

Pre-attack symptomatology and temperament as predictors of children's responses to the September 11 terrorist attacks

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Background: The aims of this study were to assess the psychological response of children following the September 11, 2001 terrorist attacks in New York and Washington, DC and to examine prospective predictors of children's post-attack responses. **Method:** Children's responses were assessed in a community sample of children in Seattle, Washington, participating in an ongoing study. Symptomatology and temperament assessed prior to the attacks were examined as prospective predictors of post-attack post-traumatic stress (PTS), anxiety, depression and externalizing problems. **Results:** Children demonstrated PTS symptoms and worries at levels comparable to those in children directly experiencing disasters, with 77% of children reporting being worried, 68% being upset by reminders, and 39% having upsetting thoughts. The most common PTS symptom cluster was re-experiencing, and 8% of children met criteria consistent with PTSD. African-American children reported more avoidant PTS symptoms and being more upset by the attacks than European-American children. Girls reported being more upset than boys. Prior internalizing, externalizing, social competence and self-esteem were related to post-attack PTS; and child inhibitory control, assessed prior to the 9/11 attacks, demonstrated a trend towards an association with post-attack PTS symptoms controlling for prior levels of symptomatology. PTS predicted child-report anxiety and conduct problem symptoms at follow-up, approximately 6 months after 9/11. **Conclusions:** Children experiencing a major disaster at a distance or indirectly through media exposure demonstrated worries and PTS symptoms suggesting that communities need to attend to children's mental health needs in response to national or regional disasters. Pre-disaster symptomatology or low self-regulation may render children more vulnerable in response to a disaster, and immediate post-disaster responses predict subsequent symptomatology. These variables might be used in the identification of children in need of intervention. **Keywords:** Post-traumatic stress, symptomatology, terrorist attacks, temperament.

The September 11, 2001 terrorist attacks on the World Trade Center in New York City and the Pentagon in Washington, DC, had a dramatic effect on most US citizens and on individuals worldwide. This was a major, unprecedented terrorist attack, with the death toll approaching 3000. Although the impact of these events can be expected to be greatest on those who experienced them directly or whose loved ones were involved, there is evidence that people across the country experienced psychological effects in the days following the attacks (Schuster et al., 2001). Disasters such as this are atypical and overwhelming events that can affect entire communities, and with extensive media coverage, can have an impact nationally and internationally. Little is known about how children experiencing such catastrophic events at a distance might react, although there is evidence that even individuals who do not experience disasters directly are affected by them (e.g., Cantor et al., 1993; Dixon et al., 1993; Pfefferbaum, Seale et al., 2000; Terr et al., 1999). Mental health professionals are increasingly called upon to offer assistance and expertise to families, schools, and community agencies in the aftermath of disasters, and greater attention is being afforded to children's needs following such events. Empirical

research examining predictors of children's responses to disasters is needed.

This study examined the acute post-traumatic and psychological symptoms of children in Seattle following the 9/11 terrorist attacks. Prospective predictors of children's responses, including temperament and prior symptomatology, were examined. Also, PTS symptoms following 9/11 were examined as predictors of later symptomatology. The aims of the study were to describe children's stress responses, examine event-related correlates of stress responses, and identify prospective predictors of those responses to better understand the impact of such catastrophic events on children experiencing them indirectly and from a distance.

There is evidence that the degree of exposure to or distance from a disaster influences the emergence of post-traumatic symptoms (e.g. Breton, Valla, & Lambert, 1993; LaGreca, Silverman, Vernberg, & Prinstein, 1996; Lonigan et al., 1991; Terr et al., 1999). Also, it appears that major traumatic events do not need to be experienced directly to result in post-traumatic symptoms (e.g., Cantor et al., 1993; Dixon et al., 1993; Pfefferbaum, Seale et al., 2000; Pfefferbaum et al., 2001; Terr et al., 1999). The occurrence or perception of frightening and/or

