

# Children's Mental Health After Disasters: The Impact of the World Trade Center Attack

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This paper summarizes the results of systematic studies published in peer-reviewed journals from 1999 to 2002 addressing post-traumatic stress reactions in children after mass disasters. Children's post-traumatic reactions are considered in five different contexts—natural disasters, large-scale human-induced accidents, spree shootings, war, and terrorism. Association of these reactions with gender and age, as well as longitudinal course, is addressed. Other post-traumatic reactions in children after a mass disaster, as well as the comorbidity of these with stress reactions, are reported. With this as background, the most relevant epidemiologic investigations conducted after the World Trade Center attacks are then described. It is expected that new knowledge in the area of children's post-traumatic reactions to disasters will result from the research initiatives launched after September 11, 2001.

## Introduction

Addressing children's mental health needs in the aftermath of a mass disaster is critically important to provide adequate care for this highly vulnerable population, and also to prevent the escalation of negative mental health outcomes that would otherwise be likely to ensue. In general, expertise of how to best address children's responses to mass disasters remains nascent compared with other areas of child psychiatry. It is, therefore, important to keep in mind as one reads this review that the diagnosis of post-traumatic stress disorder (PTSD), for example, has only been applied to children and adolescents since the publication of third edition of the *Diagnostic and Statistical Manual of Mental Disorders* in 1987.

First, researchers should recognize that what constitutes exposure to a mass disaster may vary considerably

depending on the type of disaster and on the framework used by the observer. Rates of reactions to trauma in the general population, in the absence of a major disaster, are important as reference, yet, they remain largely unknown, with few exceptions [1,2•,3]. Without such reference, it is difficult to evaluate the magnitude of the psychologic impact of a mass disaster, such as the World Trade Center attacks in 2001.

The authors consider it of special importance, therefore, to compile herewith the most recent evidence, from 1999 to the present, about children's mental health sequelae to mass disaster, identifying past accomplishments and suggesting future priorities. The last part of this review concentrates on a recent mass disaster with unique characteristics—the World Trade Center attacks.

## Post-Disaster Mental Health Problems in Children

Mass disasters that most commonly have a pronounced impact on children will be categorized here as follows: 1) natural disasters, 2) large-scale human-induced accidents, 3) spree shootings, 4) war, and 5) terrorism. All of these events have been shown to exert a deleterious, unpredictable, or uncontrollable impact on a large number of people at the same time. However, they also differ on a number of key points, such as origin (natural causes or not) or motivation (accidental, ideologic, political, or driven by individual needs). These distinctions are likely to result in different effects. For example, the experience of war, usually characterized by a high degree of uncertainty regarding duration and types of violence it might produce, generates a traumatic experience that is protracted and widespread. A school shooting, on the other hand, is contained to a smaller community and is experienced as a one-time event.

## Post-traumatic stress reactions

### *Natural disasters*

Most studies of children's mental health reactions after mass disasters address natural disasters, such as hurricanes, tornadoes, earthquakes, or floods. Recent studies of children exposed to such disasters have been conducted in the US,

Taiwan, Japan, and Armenia. The majority of these studies focus on indicators of PTSD. Prevalence of PTSD-like syndromes varies from 3% in children exposed to a tornado [4] to 90% in children 6 months after exposure to a hurricane [5]. Heterogeneity in study methodology precludes drawing any conclusions from these rates. However, studies consistently demonstrate that proximity to the natural disaster site is associated with PTSD symptoms [5–7]. Other exposure factors associated with indicators of PTSD after a disaster were being physically injured and losing a household family member [8], or living with a surviving parent who presented significant post-traumatic symptoms [4].

#### *Large-scale human-induced accidents*

Post-traumatic reactions are common in children after large-scale human-induced accidents. Post-traumatic stress disorder was observed in approximately 52% of the children who survived a shipping disaster, resulting in a relative risk of 14.8 compared with control individuals [9]. The most important predictors of PTSD were direct exposure to the traumatic situation, subjective appraisal at the moment of the trauma, and anxiety symptoms 5 months after the disaster [10]. Sixty percent of the children who watched the Challenger (space shuttle) accident reacted with fear to at least one of the stimuli associated with it 1 year later [11].

