 40••]. In their meta-analysis of 96 child disaster studies, Furr and colleagues [39] concluded that it is not mere proximity to an event but specific aspects of exposure that

determine risk for adverse outcomes. For example, the child's perception of threat and other subjective reactions; the extent of disruption, destruction, injury, and death; and the child's specific disaster experiences such as being injured, witnessing the event, and loss of loved ones are aspects of disaster exposure that influence posttraumatic stress [39] and depression [11••, 12•]. The dose-response relationship applies to interpersonal disaster exposure through, for example, the closeness of family and associates [41•].

The Influence of Personal Factors on Children's Disaster Reactions

A number of child characteristics affect children's disaster reactions and recovery including demographics, preexisting vulnerabilities, and post-disaster experiences. Girls are commonly identified as being at greater risk than boys for adverse outcomes such as posttraumatic stress reactions [39] and depression [11••], but it may be that boys and girls display distress differently with girls suffering more internalizing symptoms and boys evidencing more externalizing difficulties. Moreover, boys and girls may interpret and report events differently [40••]. Children's age or stage of development influences their understanding of an event, the specific presentation of their reactions [42], and adaptation [40••], but findings on the effects of age or development on outcomes are inconclusive [40••]. Children of ethnic minority heritage may be at greater risk for adjustment problems post-disaster than children from the majority culture, but these differences may represent, or be influenced by, differences in disaster experiences, socioeconomic status, exposure to prior trauma, and/or family or other social influences [6]. Children's pre-event emotional status, prior trauma, and major life events post-incident influence their disaster reactions and recovery [6, 11••, 12•, 40••].

Coping

Coping entails both involuntary and deliberate cognitive, behavioral, and emotional efforts to reconcile a perceived discrepancy between the demands of environmental stressors and the child's own personal resources [43]. Coping strategies can be adaptive or maladaptive depending on their relationship to adverse outcomes [44••]. Children's ability to cope, their approach to coping, and their repertoire for coping vary with age and development [44••, 45•], gender [45•], and culture [e.g., 46]. Other factors that may influence coping include aspects of the child's event exposure [e.g., 47, 48] or the interaction of personal and exposure characteristics [e.g., 49], time since the disaster [e.g., 50], the degree of perceived control the child has over the situation [e.g., 51], and the child's disposition [45•] and self-esteem [e.g., 52]. The literature in general approaches mass trauma as single incidents, though coping has been explored in the context of ongoing political violence [44••]. Little disaster research has explored coping in relationship to positive outcomes such as well-being [44••].

Conclusions and Future Directions

An impressive literature over several decades has documented children's reactions to disasters and the various event, exposure, and personal factors that influence those reactions. Recent research has extended the examination of outcomes beyond internalizing conditions (e.g., PTSD, anxiety, depression) to include externalizing conditions (e.g., behavior problems, substance use), functioning and cognitive impairment, traumatic grief, and posttraumatic growth. With a primary focus on PTSD and posttraumatic stress reactions, relatively little is known about pre- and post-event comorbid conditions that may affect outcome [13•]. Longitudinal assessment of children has charted children's reactions over several years post-disaster and delineated trajectories of response. Many children exposed to disasters are resilient. Studies suggest that in addition to aspects of disaster exposure such as perceived life threat, preexisting child characteristics and pre- and post-event life experiences are important determinants of the child's disaster outcomes. The literature has begun to address children's coping in the context of disasters, but the studies are too few and too diverse to draw definitive conclusions about the strategies and determinants that influence outcomes. Additional research to benefit the field would include exploring the timing and course of depression and anxiety post-event and their interactions with other disorders and the effects of disasters on children's quality of life and potential growth as well as on psychopathology.

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Compliance with Ethics Guidelines

Conflict of Interest Natalie Griffin and J. Brian Houston declare that they have no conflict of interest.

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