

Addressing the Needs of Preschool Children in the Context of Disasters and Terrorism: Clinical Pictures and Moderating Factors

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Abstract

Purpose of Review This paper surveys the existent theoretical and research literature regarding the needs of preschool children in the context of disasters and terrorism with the aim of understanding (a) the consequences of such events for young children and (b) the main moderating variables influencing the event-consequence association to learn how to enhance their resilience. **Recent Findings** Consequences include a variety of emotional, behavioral, and biological outcomes. Implications for refugee children are discussed. Main moderating variables were mother's sensitivity and mother's PTSD symptoms. **Summary** Exposure to disasters and terrorism may have severe effects on the mental health and development among preschool children. Future research should explore the implications of different levels of exposure and the effects of moderating psychosocial and biological variables, including the parent-child triad, on the event-consequence relationship.

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Introduction

Today, preschool children are exposed to an increasingly wide variety of disasters and terrorist incidents, either directly or indirectly through their parents or their surroundings [1]. Over one billion children under the age of 18 live in countries affected by armed conflict [2]. Moreover, forced migration, a byproduct of armed conflict and famine, is at its highest since World War II, and by the end of 2015, some 41 million people (an estimated 17 million children) worldwide were newly displaced due to violence and conflict within their own countries [3]. Additionally, estimates suggest that worldwide terrorism has increased fivefold since 2000 [4], and modern warfare is now aimed at heavily populated civilian locations. Indeed, the contemporary battlefield has no clear boundaries, and citizens and children no longer have a safe haven.

Trauma as a result of terrorism and disasters, whether natural, technological, or human-made, imposes incalculable physical, psychological, and economic hardships on survivors and their surroundings, thereby impacting multiple dimensions of children's lives. The literature distinguishes between traumas, disasters and terrorism. Traumas are personal incidents that threaten health and well-being and may render an individual helpless in the face of intolerable internal or external danger. For the traumatized individual, the present is interrupted by arbitrary, flashback-type memories of the traumatic incident [5]. Disasters are public incidents that cause extensive damage to property and lives and have a comprehensive and ongoing disruptive impact on child, family and social networks—their basic daily routines, and sense of safety and connectedness [6•]. Terrorism is the politically motivated creation of fear in

a target group by means of violence. Whereas trauma involves unintentional (re)experiencing of past violence, terrorism evokes fearful anticipation of future violence based on and initiated by past violence [5]. A growing number of articles have addressed the consequences of disasters and terrorism on children and adolescents [7, 8]. Yet only in recent years has evidence emerged showing the high risk associated with disasters and terrorism during preschool years [9•, 10•, 11, 12].

Development among infants and preschoolers is characterized by multiple, rapid, and complex physiological, cognitive, and emotional changes and can be profoundly affected by trauma [9•, 10•, 11–13]. Consequences range from posttraumatic stress symptoms to behavioral and emotional disorders, psychosomatic symptoms, sleep disorders, cognitive ramifications, and biological impairments [9•, 14–17, 18•].

The goal of this article—the first of two articles dealing with preschool children (ages 0–6) who have been exposed to terrorism and disaster—is to provide an updated review of the possible consequences of such events for this vulnerable group. Additionally, we describe the implications of such exposure for refugee children, as their experiences may generate different consequences and therefore may require different actions and treatment. Moreover, we explain the moderating and mediating variables that intervene in the event-consequence relationship. Finally, we discuss the research challenges in this field and future research directions that may help in understanding preschoolers' needs in the context of disasters and terrorism.

Consequences of Terrorism and Disaster for Preschool Children

To understand the needs of preschoolers in the context of disaster and terrorism, we first need to understand the possible consequences of such incidents. Although the effects of disasters on preschool children have been discussed since the middle of the twentieth century [19], researchers do not agree upon the severity of the consequences for preschoolers. Previously, it was assumed that preschoolers have only a mild response to severe traumas because their cognitive immaturity prevents them from understanding and remembering these traumas [20, 21]. However, developmental theories as well as clinical and empirical evidence have increasingly shown that in many ways the critical developmental stages of very young children make them more vulnerable to trauma than older children and adults [9•, 12, 22]. Preschoolers' cognitive, verbal, and emotional immaturity as well as their lack of autonomy may lead to limited comprehension and communication of emotions and thoughts. Moreover, preschoolers' worldview is organized by a set of self-centered beliefs leading them to assume that their actions cause things to happen [23].