#### *Spree shooting*

The first study to undertake a truly systematic evaluation of post-traumatic stress response in children was conducted after a sniper attack in an elementary school, where 60.4% of the children presented symptoms compatible with PTSD [12]. Children who were closer to the attack, that is, actually on the playground where the shooting took place, had more severe or moderate PTSD symptoms (77%) compared with children who were in the school but not on the playground (67%). This indicates a relationship between physical proximity to violence and PTSD symptoms. Yet, proximity does not appear to be a necessary condition for presenting a posttraumatic reaction after a disaster. More ninth to 12th-grade public and private school students throughout the US reported feeling unsafe after the Columbine, CO shooting than before, though, paradoxically, a decrease in suicide ideation was observed during this period [13•].

School shootings are more frequent than they were 20 years ago; 28 events were registered in the 1990s, whereas only five were recorded in the 1980s (US Secret Service & US Department of Education, Unpublished data). Despite this increase, there has been a relative absence of studies about the impact of school shootings on the mental health of children, ignoring that school shootings are very likely to have an enormous, broad, and lasting effect on children.

#### *War*

Of all the mass disaster categories, war has received the most attention from child mental health researchers in

recent years. Studies conducted in the war area are theoretically more accurate, because they avoid the potentially confounding effects of displacement or immigration. However, it is also true that precarious conditions of war may not allow for appropriate planning and implementation of large-scale epidemiologic studies. The majority of studies that have been done have addressed eastern European populations, particularly Bosnians. Studies of refugee children conducted outside the war zone are most common [14–21]. However, assessments have also been conducted in war zones including Bosnia [22–24], Kosovo [25], Croatia [26], and Iraq [27]. Two studies have addressed the problems of Palestinian children [28,29]; however, only one investigation provided systematic data about African children, in which approximately 3000 children were assessed 13 months after the 1994 genocide in Rwanda [30•].

Most of the investigations assessing children in war zones found elevated symptom levels of post-traumatic stress [24,25,28,29,30•], with prevalences that were as high as 87% in one of the studies conducted in Bosnia [19]. Specific factors associated with post-traumatic stress reactions in children living in war areas were the level of exposure to war [23,24,28,29], not being in a shelter during a bombing [30•], lack of resources at home or in the community, poor physical or mental health conditions, and presence of school stressors [22]. The relationship between exposure to war and post-traumatic symptoms was also found in refugee studies [15,16,19,31], indicating that PTSD symptoms remain even after the child is placed in a more favorable situation. Some studies demonstrated the additive effect that violence and overall deprivation have on PTSD symptomology in children [22,23].

#### *Terrorism*

Published information in peer-reviewed journals about children's reaction to terrorism in recent years is primarily restricted to studies conducted in the US, addressing, in particular, the Oklahoma City and 1993 World Trade Center bombings. As these investigations have used convenience samples rather than community (probability) samples, overall rates of PTSD cannot be inferred. Post-traumatic stress symptoms after the Oklahoma City bombing were related to media exposure [32] and knowing someone who was injured or killed [33••,34]. Among the 22 children who were evaluated after the World Trade Center bombing in 1993, PTSD reactions were found in 66% evaluated after 3 months and were still present in 55% of the children 9 months later [35].

#### **Other post-disaster reactions and comorbidity**

Depressive and anxiety symptoms in children after a mass disaster have been reported by most investigations [5,15,16], but not all [24]. A substantial part of child post-disaster depression seems to stem from loss; studies have shown that up to 90% of children who experienced the

death of a close family member during the course of a disaster developed depressive symptoms [5,36]. Post-traumatic stress responses were also found in bereaved children, for example, in 48.9% of those who lost a parent or a sibling in the Oklahoma bombing [34]. Grief reaction was associated with degree of acquaintance with the deceased girl in a shooting and being in the playground where the disaster took place [37].