life-threatening events, and the loss, damage and disruption that can follow such events may be more important determinants of post-trauma reactions than exposure itself (Green, 1991; La Greca et al., 1996; Lonigan et al., 1991, 1994; Vogel & Vernberg, 1993). For example, when loved ones, friends, or acquaintances are harmed, or when individuals personalize the events or view themselves as potential victims, stress symptoms might emerge (e.g., Dixon et al., 1993, Pfefferbaum, Gurwitsch et al., 2000). Also, the extent of loss of life and injury resulting from a traumatic event is related to elevated stress symptoms (Rubonis & Bickman, 1991). Moreover, exposure through television and media can lead to stress symptoms (Cantor et al., 1993; Pfefferbaum, Seale et al., 2000; Terr et al., 1999). Given the magnitude of the 9/11 terrorist attacks, the extent of loss of life and destruction, and the pervasive media coverage following the attacks, it seems plausible that children across the country may have personalized the event and have been psychologically affected by it.

A few studies have offered some initial indication of children's responses following the 9/11 terrorist attacks. Whalen et al. (2004) reported no change in ongoing daily mood ratings of adolescents distant from the attacks following 9/11, but did find that 2–5 months after the attacks, 20% of the sample reported moderate to severe levels of re-experiencing symptoms, and 50% reported thinking that it might happen again. Pre-attack baseline levels of anxiety and depression were correlated with PTS symptoms, as were impulsivity and externalizing problems. Pre-attack optimism was negatively correlated with post-attack PTS symptoms (Whalen et al., 2004). In a national phone survey in the days after the 9/11 terrorist attacks, 35% of parents reported that their children had at least one of five stress symptoms, such as being worried about safety, having trouble concentrating, or sleep troubles (Schuster et al., 2001). Although the study utilized a nationally representative sample, children's self-reports were not obtained. There is evidence that parents underestimate their children's stress responses or may be unaware of children's level of anxiety (Cantor & Reilly, 1982; Handford et al., 1986; Vogel & Vernberg, 1993). There is also evidence that more distressed parents report greater symptomatology in children following traumatic events (Schuster et al., 2001; Smith, Perrin, Yule, & Rabe-Hesketh, 2001). Thus, children's report of their experiences following a disaster or trauma is needed for a better understanding of how children respond to such events. Child self-report was obtained in this study.

There is little consistent evidence of elevations on general behavior problem rating scales following disasters or single, traumatic events (Vogel & Vernberg, 1993). However, many studies point to elevations in post-traumatic stress (PTS) symptoms, anxiety, depression, somatic complaints (e.g., Pfef-

ferbaum, Seale et al., 2000; Smith et al., 2001; Vogel & Vernberg, 1993), and specific fears about disaster- or trauma-related stimuli or reminders (e.g., Terr et al., 1999). There is also evidence of elevated PTS symptoms in the absence of depression or anxiety (Lonigan, Shannon, Taylor, Finch, & Sallee, 1994; Smith et al., 2001). In children mildly or indirectly exposed to disasters, the most frequent symptoms include being upset by reminders of the event and re-experiencing (Shannon et al., 1994; Vogel & Vernberg, 1993). In addition, there is evidence of gender and race or ethnicity differences in post-traumatic reactions. Many studies provide evidence that females demonstrate higher levels of symptomatology, particularly internalizing symptoms (Breton et al., 1993; Schuster et al., 2001; Shannon et al., 1994; Vogel & Vernberg, 1993) and worries (Silverman, La Greca, & Wasserstein, 1995), although some studies find no gender differences (La Greca, Silverman, & Wasserstein, 1998). Similarly, some studies report race or ethnicity differences with African-American or other ethnic minorities demonstrating greater symptomatology (Shannon et al., 1994) and worries (Silverman et al., 1995), but other studies find no race/ethnicity differences (La Greca, Silverman, & Wasserstein, 1998; Schuster et al., 2001). Gender and race differences will be explored in this study.

In sum, children indirectly exposed to a catastrophic event can be expected to demonstrate stress-related symptoms of PTS and anxiety. To understand children's responses, it is important to obtain children's self-report of their symptoms. It is also important to move beyond description of children's responses to catastrophic events towards understanding factors that predispose an individual to an adverse response. Such information will be useful to mental health professionals who are increasingly asked to attend to the needs of children and families following disasters and traumatic events.