Posttraumatic Stress Symptoms Slone and Mann [9•] reviewed 35 studies that examined the effects of exposure to war, conflict, and terrorism on preschool children (aged 0–6). They found that 17–44% of children exposed to these types of traumatic incidents show clinical or sub-clinical post-trauma outcomes depending on incident type and exposure.

The most well-defined psychological outcome of disasters and terrorism is PTSD, which is organized into four major symptom clusters: (1) intrusion (e.g., memories, dreams, flashbacks, cue-related prolonged psychological distress or physiological reactions); (2) avoidance of stimuli associated with the event (e.g., distressing memories, thoughts, or feelings, and reminders associated with the traumatic event); (3) negative alterations in cognition and mood associated with the traumatic event (e.g., inability to remember important aspects of the event; negative beliefs or expectations about the self, others, or the world; distorted cognitions about the causes or consequences of the traumatic event that lead to guilt; and inability to experience positive emotions); and (4) alterations in arousal and reactivity associated with the traumatic event (e.g., reckless or self-destructive behavior, hypervigilance, exaggerated startle response, problems with concentration, or sleep disturbances) [24, 25]. To note, PTSD is expressed differently in children of different ages and, therefore, is characterized by specifically different criteria in the DSM-5 [24].

These symptoms reflect children's inner state of distress as a result of traumatic exposure. Most children, however, will not develop full-blown PTSD. Instead, most will display one or more of the following: specific fears and dependent behavior [26], sensorimotor disorganization and disruption of biological rhythms (e.g., prolonged crying, unresponsiveness to soothing, muscular flailing, rigidity, agitation and restlessness, feeding disturbances, sleeping disorders), lack of interest in the environment, and somatic problems with no detectable organic cause, as well as aggressive symptomatology [9•, 22]. Play patterns can also be affected, as manifested in the use of morbid themes and less fantasy play, increased inhibition, negative affect, aggression, anxiety, and reduced social interaction [27, 28].

Several studies examined the long-term influence of exposure to trauma among preschoolers. For instance, 5 years after a SCUD missile attack on preschool children in Israel, Laor, Wolmer and Cohen found a significant decrease in severity in most symptom domains and an increase in avoidant symptoms [29]. A recent study found that war-exposed preschool children had more comorbid psychopathologies and that the number of comorbidities increased with age into middle (5–8 years) and late (9–11 years) childhood [10•]. These findings indicate the changing symptomatology at different times and emphasize the need for constructing individual dynamic interventions appropriate for different developmental stages.

Cognitive Outcomes Pfefferbaum, Noffsinger, Jacobs, and Varma [14] reviewed cognitive functioning among children

exposed to disasters and terrorism. Appraisals were found to be critical to the content encoded into memory during a traumatic incident and were associated with certain emotions likely to resurface as intrusive images are recalled. The review emphasized the need for extended research on the attention and concentration ability of exposed children and on their academic achievement and executive function. After September 11, Chemtob et al. [30] found a significant dose-response relationship (measured as the number of high intensity incidents) with clinically significant attention problems among preschool children.

Biological Outcomes Biological outcomes in the context of preschool childhood stress may have neurological, neuroendocrine, physiological and genetic aspects. Preschool children who experience trauma are at particular risk due to the vulnerability of their rapidly developing brains [16]. Early childhood trauma has been associated with reduced size of the brain cortex, the area responsible for complex functions including memory, attention, perceptual awareness, thinking, language, and consciousness. These changes may affect IQ and emotional regulation ability [17]. Moreover, early life stress has been associated with structural differences in the amygdalae and hippocampus, two important medial temporal lobe structures involved in emotion processing and regulation that play a central role in psychopathology later in life [16]. Preliminary evidence indicates that early stress disrupts development of social reciprocity and empathy by influencing neural regions, including the superior temporal sulcus, insula, medial and orbitofrontal cortices, amygdala and anterior cingulate cortex [31].

Additionally, early stress was found to initiate a cascade of physiological processes that alter the development of children's physiological stress systems. Neuroendocrine markers of stress in war-exposed children differed from those found in non-exposed preschool children, changes that were associated with a diagnosis of PTSD [15]. A study of children in foster care emphasized the importance of age at the time of exposure. The study showed effects on both the peripheral nervous system (PNS) and hypothalamic pituitary adrenal (HPA) axis among children exposed to severe stress before age 24 months, suggesting the existence of a sensitive period during which stress response systems are most strongly influenced by environmental inputs [32].