Although PTSD and depression are independent conditions, many children exposed to trauma develop symptoms of these disorders [26,38••]. Rates of comorbidity as high as 79% have been found in highly exposed areas [5]. Unlike PTSD, depression does not always surface in children during the short-term post-disaster period. This suggests that some depression may be secondary to persistent PTSD symptoms and may contribute to the onset and severity of secondary depression [5]. Disturbance in conscience functioning [7], anxiety, problems with peer relationships [38••], and psychosomatic complaints have been described [26] in association with posttraumatic stress symptoms.

Other negative reactions were detected in children in the aftermath of natural disasters, including anxiety, panic, hostility, psychotic and obsessive symptoms [8], physical symptoms [6,22,31], and a negative conceptualization of self and others [7]. By contrast, adolescents also demonstrated advanced moral development, which was expressed as the assumption of greater responsibilities and moral challenges [7]. For 22 junior high school victims of an earthquake in Taiwan, the major factors contributing to psychologic recovery were self-healing, assistance from non-afflicted people, interest in activities, and occurrence of other important post-earthquake events [39].

In reaction to war, 90% of children interviewed in Rwanda reported that they believed they would die [30•] and 61% in Kosovo reported feeling unsafe in the streets [25].

Less obvious consequences of a disaster have only minimally been investigated. Among those cited is an increase in child abuse (physical, sexual, or emotional) registered by state agencies after Hurricanes Hugo and Andrew [40]. Other reports by teachers in Kosovo state that 84% of their students presented learning difficulties [25].

### Risk factors for post-disaster reactions

#### Gender

Several studies have found that female gender is associated with post-traumatic stress reactions [10,23,26,31,34] even in the absence of a mass disaster [1]. One study reported gender differences to be more prominent in older children [26]. Male gender was associated with post-traumatic cognitive symptoms [3], a greater decrease in symptoms over time [17], and with aggressive behavior in child and adolescent refugees [31]. A study of the effects of age on post-traumatic depression in adolescents found that post-pubescent girls have higher rates of depression than post-pubescent boys [41••].

#### Age

Younger age was associated with post-traumatic stress reactions according to most investigations [4,17,26,31]. When an opposite trend was observed, it was explained by a higher likelihood of exposure to the violence of war among older children [42]. In some studies, even when older children were more exposed, they did not present with more post-traumatic symptoms than younger children [7,23,43].

#### Post-disaster reactions over time

Repeated assessments are necessary to determine the mental health effects of a disaster over time. Longitudinal studies addressing post-disaster reactions are more rare than cross-sectional assessments, but those that do exist are highly informative. Available studies have measured stress disorders from 3 months to 8 years after a disaster. The literature consistently shows that post-traumatic stress reactions are not transitory entities, but rather persist over time [6,17,27,44]. Even when a decline in symptoms is observed, it does not equate complete recovery. For example, after Hurricane Andrew, 29.8% of the children studied satisfied criteria for a PTSD diagnosis 3 months post-disaster, a percentage that decreased to a still significant 12.5% by the 10-month follow-up [44].

A thorough assessment of the longitudinal course of post-traumatic stress reactions found that, among the 51.7% who survived a shipping disaster and developed PTSD at some point during the 8-year follow-up, most presented the disorder within 6 months after the disaster. Strikingly, one third of those who developed PTSD still exhibited symptoms even 5 years after the event [9]. In this study, although PTSD, specific phobias, and separation anxiety developed usually immediately after the disaster, panic disorder and depression had a delayed onset, often beginning more than a year after the disaster. When the child presented with PTSD and depression, depression developed after recovery from PTSD in a third of the cases [41••]. Not only does post-disaster depression seem to take longer to develop than PTSD, but evidence also indicates that it grows worse over time [36].

Lack of longitudinal post-disaster information also accounts for the limited knowledge about the role of pre-existent psychopathology in the development of PTSD, as well as the specific contribution of past exposure to trauma. The latter, if considered, has been assessed retrospectively [10]. From the longitudinal assessment of the shipping disaster, researchers learned that previous vulnerability is the main factor influencing severity and duration of PTSD [10]. In a "natural experiment," information on child psychopathology from an ongoing study permitted investigators to determine that previous anxiety symptoms were the only predictors of PTSD symptoms after the Northridge earthquake in Los Angeles [38••]. Over time, association between post-traumatic symptoms among parents and their children was also reported to increase [35].

