Psychological Trauma: Theory, Research, Practice, and Policy
2011, Vol. 3, No. 1, 1–7

© 2010 American Psychological Association
1942-9681/10/$12.00 DOI: 10.1037/a0020567

Young Children in the Aftermath of the World Trade Center Attacks

Ellen R. DeVoe
Boston University

Tovah P. Klein
Barnard College

William Bannon, Jr.
Mt. Sinai School of Medicine

Claudia Miranda-Julian
Tufts University

The attacks of September 11, 2001, on the World Trade Center were unprecedented acts of terrorism on U.S. soil. The disaster provides an opportunity to understand the responses of young children to a traumatic event of this proportion. This retrospective study took place within a year of the attacks and examined the relationship of levels of exposure to the World Trade Center disaster and family level predictors to trauma symptoms in a highly exposed sample of 180 young children in New York City. Data were collected through interviews with parents of children five years or younger at the time of the attacks. Primary variables included direct exposure and post9/11 child and parent functioning, including trauma symptoms. Child trauma symptoms were related to direct exposure to the disaster, previous trauma, negative changes in parenting, and increased couple tension. Findings support the conceptualization that children's responses to traumatic events must be addressed within the caregiving context of family relationships. Clinical and preventive intervention for young children should be aimed at multiple levels of the social ecology.

Keywords: post-traumatic stress disorder, parenting, young children, September 11th terrorist attacks, disaster mental health

This document is copyrighted by the American Psychological Association or one of its allied publishers.
This article is intended solely for the personal use of the individual user and is not to be disseminated broadly.
All rights, including for text and data mining, AI training, and similar technologies, are reserved.

The unprecedented horror in this country of the attacks on the World Trade Center had the potential to profoundly affect young children's adaptation, particularly among children whose families lived in close proximity to the disaster site (Hoven et al., 2005). To date, however, we know very little about how young children are affected by exposure to catastrophic community trauma (Osofsky, 2004) and what we do know is based on only a handful of empirical studies (Osofsky, 1995; Scheeringa & Zeanah, 1995; Scheeringa, Zeanah, Myers, & Putnam, 2003). Because there is a paucity of research from the September 11th attacks concerning this age group, very young children and their families remain without benefit of services informed by evidence in the wake of disaster (Osofsky, Osofsky, & Harris, 2007). Thus, in this article, while we focus on the World Trade Center attacks, the data can inform us about trauma and young children more generally. In light of Hurricane Katrina, the earthquake in Haiti, and the number of families with young children affected by the Wars in Iraq and Afghanistan, the need for this information is particularly pressing.

Developmental Vulnerability of Young Children in the Wake of Traumatic Events

Young children are particularly vulnerable in the face of traumatic events partly due to their dependence on caregivers for security, both physically and psychologically. In addition to children's cognitive appraisal of the event in question (Arroyo & Eth, 1996; Scheeringa & Zeanah, 1995), young children have a unique set of factors that can influence their postevent adaptation. For the very youngest, degree of threat to a caregiver, the influence of parents' reactions, and family cohesiveness may be of greater importance than direct exposure to the disaster (Green, Korol, Grace, Vary, Leonard, Gleser, & Smitson-Cohen, 1991; Laor, Wolmer, & Cohen, 2001; Laor, Wolmer, Mayes, Golomb, Silverberg, Weizman, & Cohen, 1996; Scheeringa et al., 2003). The child's perceptions of the event and its degree of threat can be mediated by important adults in the child's life and can influence the child's mobilization of internal and external resources to cope with the traumatic stressor: "Older children are better able to confront adverse situations cognitively, affectively, and socially and therefore may be less dependent on their closest human and nonhuman environments for the regulation of their well-being" (Laor et al., 1996, p. 422). For young children, however, the influence of important adults is thought to be central in influencing posttraumatic adaptation and associations between parental and child functioning have been found in studies of war (Laor, Wolmer, & Cohen, 2001; Levy-Shiff, Holman, & Rosenthal, 1993). Similarly, studies of older children's responses to natural and

This article was published Online First November 1, 2010.

Ellen R. DeVoe, School of Social Work, Boston University; Tovah P. Klein, Barnard Center for Toddler Development, Barnard College; William Bannon, Jr., Department of Psychiatry & Community Medicine, Mt. Sinai School of Medicine; Claudia Miranda-Julian, Department of Child Development, Tufts University.

This research was funded by the National Institute of Mental Health R01 MH66462-01, a Barnard College Faculty Grant and the Barnard Center for Toddler Development.

The authors thank the families and preschools that so generously participated in this study.

Correspondence concerning this article should be addressed to Tovah P. Klein, Ph.D., Barnard College, 3009 Broadway, New York, NY 10027. E-mail: tklein@barnard.edu

nuclear disasters and war exposure have found an association between parental level of distress or psychopathology and child outcomes (Green et al., 1991; Laor, Wolmer, & Cohen, 2001; McFarlane, Clayer & Bookless, 1987).