Genetic background may contribute to children's reaction to early life events, but DNA function can also be modified by exposure to these events through epigenetic pathways [33••, 34, 35••]. The first evidence of such modification was found in maltreated rat infants. Maltreatment induced changes in the DNA methylation of *BDNF* DNA, which in turn altered *BDNF* gene expression in the adult prefrontal cortex. Moreover, researchers found altered *BDNF* DNA methylation in the offspring of females that had previously experienced the

maltreatment regimen [34]. Later research findings showed the glucocorticoid receptor gene (*NR3C1*) to be susceptible to epigenetic modification, specifically DNA methylation, in the context of environmental stress such as early life trauma, an established risk for depression later in life [18••, 35••]. Moreover, alterations in *NR3C1*-1F promoter methylation were found to reflect enduring changes among combat veterans with PTSD, compared to combat-exposed veterans who did not develop PTSD [33••]. The question concerning epigenetic influence on the vulnerability to anxiety and or post-trauma is still open.

Political Attitude Outcome/Influence A somewhat different influence of continued terrorism and armed conflict concerns the development of political attitudes and readiness for personal sacrifice for the sake of ideology [36] in young children or adolescents having been exposed to disasters or terrorism. It has been found that children and adolescents develop their political attitudes as part of their socio-political context and nationhood [37]. Research has found that for children and adolescents living in war zones and experiencing war situations, violent situations become part of their political socialization through the years [38]. A study conducted on Israeli preschool children exposed to war showed that an increase in externalizing and posttraumatic symptoms and more immature defenses were associated with very negative attitudes towards the enemy [39]. These results illustrate that trauma experienced as a result of political conflict may be a prominent factor in the development of stereotypes and hatred possibly contributing to the cycle of violent conflicts.

The Case of Preschool-Aged Refugees

In recent years, the number of people who have been forcibly displaced has increased tremendously, reaching a peak in 2015. More than half of these refugees were children [3]. Refugees often arrive at their destination after experiencing traumatic events in their home country as well as during their escape and relocation. While their traumatic experiences will likely affect their lives, the most prominent issues of their resettlement process have yet to be delineated [40].

A significant body of research has begun addressing the traumatic experiences of child and adolescent refugees who have experienced war, famine, and political conflict in their home countries [41]. Many child refugees suffer from severe psychiatric disorders (e.g., PTSD, depression, anxiety, and conduct disorder) and symptoms (e.g., somatic complaints, over-dependency, and restlessness), social life disruptions, learning difficulties and loss of family and friends [39, 42–44]. Despite the lack of research on preschool-aged refugees [43], they are known to develop different kinds of behavioral disorders, including PTSD [44].

Objective and Subjective Moderating Factors Affecting the Exposure-Consequence Association

It is important to map the objective factors and the subjective moderating components of preschoolers exposed to disaster and terrorism for understanding children's resilience and developing prevention programs.

Objective Factors These factors include type and number of incidents and level of exposure. The literature emphasizes the importance of exposure level in understanding an incident's effects [45]. Exposure levels range from (a) the child himself being directly exposed to the disaster or the terrorist incident, through (b) the death or injury of his caretakers, to (c) the effects on the child's surroundings (community, neighborhood). In a study of Israeli infants and toddlers exposed to missile attacks during the Gulf War, significantly more children residing in the target zone displayed adjustment disturbances than children residing in a non-target zone [46].

Other studies examined the consequences of preschool children's personal exposure to disasters or terrorist incidents. A study conducted in the Gaza Strip found that level of personal exposure to violence was not associated with children's mental health, but was strongly associated with their mothers' mental health [47]. However, the majority of these children were born and raised in an atmosphere of political violence, thus limiting the ability to detect an association between exposure and children's mental health.

Personal exposure also predicted PTSD diagnosis [48] and parental help seeking [49]. Wang et al. demonstrated that being directly exposed to terrorism is significantly associated with increased risk of internalizing and externalizing behavior problems in preschool children [45]. Importantly, the term direct exposure in their paper, referred to preschoolers that were present during a terrorist attack with or without injury, were near a terrorist attack, or knew someone close to the child who was injured or killed during a terrorist attack.

A further level of exposure that merits consideration is the media, which provides sensational coverage of disasters and terrorism, including intensely graphic visual material [50]. For instance, exposure to media coverage on September 11 among preschoolers predicted PTSD symptoms [51] and sleep problems [45, 52]. However, despite the impact of exposure, a study in children 8–12 years old following a devastating tornado found that beliefs and attributions about disasters predicted long-term posttraumatic distress stronger than degree of exposure or coping strategies [53].