## The Impact of the World Trade Center Attack on Children's Mental Health

The events of September 11, 2001 were unique in scope and visibility. Even for people who were not in immediate physical danger on that day, the destruction of a highly visible symbol, shown in real time on television, and produced a widespread sense of shock and vulnerability. Susser *et al.* [45] point out that some of the most insidious effects of terrorism are intentionally psychologic, and that a truly comprehensive and effective response to ongoing terror threats must address the mental health needs that such threats engender. A little more than 1 year after the attacks, some information has been generated about the psychologic reactions among the New York City population. As usual, adults have been the focus of most studies. Hence, the first findings from adults are an attempt to provide a larger framework for understanding of the psychologic consequences of this attack. The first attempt to assess the scope of mental health needs after September 11 was undertaken by the New York State Office of Mental Health and the Columbia Mailman School of Public Health. Estimates were produced based on prevalence rates determined after the Oklahoma City bombing; over 520,000 people in New York City and surrounding counties were expected to develop PTSD, and over 129,000 were expected to seek treatment for PTSD in 2002 [45].

This assessment, although useful as an immediate response to crisis, could not be precise, because psychologic effects of different kinds of trauma are likely to vary. Compared with the Oklahoma City bombing, the World Trade Center attacks were larger in scope, and occurred in a more densely populated urban area. In addition, other attacks occurring simultaneously in different locations, coupled with a largely hidden and widespread organization that was responsible for them, may also have increased the uncertainty, fear, and anxiety in people across the country that they too might be targets.

The first empiric study to address the effects of September 11 was conducted just a few days after the event [46]. Adults across the US were sampled in a random-digit dialing telephone survey. At least one substantial stress symptom was reported by 44% of the adults surveyed and 90% reported low-level stress symptoms. Higher rates of substantial stress reactions were found in women, non-whites, and people with pre-existing psychologic problems [46].

An Internet-based national survey of psychologic reactions to the events of September 11 was carried out 1 to 2 months after the attacks [47] to estimate the prevalence of PTSD symptoms and clinically significant distress across the country and in areas near the attack sites. Results indicated that the rate of probable PTSD was 11.2% in New York City, 2.7% in Washington DC, 3.6% in other major metropolitan areas, and 4% in the rest of the country. Although the comprehensive and immediate nature of this study should certainly be acknowledged, it is hard to interpret the results, because

considerable selection bias likely resulted from the Internet-based design.

The most comprehensive and precise study of the immediate aftermath of September 11 to date (5 to 8 weeks after the attacks) was conducted using random telephone dialing among residents of Manhattan living below 110th Street, which yielded a representative sample of 988 adults [48••]. Almost 58% of the respondents reported at least one symptom of PTSD in the previous month and symptoms consistent with a probable diagnosis of PTSD in the previous 30 days were reported by 8.8% of respondents [49]. Symptoms consistent with probable PTSD specifically resulting from the September 11 attacks were reported by 7.5% of respondents; symptoms consistent with major depression were reported by 9.7% [48••]. The study also identified an increase in the use of cigarettes (9.7%), alcohol (24.6%), and marijuana (3.2%) after the attacks and increases associated with PTSD and depression [50]. Risk factors for elevated probable PTSD and depression after the attacks included Hispanic ethnicity, two or more past stressors, and panic attack during or near the events. In addition, residence south of Canal Street and loss of possessions because of the attack predicted symptomatology consistent with PTSD, whereas low social support, the death of a friend or relative during the attacks, and loss of job because of the attacks predicted depression [48••]. Within the Hispanic population, being female and living near the World Trade Center were additional risk factors for depression, and exposure to two or more life stressors and having an income below \$30,000 were additional risk factors for PTSD [51].

An increase in the need for mental health services after September 11 was expected. Project Liberty was created as a free crisis counseling and educational outreach program for people distraught as a result of the attacks. Despite this, only 50.7% of women and 27.5% of men presenting with either probable PTSD or major depression in the wake of September 11 received mental health treatment. Among 18 to 24 year olds with the same diagnoses, the rate of treatment was a mere 7.3% [52]. Additionally, only 1.1% of those with PTSD or major depression who did not have health insurance received psychiatric medication compared with 24.6% of those with insurance.