Identifying prospective predictors of children's adjustment following a disaster or traumatic event is important for the identification of children who are likely to demonstrate more severe reactions or symptomatology following a catastrophic event. Such children might benefit from monitoring or intervention aimed at preventing persistent problems (La Greca et al., 1998). A few studies have investigated post-trauma predictors of children's long-term adjustment to traumatic events. Anxiety is an important correlate of a severe post-traumatic reaction (Shannon et al., 1994), and children with moderate to severe acute PTS or anxiety responses following a traumatic event appear to have a greater likelihood of demonstrating persistent symptoms for a year or more (e.g., La Greca et al., 1996).

The availability of studies examining prospective predictors assessed *prior* to a disaster or trauma is limited. Evidence from those studies suggests that prior adjustment, particularly anxiety, predicts children's post-traumatic response. For children

experiencing Hurricane Andrew, pre-disaster anxiety, attention problems and academic skills, but not conduct problems, predicted PTS symptoms at 3 months post-disaster, whereas only pre-disaster anxiety predicted PTS symptoms 7 months after the disaster (La Greca et al., 1998). It might also be useful to consider children's adaptive functioning prior to a catastrophic event. Children who are socially competent or who have good self-esteem may have social and personal resources that are protective in the event of a disaster. However, aside from Whalen et al.'s (2004) finding that optimism was related to PTS symptoms, prior positive adjustment has not been examined as a predictor of children's post-traumatic adjustment.

Another set of variables that may be important prospective pre-trauma predictors include child characteristics such as emotionality and self-regulation (Salmon & Bryant, 2002). However, few characteristics besides prior psychological functioning have been examined in previous research. This study examined emotionality and self-regulation assessed prior to the 9/11 terrorist attacks as predictors of children's stress response and adjustment after the attacks. Emotionality and self-regulation are often conceptualized as temperament characteristics that are relatively stable, physiologically based individual differences (Rothbart, 1989). Negative emotionality involves individual differences in arousability of fear and frustration. A review of temperament studies suggests that negative emotionality is related to both internalizing and externalizing problems (Rothbart & Bates, 1998). Self-regulation includes processes that modulate emotionality, facilitating or inhibiting affective responses, and may be important in the modulation of the stress response after a traumatic event. Self-regulation processes include attention, inhibitory control, and impulsivity (Goldsmith & Rothbart, 1991; Rothbart, 1989). Attention regulation and inhibitory control may be particularly relevant for the regulation of emotion-related physiological processes, internal emotional states, and emotion-related behaviors (Derryberry & Reed, 1996; Eisenberg, Fabes, Guthrie & Reiser, 2000; Rothbart, Ahadi, & Evans, 2000). Impulsivity is an indicator of behavioral undercontrol and is believed to be a specific predictor of externalizing problems (cf., Rothbart & Bates, 1998).

Negative emotionality and self-regulation may contribute to adjustment following a traumatic event (Salmon & Bryant, 2002). For example, it has been suggested that trait anxiety is an important predictor of PTS symptoms (Shannon et al., 1994). Children who tend to experience higher levels of negative affect in response to events and who are less able to modulate their emotional responses may be at increased risk for developing symptoms following a disaster. Attention and inhibitory control processes might be particularly important in determining children's stress responses following a disaster. These abilities may allow children to shift attention

away from distressing aspects of the event while still processing event-related information. They may also allow children to inhibit automatic thoughts, reactions and behaviors that might be detrimental and substitute them with more adaptive responses (e.g., Derryberry & Reed, 1996; Eisenberg, Fabes, Guthrie, & Reiser, 2000). For example, attentional biases are shown to be an important mechanism in PTSD symptomatology in adults (e.g., McNally, 1998). Thus, overarousal resulting from dispositional negative emotionality or poor self-regulation might contribute to avoidance or rumination and would relate to poorer adaptation (Salmon & Bryant, 2002).