Young Children's Responses to Traumatic Events and Disaster

One reason for the lack of studies of this age group may be that young children's manifest responses to trauma appear different from those of adults. Researchers have documented unique patterns of posttraumatic adaptation among young children through case studies and a handful of empirical investigations (Gaensbauer, 1995; Scheeringa & Zeanah, 1995; Sugar, 1992; Terr, 1979, 1988). For example, while young children may be less likely to display recognizable symptoms of PTSD, they are more likely to have "global and disorganized responses to stress" (Laor et al., 1996, p. 421) including high incidence of specific behavioral disturbance, trauma-specific fears, aggressiveness, separation difficulties, and regressive behaviors (e.g., Arroyo & Eth, 1996; Green et al., 1991; McFarlane, 1987; Scheeringa, Zeanah, Drell, & Larrieu, 1995; Vogel & Vernberg, 1993). Very young children may also be expected to demonstrate an increase in proximity-seeking to important adults, as opposed to avoidance of relationships, a symptom of PTSD.

There is growing consensus among scholars of infancy and early childhood that DSM-based criteria for PTSD are inadequate for assessing posttraumatic reactions in young children (e.g., Scheeringa et al., 1995) and that very young children's responses to trauma are best considered within the context of caregiving relationships (Lieberman, Van Horn, & Ippen, 2005; Scheeringa et al., 2003). For example, in the first empirical study of PTSD in children under 48 months of age ($N = 41$), researchers found that when the traumatic event involved direct threat to the child's caregiver, and not directly to the child, children still had elevated levels of hyperarousal, as well as more new fears and aggression. These scholars concluded that the diagnostic criteria for PTSD in young children should include the symptom categories reflecting newly developed fears and aggressive behaviors in the posttrauma period (Scheeringa & Zeanah, 1995). As an alternative to DSM-based definitions, criteria for assessing trauma symptoms in young children have been developed to address these developmentally specific issues (Zero to Three, 1994). These criteria include developmentally relevant behaviors, such as night terrors, separation anxiety, constriction in play, posttraumatic play and aggression, and have been incorporated in the current study.

Research on the Impact of 9/11

The horrific nature of 9/11 and the large numbers of people affected by the disaster spurred an emerging domain of research about children's responses to the disaster. Still, relatively few studies have been focused on youth directly exposed to the events of September 11th in New York City, and only one study of preschool age children has been reported to date (Chemtob, Namura, & Abramovitz, 2008).

Research on children. Only one population-based survey of New York City children was conducted in the early aftermath of September 11th with oversampling of children living in high risk areas, including in close proximity to Ground Zero (Hoven, Duarte, Lucas, et al., 2005). Six months post9/11, a representative sample of 8,236 public schoolchildren (Grades 4–12) in 94 public schools was surveyed about exposure to the disaster, pre9/11 trauma, and post9/11 adjustment. Findings indicate that children in the city had higher than population rates of *probable* PTSD (10.6%), generalized anxiety (10.3%), agoraphobia (14.8%), and separation anxiety (12.3%). Significantly, children with higher levels of direct personal and "family" exposure to the disaster and previous trauma were at greater risk of developing PTSD than children without these risk factors. Of particular relevance for the current research are the findings that younger children (4th and 5th grade girls) and those children who had family members with high exposure were more vulnerable to developing post9/11 symptoms. Specifically, family member's exposure to the attacks was found to be a highly significant risk factor in predicting the development of probable PTSD at 6-months postevent.

Studies of children younger than the 4th grade level in the most highly affected areas of the attacks are sparse. Phillips and colleagues (2004) reported on an exploratory study of 147 elementary schoolchildren (K-6th grades) in Washington, DC (Phillips, Prince, & Schiebelhut, 2004). Investigation based on parent report on all children and child self report from 4th to 6th grade children focused on the following: a) the accuracy of parental reports about their children's reactions to the attacks; b) the relationship of child age and gender, parental stress, and media exposure to children's reactions; and c) the association between parent–child communication about the attacks and children's responses. Findings indicate that parental negative reactions and high media exposure were associated with greater distress among children and that parents significantly underestimated the degree of negative reactions experienced by their children. It is important to emphasize that children's exposure within this sample was limited to TV and other media coverage and discussion of the events with parents and at school.

Only one empirical study of outcomes for young children who were directly exposed to the events of September 11th has been reported at the time of this writing (Chemtob et al., 2008). In this research, parents reported on a sample of 116 preschool children who were between ages 18 and 54 months at the time of the attacks. The study began a year and a half after the disaster and was conducted over more than a two-year period. Findings indicate that children with "high intensity" exposure to the disaster and who had lifetime history of other traumatic experience were more likely to be reported as having clinically significant problems on the Child Behavior Checklist, including anxious/depressed and sleep problems. Significant limitations of this study include the length of time elapsed from the disaster to the data collection period and the exclusion of abuse and violence-related items in the assessment of lifetime trauma for children.