The immediate effect of the World Trade Center disasters on children, although expected to be substantial, was not assessed as promptly and thoroughly as the impact on adults. One or more substantial stress symptoms were found in 35% of children, and 47% felt worried about their own safety or the safety of their loved ones [46]. Over 60% of New York City adults reported one or more of their children being upset by the attacks [47]. In the study by Galea *et al.* [48••], substantial disturbance was reported among children, with 21% not getting along with other children, 31% being unhappy, sad, or depressed, and 40% being unable to concentrate or pay attention. Overall, 22% of children had received some form of counseling,

usually delivered in schools; children whose parents had current symptoms related to the attacks were more likely to receive counseling, as were boys and children with at least one sibling in the household [53].

Results of post-attack studies pertaining to children are quite limited for several reasons. First, information about children was obtained through adults rather than through the children themselves. Although caregivers do have insight into their children's emotional state, they often fail to have valid information about their children's internalizing disorders, which are those expected to result from a traumatic experience. Parents were not asked about their children's psychiatric disorders, but only had to answer vague questions about the children's general emotional state.

Six months after the World Trade Center attacks, the former New York City Board of Education, in an effort to assess short-term outcomes, sponsored the New York School Survey to investigate the effects of the attacks on a representative sample of New York City Public School children in grades 4 through 12 ( $n=8266$ ). Unlike previous studies, this one included a valid and reliable *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* diagnostic screen for eight psychiatric disorders (major depression, generalized anxiety, separation anxiety, panic agoraphobia, PTSD, conduct disorder, and alcohol use or dependence), so that probable disorders could be assessed, not merely symptom levels or reactions. The results of that survey have caused appropriate concern. Throughout the city, rates for each of the eight probable psychiatric disorders among New York public school students were elevated above rates found in nearby urban and suburban communities tested before September 11. Most diagnoses were two to three times as high [54••].

## Conclusions

From the existing disaster literature, it is not possible to derive an overall expected frequency of PTSD or other reactions among children exposed to mass disasters. One reason is the tremendous variation in study methodologies. Specifically, exposure criteria vary significantly by study, and operational definitions are rarely clearly stated. Also, different types of comparisons are conducted, such as between exposed and non-exposed [9], exposed and "less" exposed [5], and exclusive use of exposed group [10,55]. Despite this variation, one can infer from the literature that children are profoundly affected by disaster events and are at significant risk for developing stress disorders.

What are the risk factors for mental health problems in children after a mass disaster? This is a difficult question to answer given the heterogeneity of traumatic experiences, the spectrum of complex factors that appear to play a role in the etiology of these disorders (eg, a child's physical and emotional proximity to the disaster as well as pre-existing problems), and that few studies have pre-disaster

morbidity measures [13•,38••]. However, consistently observed across studies was the higher risk of post-traumatic stress reactions after a mass disaster for girls and younger children.

There is no doubt that much still remains to be learned about children's reactions to mass disasters, so that the impact on this vulnerable population can be more promptly addressed. Much of the available work lacks information about psychiatric disorders other than PTSD that may develop after a mass traumatic experience, and also lack information about comorbidity of these other disorders with PTSD. This is unfortunate, because these may prove to be key variables in estimation of prognosis. The lack of studies addressing the impact of school shootings on children has already been mentioned.

The World Trade Center attack was a single mass disaster event that had a catastrophic effect on the whole population of a community (New York City) that is particularly rich in research resources. Setting up an all-encompassing study in a post-disaster situation is not an easy task, but the brief review of empiric investigations launched after September 11th clearly illustrates that, if prioritized, comprehensive and rigorous studies can be conducted in the immediate aftermath of a disaster. The careful examination of psychologic reactions over time is particularly critical for children. This is, in fact, the sole measure of anticipating and addressing future problems before they occur. Fortunately, because of all the research effort that followed the World Trade Center attacks, researchers predict that a significant enhancement of overall knowledge about effective intervention for post-traumatic reactions in adults, as well as in children, will occur.