This study describes children's psychological adjustment following the 9/11 terrorist attacks and examined pre-attack predictors of post-attack adjustment. Participants in this study were participating in an ongoing study of individual differences in children's responses to socialization and contextual experiences. The sample is a community sample of typically developing 9- to 13-year-old children. Parents and children were interviewed by phone approximately 1 month following the 9/11 terrorist attacks. Children's worries and post-traumatic stress symptoms were assessed, and race and gender differences were explored. Prior symptomatology and temperament were examined as prospective predictors of children's post-attack PTS symptoms. In addition, post-attack PTS symptoms were examined as predictors of subsequent symptomatology, assessed approximately 6 months after the 9/11 terrorist attacks.

Method

Participants

Participants were 151 children and their parents who were participants in an ongoing longitudinal study of child, family and contextual influences on children's development. Participants in the ongoing study were recruited through the children's public school classrooms. Schools were selected for recruitment to represent a variety of sociodemographic and ethnic characteristics of the Seattle, Washington, urban area to obtain an economically and ethnically diverse sample. Approximately 1280 families from 59 classrooms in 13 schools were approached to participate; 697 families returned the information forms, with 313 families indicating potential interest in participating. One child in the target grades per family was asked to participate, and if there was more than one child in the target grades in the family, one child was randomly selected to participate. Children with developmental disabilities and families who were not fluent in English were excluded from the study so as to ensure adequate comprehension of the questionnaires used in this study. By September 11, 2001, 207 of 214 families in the larger study had completed either their first or second of three annual interviews as part of the larger study (pre-attack interview). After September 11, all 207 families were contacted to participate in phone

interviews regarding children's responses to the 9/11 terrorist attacks. Six families declined to participate as a result of concerns about further distressing their children; 18 declined for other reasons (e.g., too busy); and 32 could not be reached by the interviewers or did not respond to messages within the targeted interview period (2 months post attacks). Six parents agreed to be interviewed, but elected not to have their children participate in the interviews, resulting in a sample size of 145 for child report. An additional 3 families did not complete follow-up interviews, therefore analyses of follow-up data were based on 142 cases.

The average time between the pre-attack and post-attack interviews was 6.78 months (SD = 3.12, range = 1.61–20.34 months). Post-attack interviews were started 2 weeks after the 9/11 terrorist attacks and completed 2 months after the attacks (M = 29.06 days, SD = 11.29, range = 13–62 days after 9/11). Forty-four percent of the interviews were conducted prior to the start of the air strikes in Afghanistan, which might have added another layer of stress to the events. The follow-up interviews occurred on average 6.18 months after the 9/11 terrorist attacks (SD = 2.74, range = .82–13.87 months).

Children's mean age at the post-attack interview was 10.93 years (SD = 1.01, range = 9.13–13.65). Fifty-three percent of children were female (47% male). Ninety-five percent of parents interviewed in the post-attack interviews were female caregivers. One hundred thirty-five of the female caregivers were biological mothers; 6 were adoptive mothers, and 3 were grandmothers who were the primary residential caregivers. All seven of the fathers interviewed were biological fathers. Thirteen percent of children were African-American; 3% were Asian-American; 69% were Caucasian or European-American; 5% were Hispanic or Latino; 1% were Native American; and 9% reported multiple ethnic or racial backgrounds. Sixty-four percent ($n = 97$) of the families consisted of two biological-, adoptive-, or step-parent married families. Thirty-two percent ($n = 48$) of the families were single parent families maintained by female caregivers (12 never married, 8 separated, 25 divorced, 3 widowed). Four percent ($n = 6$) of the families included mothers who had a live-in partner. Average annual family income was \$53,250 and ranged from less than \$10,000 ($n = 8$) to over \$150,000 ($n = 5$). The distribution of income was approximately bimodal; modes were \$21,000 to \$40,000 ($n = 28$) and above \$100,000 ($n = 29$). The average level of parents' educational attainment was college or university graduate, ranging from 6 mothers and 14 fathers having high school level education or less to 10 mothers and 12 fathers with doctorate degrees.