The Current Study

A primary aim of the current research was to examine the relationship between exposure and family level variables and symptoms of posttraumatic stress within a sample of highly exposed young children (5 years or younger on 9/11/01) in New York City in the aftermath of the September 11th attacks. While we acknowledge that traumatic impact is often manifested beyond

This document is copyrighted by the American Psychological Association or one of its allied publishers.
This article is intended solely for the personal use of the individual user and is not to be disseminated broadly.
All rights, including for text and data mining, AI training, and similar technologies, are reserved.

PTSD symptoms (Aber & Gershoff, 2004), in this work, we focus on examining symptoms and patterns of acute traumatic stress in young children as reported by their parents, with the recognition that this domain of mental health impact is defined narrowly by the current field of traumatic stress. Specifically, we explore the correlates of child posttraumatic stress symptoms, including child's exposure to the disaster and to adults' reactions on 9/11, parental mental health post9/11, family level exposure, and child's previous history of trauma, including separation from caregiver in an effort to better understand factors influencing the outcomes in young children.

Methods

Data Collection

A sample of 180 parents with at least one child under age 5 years on 9/11/01 was recruited through 11 early childhood centers in New York City in the summer of 2002. Of participating centers, nine are located in lower Manhattan below the "frozen zone" (14th Street), within several blocks to one mile of Ground Zero. One site is located in Brooklyn with windows facing the World Trade Center site and one center is located further uptown, not within visual distance of the World Trade Center site. Families were recruited by leaving fliers and information with each early childhood center. When parents completed a "consent to contact" or request for more information, research staff contacted the family to set up an appointment for an interview. Because of the postdisaster environment, it was not possible to track nonresponders as we did not want to further burden center staff members.

Parent report data about target children were obtained through in-depth interviews conducted from June 2002 through October 2002 in New York City. Prior to the interviews, informed consent was obtained from each parent as described in a protocol approved by both the Columbia University and Barnard College Institutional Review Boards. All interviewers had a background in social work and/or psychology and had been trained by the investigators specifically for the current study. Training focused on interviewer sensitivity to potential trauma material and the ability to assess and respond to participant distress. Interviews were audiotaped with the written consent of the participants for the purposes of transcribing narrative components of the interview and for training purposes. Interviews lasted an average of 1.5 hours and were conducted at a location selected by each participant, typically the family home.

Participants

Data were gathered on 180 families, including one target child within the 0–5 year age range. All parent and child participants were highly proficient English speakers; thus, translators and translations of instruments were not necessary. Ninety-six percent of the parents responding to the survey were mothers, 93% were married, and 93% were college graduates. The average parent was 40 years of age ($SD = 5.24$). Seventy-nine percent of parents were White, 10% were Black or Hispanic, and 11% were Asian/Mixed/other. Overall, 71% of children were White, 6% were Black or Hispanic, 17% were of a mixed racial background, and 6% were Asian/Pacific Islander/other. Fifty-four percent of the sample of children was female. At the time of the attacks, children were an average of four years old ($SD = 1.06$ years).

Instrumentation

Demographics. Basic information about child and family demographic characteristics, that is, child race, age, and gender, and family SES (i.e., income), was gathered.

Post9/11 intervening variables. Nine items were used to examine Post9/11 intervening variables. Specifically, nine items (*yes/no*) were used to assess the degree to which the WTC disaster disrupted the child and family's life after 9/11. Two sample items are "Since 9/11, are there fewer places to play and gather?" and "Since 9/11, have you experienced a sense of loss of community because families have moved away?" These items were summed to create a composite representing the presence of post9/11 intervening variables that have negatively impacted the child and family.

Previous child experiences of trauma. Previous child experiences of trauma were assessed using the "Life Events" items developed for the Infant-Toddler Social & Emotional Assessment-Revised (ITSEA; Carter & Briggs-Gowan, 1999). Parents were asked (*yes/no*) to describe whether their children had experienced any of 16 specific traumatic events prior to the WTC disaster and the age at which the child experienced this event. Consistent with current conceptualizations of what constitutes trauma in young children (Osofsky, 2004; Scheeringa et al., 2003), separation from caregivers is included in this inventory. Two sample items are as follows: "In your child's whole life, has he or she ever been separated from parent or guardian for one week or more?" and "In your child's whole life, has he or she ever been hurt seriously?" Parents also were asked to report on their own previous trauma according to the Parent component of the ITSEA Life Events inventory (Carter & Briggs-Gowan, 1999).