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## References and Recommended Reading

Papers of particular interest, published recently, have been highlighted as:

- Of importance
- Of major importance

1. Elklit A: **Victimization and PTSD in a Danish national youth probability sample.** *J Am Acad Child Adolesc Psychiatry* 2002, 41:174–181.
2. • Giaconia RM, Reinherz HZ, Silverman AB, et al.: **Traumas and posttraumatic stress disorder in a community population of older adolescents.** *J Am Acad Child Adolesc Psychiatry* 1995, 34:1369–1380.

This is a community study of post-traumatic reactions to trauma in adolescents. Useful as a reference when evaluating the impact of mass disasters.

3. Shannon MP, Lonigan CJ, Finch AJ Jr., Taylor CM: **Children exposed to disaster: I. Epidemiology of post-traumatic symptoms and symptom profiles.** *J Am Acad Child Adolesc Psychiatry* 1994, 33:80–93.

4. Stoppelbein L, Greening L: Posttraumatic stress symptoms in parentally bereaved children and adolescents. *J Am Acad Child Adolesc Psychiatry* 2000, 39:1112-1119.
  5. Goenjian AK, Molina L, Steinberg AM, et al.: Posttraumatic stress and depressive reactions among Nicaraguan adolescents after Hurricane Mitch. *Am J Psychiatry* 2001, 158:788-794.
  6. Kitayama S, Okada Y, Takumi T, et al.: Psychological and physical reactions on children after the Hanshin-Awaji earthquake disaster. *Kobe J Med Sci* 2000, 46:189-200.
  7. Goenjian A, Stilwell BM, Steinberg AM, et al.: Moral development and psychopathological interference in conscience functioning among adolescents after trauma. *J Am Acad Child Adolesc Psychiatry* 1999, 38:376-384.
  8. Hsu CC, Chong MY, Yang P, Yen CF: Posttraumatic stress disorder among adolescent earthquake victims in Taiwan. *J Am Acad Child Adolesc Psychiatry* 2002, 41:875-881.
  9. Yule W, Bolton D, Udwin O, et al.: The long-term psychological effects of a disaster experienced in adolescence: I. The incidence and course of PTSD. *J Child Psychol Psychiatry* 2000, 41:503-511.
  10. Udwin O, Boyle S, Yule W, et al.: Risk factors for long-term psychological effects of a disaster experienced in adolescence: predictors of post-traumatic stress disorder. *J Child Psychol Psychiatry Allied Disciplines* 2000, 41:969-979.
  11. Terr LC, Bloch DA, Michel BA, et al.: Children's symptoms in the wake of Challenger: a field study of distant-traumatic effects and an outline of related conditions. *Am J Psychiatry* 1999, 156:1536-1544.
  12. Pynoos RS, Frederick C, Nader K, et al.: Life threat and post-traumatic stress in school-age children. *Arch Gen Psychiatry* 1987, 44:1057-1063.
  13. Brener ND, Simon TR, Anderson M, et al.: Effect of the incident at Columbine on students' violence- and suicide-related behaviors. *Am J Prev Med* 2002, 22:146-150.
- This is the only recent study to evaluate the ecologic impact of a school spree shooting on children's mental health.
14. Goldin S, Levin L, Persson LA, Hagglof B: Stories of pre-war, war and exile: Bosnian refugee children in Sweden. *Med Confl Surviv* 2001, 17:25-47.
  15. Angel B, Hjern A, Ingleby D: Effects of war and organized violence on children: a study of Bosnian refugees in Sweden. *Am J Orthopsychiatry* 2001, 71:4-15.
  16. Papageorgiou V, Frangou-Garunovic A, Iordanidou R, et al.: War trauma and psychopathology in Bosnian refugee children. *Eur Child Adolesc Psychiatry* 2000, 9:84-90.
  17. Stein B, Comer D, Gardner W, Kelleher K: Prospective study of displaced children's symptoms in wartime Bosnia. *Soc Psychiatry Psychiatr Epidemiol* 1999, 34:464-469.
  18. Sundelin-Wahlsten V, Ahmad A, von Knorring AL: Traumatic experiences and post-traumatic stress reactions in children from Kurdistan and Sweden. *Acta Paediatr* 2001, 90:563-568.
  19. Ahmad A, Sofi MA, Sundelin-Wahlsten V, von Knorring AL: Posttraumatic stress disorder in children after the military operation "Anfal" in Iraqi Kurdistan. *Eur Child Adolesc Psychiatry* 2000, 9:235-243.
  20. Ferren PM: Comparing perceived self-efficacy among adolescent Bosnian and Croatian refugees with and without post-traumatic stress disorder. *J Trauma Stress* 1999, 12:405-420.
  21. Becker DF, Weine SM, Vojvoda D, McGlashan TH: Case series: PTSD symptoms in adolescent survivors of "ethnic cleansing": results from a 1-year follow-up study. *J Am Acad Child Adolesc Psychiatry* 1999, 38:775-781.