Incident number and severity is related to posttraumatic symptoms and behavioral and emotional problems in various settings [6•, 52, 54]. Displacement due to natural disasters or political conflicts is a form of stressful exposure. Pfefferbaum, Jacobs, Van Horn, and Houston reviewed the effects of displacement among children exposed to disasters [55•]. Their

findings revealed that social effects such as loss of jobs, schools, places of worship, access to usual medical care, and sometimes all or part of their social networks lead to loss of security, comfort, traditions, and familiar living conditions. These changes profoundly affect parental reactions, parenting styles, and family interactions, which in turn can influence post-disaster functioning among children. In some studies, displacement correlated with symptoms of posttraumatic stress, depression, and post-disaster trauma, while others showed that relocated children had lower rates of serious emotional disturbance than those who did not relocate. A study on Israeli preschoolers under missile attacks found that displaced children and mothers showed higher externalizing and stress symptom levels compared with nondisplaced and threatened children [56]. No additional research on the effect of displacement on preschoolers was found.

Subjective Moderating Variables The literature often refers to the parent-child relationship as the most essential moderator affecting children's tendency to psychopathologies in general and specifically to their reaction to trauma exposure [57, 58]. This understanding has been evident since Freud and Burlingham showed that during WWII young children displayed more symptoms of distress when they were separated from their parents [19]. Subsequent research has consistently emphasized the correlations between parental and child distress, especially among preschool children [59]. In this context, maternal reaction to stress and maternal mental health (e.g., PTSD) have been found to predict children's responses to trauma (e.g., posttraumatic stress symptoms, behavioral problems, and somatic complaints) [13, 58, 59].

A mother's ability to provide emotional availability, empathic responsiveness, [60] and sensitive containment, the cornerstone of attachment theory [61], provides a regulatory framework for the development of bio-behavioral stress-management systems. Indeed, attachment has been found to be a crucial mechanism in posttraumatic resilience. A study that examined Israeli preschool children who lived near the Gaza Strip and were exposed to war-related trauma on a daily basis found that preschoolers who developed PTSD increased their attachment-related avoidant behavior when traumatic memories were evoked. Under the same conditions, however, secure attachment-related behavior increased among children who did not develop PTSD [13]. Hence, they concluded that attachment patterns and mother's sensitivity serve as resilient factors in the exposure consequence association. The child-father relationship and the triadic relation have yet to be thoroughly researched.

A 2-year prospective study on preschool children who experienced life-threatening trauma offers another way of understanding the mother-child symptom relationship [62•]. The study assessed the outcome of these children's PTSD symptoms, as well as of seven maternal factors examined as mediators or moderators 2 years after the experienced event.

Significant mediator variables included maternal symptoms (PTSD, depression), maternal escape/avoidance coping, and emotional sensitivity. The study showed that greater maternal emotional sensitivity appeared to mediate the development of more PTSD symptoms among their children. The authors speculated that the child's symptoms may influence those of the parents, supporting bidirectional effects between parent-child dyads [63, 64]. Also, parents may carry a genetic susceptibility for developing PTSD, transmitted to their children.

Research regarding genetic involvement suggests that PTSD risk is determined by the interaction of genetic dispositions and early experiences [65]. Feldman, Vengrober, and Ebstein found that a biological, oxytocin-vasopressin genotype and mothers' sensitive caregiving during evocation of a traumatic incident jointly contribute to the propensity to develop PTSD among preschool children [66•].

Home environment is another ecological factor moderating the exposure-consequence association [9•, 55•, 66•, 67, 68]. For instance, a study of families exposed to the 9/11 attacks found that negative changes in parenting, increased tension between couples, and increased parental anxiety regarding parenting were correlated with the number of posttraumatic symptoms in children [67]. Social support also affects family resilience during periods of extended trauma [68]. Greater perceived social support is associated with lower levels of maternal depression and fewer posttraumatic symptoms and PTSD diagnoses in children [13, 69].

The child's temperament is a critical factor impacting the exposure-consequence association [5, 10•, 15]. Individual differences in children's temperamental reactivity were found to predispose or facilitate children's self-regulation development and have been consistently associated with children's overall adjustment to their environment [70]. A combination of temperamental negativity and low parental support places maltreated preschool children at greater risk for poor inhibitory control [71]. Notably, temperamental reactivity among preschool children under conditions of ongoing war does not necessarily indicate higher risk, as it may be an adaptive response to the stressful context [72]. Although these findings do not refer to preschoolers' reactions to disasters or terrorism, they could offer some insight into similar processes following other traumatic incidents.