Changes in parenting. Changes in parenting since September 11, 2001, were examined using a checklist developed by the investigators on the basis of focus group data obtained from parents of young children in the first 6 months after the disaster. Parents were asked a series of items designed to reflect both negative and positive changes in behavior and attitudes as a result of the disaster. Items were answered on a *yes* (1) *no* (0) scale and summed to create three subscales: negative parenting change ($\alpha = .66$, possible range = 0–3), increase in parenting anxiety ($\alpha = .70$, possible range = 0–9), and increase in tension with spouse or partner ($\alpha = .67$, possible range = 0–5) since September 11. Examples of negative parenting changes include "I am finding it harder to be a parent than before 9/11" and "I have less patience with my child/children than before 9/11." To assess anxiety in parenting, respondents were asked, "I worry more about what the future holds for my child/children," "I am more concerned about leaving my child/children with caretakers than before," and "I worry more about my child/children getting hurt than before." Finally, parents were asked how their couple relationship had changed. Items reflecting "couple tension" included the following: "We disagree about whether or not to stay in our present home/neighborhood" and "We have very different perceptions of ongoing threat of terrorism which has led to conflict."

Child experiences with adult reactions to the WTC disaster. Children's experiences of adults reactions on the day of the WTC disaster were assessed through five items (*yes/no*): 1) On

This document is copyrighted by the American Psychological Association or one of its allied publishers.
This article is intended solely for the personal use of the individual user and is not to be disseminated broadly.
All rights, including for text and data mining, AI training, and similar technologies, are reserved.

9/11 young child saw mother visibly upset, yelling/crying; 2) On 9/11 young child saw father visibly upset, yelling/crying; 3) On 9/11 young child saw other adults visibly upset, yelling/crying; 4) On 9/11 young child saw people screaming and/or running in the streets; and 5) On 9/11 young child perceived your or your partner's life/physical well being was in jeopardy. These items were added to form a composite score of 0–5, with a higher score indicating that a child had experienced a greater number of events.

Exposure to the WTC disaster. Based on a series of focus groups conducted by the investigators (November 2001 to May 2002) with parents of young children living downtown on 9/11/01, types of in-person exposures to the disaster were identified. From parent narrative descriptions, a checklist (*yes/no*) was developed to assess direct child and parent exposure to the terrorist attacks. Parents completed a separate checklist for each family member to describe the number and types of their respective exposures to the disaster. Please see Table 1 for all items on the checklist and percentage of children and mothers who experienced each individual exposure. The number of exposures reported was summed for an overall child exposure and overall mother exposure.

Parent symptoms of posttraumatic stress. The Post-Traumatic Stress Disorder Checklist–Terror (PCL-T; Weathers, Litz, Herman, Huska, & Keane, 1993; adapted by Norris, 2001, for 9/11 research) was used in order to measure parent symptoms of posttraumatic stress. This checklist corresponds directly to the *Diagnostic and Statistical Manual of Mental Disorders–IV* (*DSM–IV*; American Psychiatric Association, 1994) criteria for the disorder and was anchored specifically on the terrorist attacks. Almost half (49%) of parents reported symptoms corresponding to a diagnosis of PTSD, according to the *DSM–IV* criteria (American Psychiatric Association, 1994; DeVoe, Bannon, Klein, & Miranda, 2007).

Table 1
Description of Child and Mother In-Person Exposures to the September 11th 2001 World Trade Center Terrorist Attacks as Reported by Mothers

Variable	Children	Mother
I saw the plane(s) hit the WTC	10%	18%
I heard or felt the impact of the planes hitting the WTC	29%	40%
I saw the WTC towers collapse	16%	31%
I saw the fires from WTC	45%	66%
I saw people who were injured or dead in the WTC disaster	10%	21%
I saw people falling/jumping from the WTC towers	5%	14%
I saw body parts from the WTC disaster on the ground	0%	2%
I saw or felt debris falling from the WTC	27%	48%
I was in the cloud of smoke and dust from the WTC collapse	32%	32%
I could smell the fires and/or chemicals from the WTC collapse	80%	91%
I heard or felt the WTC tower collapse	28%	38%
I heard sirens from rescue vehicles going to/at the WTC	77%	81%
I was trapped in a building during the WTC disaster	6%	9%
I felt the planes impacting the WTC	25%	33%

Outcome Variable

Child symptoms of posttraumatic stress. Child posttraumatic stress symptoms were assessed using the parent report portion of the PTSD Semi-Structured Interview for Infants and Young Children (Scheeringa & Zeanah, 1994). This interview component included 19 items representing traumatic stress symptoms, with additional questions corresponding to traumatic stress response in young children (e.g., posttraumatic play, aggressive behavior). Children's sleep disturbances were assessed with five questions based on the work of Laor and colleagues with preschool children exposed to SCUD missile attacks (Laor et al., 1996). In considering children's posttraumatic stress symptoms in regard to caseness, the *Diagnostic and Statistical Manual of Mental Disorders–IV* (*DSM–IV*; American Psychiatric Association, 1994) criteria were adapted to require one C cluster symptom of avoidance rather than three, along with three B cluster (reexperiencing) and two D cluster (hyperarousal) symptoms. This approach of using one C cluster symptom is more consistent with the manifestation of posttraumatic stress in very young children and has been used by researchers who study this age group (e.g., Scheeringa et al., 1995). Using this modification, 14% of children were reported to have symptoms consistent with a diagnosis of PTSD after the events of 9/11 (DeVoe, Bannon, & Klein, 2006).