  22. Barath A: Psychological status of Sarajevo children after war: 1999-2000 survey. *Croat Med J* 2002, 43:213-220.
  23. Allwood MA, Bell-Dolan D, Husain SA: Children's trauma and adjustment reactions to violent and nonviolent war experiences. *J Am Acad Child Adolesc Psychiatry* 2002, 41:450-457.
  24. Smith P, Perrin S, Yule W, Rabe-Hesketh S: War exposure and maternal reactions in the psychological adjustment of children from Bosnia-Herzegovina. *J Child Psychol Psychiatry Allied Disciplines* 2001, 42:395-404.
  25. Barath A: Children's well-being after the war in Kosovo: survey in 2000. *Croat Med J* 2002, 43:199-208.
  26. Vizek-Vidovic V, Kuterovac-Jagodic G, Arambasic L: Post-traumatic symptomatology in children exposed to war. *Scand J Psychol* 2000, 41:297-306.
  27. Dyregrov A, Gjestad R, Raundalen M: Children exposed to warfare: a longitudinal study. *J Trauma Stress* 2002, 15:59-68.
  28. Miller T, El Masri M, Allodi F, Qouta S: Emotional and behavioural problems and trauma exposure of school-age Palestinian children in Gaza: some preliminary findings. *Med Confl Surviv* 1999, 15:368-378.
  29. Thabet AA, Vostanis P: Post-traumatic stress reactions in children of war. *J Child Psychol Psychiatry Allied Disciplines* 1999, 40:385-391.
  30. Dyregrov A, Gupta L, Gjestad R, Mukanoheli E: Trauma exposure and psychological reactions to genocide among Rwandan children. *J Trauma Stress* 2000, 13:3-21.
- This is the only account of African children's response to a mass disaster. Provides documentation of the children's response to genocide.
31. Rothe EM, Lewis J, Castillo-Matos H, et al.: Posttraumatic stress disorder among Cuban children and adolescents after release from a refugee camp. *Psychiatr Serv* 2002, 53:970-976.
  32. Pfefferbaum B, Seale TW, McDonald NB, et al.: Posttraumatic stress two years after the Oklahoma City bombing in youths geographically distant from the explosion. *Psychiatry* 2000, 63:358-370.
  33. Pfefferbaum B, Nixon SJ, Krug RS, et al.: Clinical needs assessment of middle and high school students following the 1995 Oklahoma City bombing. *Am J Psychiatry* 1999, 156:1069-1074.
- Examines children's post-traumatic responses to the Oklahoma City bombing. Although addressing a community and not a representative sample, it is an important documentation of children's response to terrorism.
34. Pfefferbaum B, Nixon SJ, Tucker PM, et al.: Posttraumatic stress responses in bereaved children after the Oklahoma City bombing. *J Am Acad Child Adolesc Psychiatry* 1999;38(11):1372-9.
  35. Koplewicz HS, Vogel JM, Solanto MV, et al.: Child and parent response to the 1993 World Trade Center Bombing. *J Trauma Stress* 2002, 15:77-85.
  36. Sack WH, Him C, Dickason D: Twelve-year follow-up study of Khmer youths who suffered massive war trauma as children. *J Am Acad Child Adolesc Psychiatry* 1999, 38:1173-1179.
  37. Pynoos RS, Nader K, Frederick C, et al.: Grief reactions in school age children following a snipe attack at school. *Isr J Psychiatry Relat Sci* 1987, 24:53-63.
  38. Asarnow J, Glynn S, Pynoos RS, et al.: When the earth stops shaking: earthquake sequelae among children diagnosed for pre-earthquake psychopathology. *J Am Acad Child Adolesc Psychiatry* 1999, 38:1016-1023.
- Natural experiment design. The only study that permitted the consideration of the influence of previous psychopathology on children's response to disasters.
39. Yen CF, Chang YP, Su YC, et al.: Factors attributing to the psychological recovery from the 1999 Taiwan earthquake among junior high school students: a focus group interview study. *Kaohsiung J Med Sci* 2001, 17:534-539.
  40. Curtis T, Miller BC, Berry EH: Changes in reports and incidence of child abuse following natural disasters. *Child Abuse Negl* 2000, 24:1151-1162.
  41. Bolton D, O'Ryan D, Udwin O, et al.: The long-term psychological effects of a disaster experienced in adolescence: I. The incidence and course of PTSD. *J Child Psychol Psychiatry* 2000, 41:513-523.
- This is a longitudinal study of survivors of a shipping disaster. Long-term course of post-traumatic reactions in children is discussed.
42. Nader KO, Pynoos RS, Fairbanks LA, et al.: A preliminary study of PTSD and grief among the children of Kuwait following the Gulf crisis. *Br J Clin Psychol* 1993, 32:407-416.