Child's age and developmental status at the time of exposure seem to be an additional moderating factor. Feldman and Vengrober examined symptom manifestations and risk and resilience factors among preschoolers exposed to wartime trauma. Their results showed that PTSD was diagnosed in 37.8% of exposed children. Symptoms observed in these children included nonverbal representation of trauma in play. Children with PTSD showed increased behavioral avoidance that was correlated with mother's degree of trauma exposure and maternal PTSD. Moreover, the researchers found that exposed children aged 3–5 were nearly twice as likely to develop PTSD compared to exposed infants aged 1.5–3 [13]. Age 3–5 seems to be an

especially vulnerable period due to the linguistic, symbolic, and executive skills that children have acquired and that enable them to project to the future. Accordingly, these children's anxiety may increase and regressions may be more notable. On the other hand, compared to their older schoolmates, children aged 3–5 have not yet developed operative thought, self-regulatory strategies, or the ability to lean on and be helped by their social surroundings. As a result, it seems that 3–5-year-olds may be at especially high risk. In this context, a group of studies examining Israeli preschoolers during the Gulf War revealed interesting findings [11, 55•, 73]. In one study, the correlation between PTSD symptoms in mother and child was strongest when the age of the child was 3, weaker when the child was 4, and non-existent at age 5 [11]. However, it seems that the risks for the 0–3 age group have not yet been properly understood.

An additional moderator is the child's history of stressful life events. Considerable evidence indicates that accumulated stress, such as divorce, birth of a sibling, death in the family, migration, or violence in the home, increases a child's vulnerability [29, 36, 74]. For example, a study that examined the effects of traumatic exposure and stressful life events 3 months after daily exposure to rocket attacks on Israel's southern border found that the accumulation of stressful life events in the 2 years prior to the war and severity of exposure accounted for 30% of the variance of PTSD symptoms and 16% of the variation in the child's adaptive behavior [75•].

Conclusions

The consequences of exposure to disasters and terrorism among preschool children can be severe and profound. These children are at critical stages in their development, making them more vulnerable than older children. The effects of exposure range from posttraumatic stress symptoms to emotional and behavioral outcomes, as well as biological outcomes that may be neurological, neuro-endocrinal, physiological, or epigenetic.

Notably, very little research discusses the cognitive outcomes of such exposure in preschoolers. Moreover, more longitudinal research is needed regarding the long-term consequences. Studies have found a significant decrease in severity in most symptom domains 5 years after exposure [29], more comorbid psychopathologies among war-exposed preschool children, and a growing number of comorbidities with age, as comorbidity was found to increase from middle childhood to late childhood [10•].

Posttraumatic growth has been lately studied among children and adolescents, indicating a negative association with mental health problems among other positive outcomes [76]. Although it has been suggested that posttraumatic growth may not develop among preschool children [76], this assumption has yet to be validated in future studies.

Emotional sensitivity and regulation, attachment style and PTSD symptoms of mothers are central moderators in the relation between disaster or terrorism exposure and consequences for preschoolers. Moreover, genetic dispositions, home environment, the child's temperament, and the preschooler's history of stressful events are also important variables in the exposure-consequence relationship.

Research on preschoolers' exposure to disasters and terrorist incidents faces several challenges. One of the most common challenges involves measurement of exposure type. As Slone and Mann conclude in their review, some studies did not measure the type and severity of exposure, and even when measured, exposure was not always related to a specific outcome [9••]. Categorizing the different types of traumatic exposure was challenging due to the large variation in exposure measures. In addition, many measures were not sufficiently discriminating or sensitive to each type of traumatic event. Moreover, recent research highlights the need for differentiation between profiles of traumatic life event exposure to complement the cumulative risk perspective [77].

Additionally, as the studies involved mostly mothers, the impact of the child-father and the triadic relationship, which are significant for preschoolers' development [78], has yet to be examined. Finally, research regarding preschool refugees is needed in order to understand their special needs arising from the complex circumstances they encounter.

This paper reviewed the literature describing the consequences of disasters and terrorism for preschool children. Additionally, it described the mediating and moderating variables that influence the event-consequence relationship. Further understanding the psychosocial and biological variables may help us enhance resilience and preparedness for disasters and terrorism as well as assist in constructing adequate child-oriented preparedness and intervention programs [79, 80].

In our subsequent article, we review the existing literature regarding assessment methods, preparedness programs, and intervention models that have been designed for preschoolers in the context of disasters and terrorist incidents [81]. Integrating the existing knowledge regarding preschool children into the context of disasters and terrorism is necessary for us to prepare the coming generation to contend with the challenges of the present.

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Compliance with Ethical Standards

Conflict of Interest Daniel Hamiel, Leo Wolmer, Lee Pardo-Aviv, and Nathaniel Laor declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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