Statistical Analysis

There were three steps involved in the data analysis plan. First, we conducted a series of chi-square analyses to examine if the number of child PTSD symptoms differed by important child demographic characteristics. Second, we examined whether the predictor variables independently predicted child trauma symptoms. Third, variables significantly related to the outcome variable at a level no greater than .05 at the bivariate level were entered into an Ordinary Least Squares (OLS) regression model to examine the relative influence of each predictor variable on the number of child PTSD symptoms. Checks for multicollinearity among predictors revealed no significant problems (Menard, 1995).

Results

Descriptive Analysis

Please see Table 2 for the mean, standard deviation, range, and possible minimum/maximum values of the study variables.

Bivariate Analysis

Please see Tables 3 for a description of the bivariate relationships between study variables.

Background Variables

Bivariate analysis indicated that the number of child PTSD symptoms was not related to family SES (i.e., income), $r(178) = -.12$, $p = .12$; child gender, $t(178) = 1.05$, $p = .30$; or child age, $r(178) = .05$, $p = .48$. Analysis of Variance (ANOVA) also indicated no significant mean number of child PTSD symptoms by child race, $F(179) = .68$, $p = .64$.

This document is copyrighted by the American Psychological Association or one of its allied publishers.
This article is intended solely for the personal use of the individual user and is not to be disseminated broadly.
All rights, including for text and data mining, AI training, and similar technologies, are reserved.

Table 2
Mean, Standard Deviation, and Range Values for Study Variables (N = 180)

Variable	Mean (*SD*)	Range	Min/Max[1]
Child PTSD symptoms	6.6 (4.3)	0–21	0–23
Child traumatic events prior to 9/11	1.6 (1.1)	0–5	0–10
Couple tension	1.3 (1.4)	0–5	0–5
Parenting anxiety	5.6 (2.1)	0–9	0–9
Negative changes in parenting	.6 (1.0)	0–3	0–3
Parent PTSD symptoms	9.6 (3.6)	0–16	0–17
Child experiences with adult reactions to the disaster	2.0 (1.3)	0–5	0–5
Parent WTC disaster exposure	5.2 (3.2)	0–13	0–14
Child WTC disaster exposure	4.0 (3.0)	0–12	0–14

[1] Possible minimum and maximum scale values.

Post9/11 Intervening Variables

Data also indicated that intervening variables since 9/11, $r(178) = .25$, $p < .01$, were significantly associated with the number of child PTSD symptoms. However, because we were interested in the influence of family level variables, including the child's history of trauma, on children's symptoms following the disaster, intervening variables (which included post9/11 disruptions outside of the family) were subsequently controlled for in all analyses.

Predictor Variables

Parent level variables. Bivariate analysis indicated that the number of child PTSD symptoms was significantly related to the number of parental symptoms of PTSD, $r(178) = .29$, $p < .01$, following the WTC disaster. In addition, the number of child PTSD symptoms was significantly correlated with the levels of negative changes in parenting, $r(178) = .39$, $p < .01$; increases in anxiety regarding parenting, $r(178) = .25$, $p < .01$; and increased couple tension, $r(178) = .41$, $p < .05$, since the WTC disaster.

Child level variables: Pre9/11 child trauma variables. Data indicated that child experiences of traumatic events prior to 9/11, $r(178) = .19$, $p < .01$, were significantly associated with the number of child PTSD symptoms.

Child level variables: WTC exposure variables. Bivariate analysis indicated that the number of child PTSD symptoms was significantly related to the number of child in-person exposures to the WTC disaster, $r(178) = .38$, $p < .01$, and parent in-person exposures to the WTC disaster, $r(178) = .32$, $p < .01$. Data also indicated that the number of child PTSD symptoms was significantly associated with the child experiences with adult reactions to the disaster, $r(178) = .38$, $p < .01$.

Multivariate Analysis

Table 4 summarizes the results of the OLS linear regression model explaining the number of child PTSD symptoms. Results from the analyses indicated that the model explained 46% of the sample variance in the number of child PTSD symptoms, $R^2 = .46$, $F = 8.76$, $p < .001$. The strength of the association of the individual variables with the number of child PTSD symptoms was examined by evaluating the standardized regression coefficients and their associated significance levels within the context of the full model.

Within the full model among the parent level variables, increases in couple tensions, $B = .64$, $\beta = .20$, $p < .001$, and negative changes in parenting, $B = 1.10$, $\beta = .31$, $p < .001$, in the aftermath of the WTC disaster were significantly related to an increased number of child PTSD symptoms. Parenting anxiety, $B = .04$, $\beta = .02$, $p = .76$, and parent PTSD symptoms, $B = .04$, $\beta = .08$, $p = .72$, were unrelated to the outcome variable.