43. Deering CG: **A cognitive developmental approach to understanding how children cope with disasters.** *J Child Adolesc Psychiatr Nurs* 2000, 13:7-16.
44. La Greca AM, Silverman WK, Wasserstein SB: **Children's predisaster functioning as a predictor of posttraumatic stress following Hurricane Andrew.** *J Consult Clin Psychol* 1998, 66:883-892.
45. Susser ES, Herman DB, Aaron B: **Combating the terror of terrorism.** *Sci Am* 2002, 287:70-77.
46. Schuster MA, Stein BD, Jaycox L, et al.: **A national survey of stress reactions after the September 11, 2001 terrorist attacks.** *N Engl J Med* 2001, 345:1507-1512.
47. Schlenger WE, Caddell JM, Ebert L, et al.: **Psychological reactions to terrorist attacks: findings from the National Study of Americans' Reactions to September 11.** *JAMA* 2002, 288:581-588.
- 48.●● Galea S, Ahern J, Resnick H, et al.: **Psychological sequelae of the September 11 terrorist attacks in New York City.** *N Engl J Med* 2002, 346:982-987.
- Discusses probably psychiatric disorders of the Manhattan adult population after the World Trade Center attacks (telephone interviews).
49. Levav I, Kohn R, Dohrenwend BP, et al.: **An epidemiological study of mental disorders in a 10-year cohort of young adults in Israel.** *Psychol Med* 1993, 23:691-707.
50. Vlahov D, Galea S, Resnick H, et al.: **Increased use of cigarettes, alcohol, and marijuana among Manhattan, New York, residents after the September 11th terrorist attacks.** *Am J Epidemiol* 2002, 155:988-996.
51. Ahern J, Galea S, Vlahov D: **Psychological impact of the September 11 attacks on Hispanics in Manhattan, New York City.** *Ann Epidemiol* 2002, 12:503.
52. Pynoos RS, Eth S: **Witness to violence: the child interview.** *J Am Acad Child Adolesc Psychiatry* 1986, 25:306-319.
53. Stuber J, Fairbrother G, Galea S, et al.: **Determinants of counseling for children in Manhattan after the September 11 attacks.** *Psychiatr Serv* 2002, 53:815-822.
- 54.●● Hoven CW, Duarte CS, Lucas C, et al.: **Effects of the World Trade Center Attack on NYC Public School Students: Initial Report to the New York City Board of Education.** New York: 2002.
- Discusses eight probable psychiatric disorders in New York City public school children (representative sample of the whole city) to the World Trade Center attacks (self-report).
55. Thabet AA, Vostanis P: **Post-traumatic stress disorder reactions in children of war: a longitudinal study.** *Child Abuse Negl* 2000, 24:291-298.