Among the exposure variables in the full model, parent exposure to the WTC disaster, $B = .09$, $\beta = .12$, $p = .51$, was not significantly related to the number of child PTSD symptoms. However, both child exposure variables were significant in the model: child WTC disaster exposure, $B = .38$, $\beta = .26$, $p < .001$, was significantly related to the number of PTSD symptoms reported in children beyond the other variables in the full multivariate model, as was child experiences with adult reactions to the WTC disaster, $B = .74$, $\beta = .22$, $p < .001$. Child's previous traumatic events also were significantly related to number of PTSD symptoms in the full model, $B = .55$, $\beta = .15$, $p < .05$.

Discussion

The aim of this study was to understand the impact of exposure, previous trauma, and family level variables on children's adjust-

Table 3
Intercorrelations Between Variables (N = 180)

Variable	1	2	3	4	5	6	7	8	9
1. Child PTSD symptoms	—	.19**	.41**	.25*	.39**	.29**	.38**	.32**	.38**
2. Child traumatic events prior to 9/11		—	.20**	.05	.20*	−.00	−.11	−.20**	−.16*
3. Couple tension			—	.24**	.36**	.29**	.14	.13	.07
4. Parenting anxiety				—	.33**	.43**	.13	.22*	.15*
5. Negative changes in parenting					—	.33**	.09	.03	.04
6. Parent PTSD symptoms						—	.26**	.31**	.23**
7. Child experiences with adult reactions to the WTC disaster							—	.41**	.40**
8. Parent WTC disaster exposure								—	.67**
9. Child WTC disaster exposure									—

* $p < .05$. ** $p < .01$.

This document is copyrighted by the American Psychological Association or one of its allied publishers.
This article is intended solely for the personal use of the individual user and is not to be disseminated broadly.
All rights, including for text and data mining, AI training, and similar technologies, are reserved.

Table 4
Ordinary Least Squares (OLS) Regression Explaining the Number of Child PTSD Symptoms After the WTC Disaster (N = 180)

Variable	B	*SE* B	β
Child traumatic events prior to 9/11	.54	.24	.14*
Couple tension	.64	.20	.21***
Parenting anxiety	.04	.14	.02
Negative changes in parenting	1.10	.31	.24***
Parent PTSD symptoms	.04	.08	.03
Child experiences with adult reactions to the WTC disaster	.72	.23	.22***
Parent WTC disaster exposure	.09	.12	.07
Child WTC disaster exposure	.38	.12	.27***

Note. For Model, $R^2 = .44$, Adj. $R^2 = .40$, $df = 179$, $F = 10.11$, $p < .001$.
* $p < .05$. *** $p < .001$.

ment following the WTC disaster. Not surprisingly, children with greater exposure to the World Trade Center disaster were identified as having higher levels of PTSD symptoms, as reported by a parent. Caution is needed here, however, since it is possible that parents of more highly exposed children may have been paying closer attention to their children's behaviors. Alternatively, parents experiencing more trauma themselves may have overreported their children's distress and dysregulation. Beyond the expected dose-response relationship, our findings support the importance of considering the child's larger ecology in understanding the impact of the disaster on children's mental health outcomes. Specifically, we examined the relationship between children's experiences of their immediate environment, including their witnessing adult and parent reactions to the disaster, negative changes in parenting behavior, and increased tension in the parenting couple, to the level of PTSD symptoms in children. In addition to direct exposure to the disaster, the level of exposure children had to negative reactions in adults also predicted higher levels of PTSD symptoms. This finding suggests that not only is exposure to the disaster a risk for young children but also the reactions of adults around them can adversely affect child outcomes.

The increased stress on parents resulting from the disaster included negative changes in parenting and increased conflict and tension in parent couples. Because the mean scores for changes in parenting and increased couple tension are low, we caution overstating the data. However, from a clinical perspective, because young children are more heavily immersed in the family and home environment than school-age children are, the potential influence of these stresses on the quality of parenting and the tone of the immediate environment are essential to consider. Furthermore, although parent PTSD was not significant in the regression model predicting child PTSD (although it was at the bivariate level), the impact of parent trauma symptoms on parenting behavior and on the quality of the parent–child relationship is a critical issue for screening and possible intervention.

Other variables were related to higher rates of PTSD symptoms in children. Specifically, child's history of trauma prior to 9/11 predicted higher levels of reported PTSD symptoms. This is the first study of children in this age group following 9/11 to include a range of previous trauma including violence. The finding confirms other reports linking prior trauma and response to disasters, reiterating the need to understand what the child brings to the current situation. Past trauma may weaken a child's foundation and ability to cope with another traumatic situation. This is a little studied area worthy of more attention. In particular, we note that 40% of the children in our study had been separated from a parent for a week or more prior to 9/11. It is worth investigating whether a seemingly nontraumatic event like a weeklong separation puts a child at risk during subsequent stressful conditions. Similarly, understanding the ways in which different types of trauma (i.e., violence, illness or normative separations) affect a child's response to subsequent trauma would be beneficial in developing interventions.

Finally, at the bivariate level, disruptions in the community environment were related to higher levels of child PTSD symptoms. Although community level disruptions were controlled for in the model, it is noteworthy that the postdisaster environment likely plays a role in children's development of trauma symptoms. While many parents and children adapted easily to the stark changes in their immediate physical environment, the loss of familiar landmarks and gathering spaces (e.g., loss of playgrounds, known places to eat or shop) in the post9/11 environment were common themes among focus group participants and may have contributed to children's or parents' adjustment in the postdisaster period.

Limitations

The limitations of this study include the use of cross-sectional data derived from a self-selected sample (Pfefferbaum et al., 2004), and the use of retrospective parental reports of child and maternal exposure and functioning. While the data are retrospective, they were collected in a relatively short time (9–12 months) after the disaster. Given the enormity of the disaster, this time frame may make the retrospective nature less problematic. Selection bias also should be considered when understanding these findings. The sample was voluntary, so it is possible that families who were experiencing more distress or who had greater predisaster vulnerability were more likely to volunteer to participate in the study. While this is possible, the research has several strengths in the area of disaster research, including the mobilization of research efforts in the immediate aftermath of the September 11th terrorist attacks, a large sample size with a focus on very young children, and the ability to work with families who were highly exposed to the disaster.

Clinical Implications

Mental health professionals and parents alike would like to believe that young children are immune to experiences of trauma either because of resilience or developmental status or both (Bosquet, 2004; Osofsky, 1995). However, evidence from a variety of studies has documented clearly that young children are indeed potentially even more vulnerable to traumatic experiences than older children and adults. Our findings suggest that young children will benefit greatly from prevention and intervention efforts aimed at the child's immediate social ecology, including parenting strategies that might be affected by trauma and couple concerns. Specifically, given the consistent relationship found between exposure and child trauma symptoms, parents and caregivers of young children can be educated and supported in efforts to eliminate or reduce exposure in the event of catastrophic community

This document is copyrighted by the American Psychological Association or one of its allied publishers.
This article is intended solely for the personal use of the individual user and is not to be disseminated broadly.
All rights, including for text and data mining, AI training, and similar technologies, are reserved.

trauma, such as 9/11. When this is not possible, parents, caregivers and communities must be supported to reinstate safety and security for children, including routines and access to safe physical play space, as soon as possible in the aftermath of a disaster. Finally, parents and young children may require specific intervention to address distress, which may or may not reach the level of diagnosable PTSD but may still be disruptive to child and family functioning and within the parent–child relationship. Such dynamics are likely to be distressing to children and their parents, and thus, are clinically important.

Unfortunately, we have learned from September 11th and Hurricane Katrina that the provision of services for families with young children in a disaster context is greatly hampered by the relative invisibility of young children and the lack of infrastructure for screening, identification and intervention with the very youngest (Osofsky et al., 2007). The findings from this study underscore the critical need to provide appropriate interventions and supports to the youngest children and their families following a disaster if we want to support adaptive postdisaster family and developmental outcomes for young children.

This document is copyrighted by the American Psychological Association or one of its allied publishers.
This article is intended solely for the personal use of the individual user and is not to be disseminated broadly.
All rights, including for text and data mining, AI training, and similar technologies, are reserved.

References

Aber, J. L., & Gershoff, E. (2004). Child, youth, and parent responses to the terrorism of September 11, 2001: Implications for applied developmental science and practice. *Applied Developmental Science, 8*(4), 221–225.

American Psychiatric Association (1994). *Diagnostic and statistical manual,* Fourth Edition.

Arroyo, W., & Eth, S. (1996). Post traumatic stress disorder and other stress reactions. In R. Apfel & B. Simon (Eds.), *Minefields in their hearts: The mental health of children in war and communal violence* (pp. 52–74). New Haven: Yale University Press.

Bosquet, M. (2004). How research informs clinical work with traumatized young children. In J. Osofsky (Ed.), *Young children and trauma: Intervention and treatment*. NY: Guilford Press.

Carter, A., & Briggs-Gowan, M. J. (1999). The infant-toddler social emotional assessment-revised. Available from Pearson.

Chemtob, C. M., Nomura, Y., & Abromovitz, R. A. (2008). Impact of conjoined exposure to the World Trade Center attacks and to other traumatic events on the behavioral problems of preschool children. *Archives of Pediatric and Adolescent Medicine, 162*(2), 126–133.

DeVoe, E. R., Bannon, W., & Klein, T. P. (2006). Post-9/11 helpseeking by New York City parents on behalf of highly exposed young children. *American Journal of Orthopsychiatry, 76,* 167–175.

DeVoe, E. R., Bannon, W., Klein, T. P., & Miranda, C. M. (2007). Post-9/11 mental health service help-seeking among a group of highly exposed New York City parents. *Families in Society, 88*(2), 292–301.

Gaensbauer, T. J. (1995). Trauma in the preverbal period. Symptoms, memories, and developmental impact. *Psychoanalytic Study of the Child, 50,* 122–149.

Green, B. L., Korol, M., Grace, M. C., Vary, M. G., Leonard, A. C., Gleser, G. C., & Smitson-Cohen, S. (1991). Children and disaster: Age, gender, and parental effects on PTSD symptoms. *Journal of the American Academy of Child and Adolescent Psychiatry, 30*(6), 945–951.

Hoven, C. W., Duarte, C. S., Lucas, C. P., Wu, P., Mandell, D. J., Goodwin, R. D., . . . Susser, E. (2005). Psychopathology among New York City public school children 6 months after September 11. *Archives of General Psychiatry, 62*(5), 545–552.

Laor, N., Wolmer, L., & Cohen, D. J. (2001). Mothers' functioning and children's symptoms 5 years after a SCUD missile attack. *American Journal of Psychiatry, 158*(7), 1020–1026.

Laor, N., Wolmer, L., Mayes, L. C., Golomb, A., Silverberg, D. S., Weizman, R., & Cohen, D. J. (1996). Israeli preschoolers under Scud missile attacks. A developmental perspective on risk-modifying factors. *Archives of General Psychiatry, 53*(5), 416–423.

Levy-Shiff, R., Hoffman, M., & Rosenthal, M. K. (1993). Innocent bystanders: Young children in war. *Infant Mental Health Journal, 14*(20), 116–130.

Lieberman, A. F., Van Horn, P., & Ippen, C. G. (2005). Toward evidence-based treatment: Child-parent psychotherapy with preschoolers exposed to marital violence. *Journal of the American Academy of Child and Adolescent Psychiatry, 44*(12), 1241–1248.

Marans, D., & Adelman, A. (1997). Experiencing violence in a developmental context. In J. D. Osofsky (Ed.), *Children in a violent society* (pp. 202–222). New York, NY: Guilford Press.

McFarlane, A. C., Clayer, J. R., & Bookless, C. L. (1987). Psychiatric morbidity following a natural disaster: Australian bushfire. *Social Psychology & Psychiatric Epidemiology, 32*(5), 261–268.

Menard, S. (1995). *Applied Logistic Regression Analysis*. Thousand Oaks, CA: Sage Publications.

Norris, F. (2001). PCL adapted for 9/11/01 research. Unpublished checklist.

Osofsky, J. (1995). The effects of exposure to violence on young children. *American Psychologist, 50,* 782–788.

Osofsky, J. D. (2004). Young children and trauma: Intervention and treatment. New York, NY: Guilford Press.

Osofsky, J. D., Osofsky, H. J., & Harris, W. W. (2007). Katrina's children: Social policy considerations for children in disasters. *SRCD Social Policy Report, 21*(1), 3–18.

Pfefferbaum, B.-J., DeVoe, E.-R., Stuber, J., Schiff, M., Klein, T.-P., & Fairbrother, G. (2004). Psychological impact of terrorism on children and families in the United States. *Journal of Aggression, Maltreatment, and Trauma, 9,* 305–317.

Phillips, D., Prince, S., & Schiebelhut, L. (2004). Elementary school children's responses 3 months after the September 11 terrorist attacks: A study in Washington, DC. *American Journal of Orthopsychiatry, 74*(4), 509–528.

Scherringa, M., & Zeanah, C. (1994). PTSD semi-structured interview for infants and young children. Measure available from authors.

Scheeringa, M., & Zeenah, C. (1995). Symptom expression and trauma variables in children under 48 months. *Infant Mental Health Journal, 16*(4), 259–270.

Scheeringa, M. S., Zeanah, C. H., Drell, M. J., & Larrieu, J. A. (1995). Two approaches to the diagnosis of posttraumatic stress disorder in infancy and early childhood. *Journal of the American Academy of Child and Adolescent Psychiatry, 34,* 191–200.

Scheeringa, M. S., Zeanah, C. H., Myers, L., & Putnam, F. W. (2003). New findings on alternative criteria for PTSD in preschool children. *Journal of the American Academy of Child and Adolescent Psychiatry, 42,* 561–570.

Sugar, M. (1992). Toddlers' traumatic memories. *Infant Mental Health Journal, 13*(3), 245–251.

Terr, L. C. (1979). Children of Chowchilla: A study of psychic trauma. *The Psychoanalytic Study of the Child, 34,* 547–623.

Terr, L. C. (1988). What happens to early traumatic memories? A study of 21 children under age 5 at the time of traumatic events. *Journal of American Academy of Child and Adolescent Psychiatry, 27*(1), 96–104.

Vogel, J., & Vernberg, E. (1993). Psychological responses of children to natural and human made disasters: Interventions with young children after disasters. *Journal of Clinical Child Psychology, 22*(4), 485–498.

Weathers, F., Litz, B., Herman, D., Huska, J., & Keane, T. (1993). PTSD Checklist (PCL). Paper presented at the International Society for Traumatic Stress Studies, San Antonio, TX.

Zero to Three (1994). Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood. Washington, DC: Zero to Three.

Received July 22, 2009
Revision received February 9, 2010
Accepted April 27, 2010 ■