Families who elected to participate in the post-attack phone interviews were compared to those who declined to participate on pre-attack sociodemographic (child age, child gender, mother and father education, income, family configuration), temperament (fear, irritability, attention, inhibitory control, impulsivity) and child adjustment variables (parent- and child-report depression, anxiety, conduct problems), for a total of 17 comparisons. There were two significant differences between those participating in the post-attack interview and those not participating. Fathers of families who elected not to participate had a lower average education

level (technical or professional school) than fathers of families who participated (college or university graduate; $t(176) = 2.03, p < .05$). Mothers reported lower levels of child depression in families who elected not to participate (M = 1.95, SD = 1.99) compared to those who did participate (M = 2.73, SD = 2.47; $t(204) = 2.16, p < .05$). Thus, relatively little bias was introduced as a result of refusals to participate.

Procedures

Data were collected using structured, scripted 1-hour phone interviews. Families who had completed either their first or second of three interviews as part of the larger research project were contacted by phone and asked whether they would participate in phone interviews regarding children's response to the terrorist attacks. Structured scripts were used to obtain parental consent and child assent to participate prior to interviewing either parents or children. Confidentiality was explained to both parents and children, indicating that children's responses would not be shared with their parents unless there was concern about child safety (i.e., high level of depression, suicidal ideation, or child abuse). When possible, parents and children were interviewed sequentially during a single phone call. Parents were asked to allow children to be in a private room during the phone interview. Interviewers read scripted instructions, open-ended and close-ended questions, and all items from questionnaire measures, and recorded responses in writing. Families received monetary compensation for participating in the interviews.

Follow-up measures were obtained during families' regularly scheduled annual interviews conducted as part of the larger ongoing study. Data were collected using highly structured, scripted 2½-hour interviews conducted in the families' homes. After confidentiality was explained, mothers signed informed consent forms, and children signed assent forms. The assent forms indicated that children's responses would not be shared with their mothers unless there was concern about child safety (i.e., high level of depression, suicidal ideation, or child abuse). Mothers and children were interviewed by separate, trained interviewers in separate rooms (when possible) to ensure the privacy of their responses. Questionnaire measures were administered with interviewers reading scripted instructions and all items on the questionnaires to the participants. Families received monetary compensation for participating.

Measures

Sociodemographic variables included mother's and father's education level, family income, child's ethnic or racial minority status, family configuration, age of child, and sex of child. This information was obtained from the mother's pre-attack interview using a structured questionnaire.

Degree of indirect exposure. Indirect exposure was measured in two ways: knowing someone directly affected by the attacks and media exposure. We assessed whether children knew loved ones or acquaintances who

were present or killed in the attacks. Parents and children indicated whether children knew 1) someone in New York City or Washington, DC, 2) someone who was in the World Trade Center or Pentagon during the attacks, and/or 3) someone who died in the attacks. To assess children's media exposure to the events, we obtained parents and children's reports of how much media ('news or media coverage') about the events children were exposed to in the week of the attacks and in the week the child was interviewed (1 = hardly at all, 2 = a little, 3 = pretty much, 4 = a lot). We also asked parents whether they tried to protect their children from information or images of the attacks and limit media exposure (1 = yes, 0 = no).

Children's worries. Children's worries and level of distress in relation to the 9/11 terrorist attacks were assessed using both closed- and open-ended questions. Parents and children were asked to rate how bothered or upset children were after the attacks and how much children thought about the attacks (parents rated how much children talked about the attacks) on a 4-point Likert scale (1 = hardly at all, 2 = a little, 3 = pretty much, 4 = a lot). Parents and children reported whether children had worried since the attacks (yes or no), whether they had worried about the safety of family or friends (yes or no), or whether they had worried about their own safety (yes or no). Children also responded to an open-ended question asking what they had worried about.

Post-traumatic stress symptoms. Children's post-traumatic stress symptoms were assessed using the 17-item Child PTSD Symptom Scale (CPSS; Foa, Johnson, Feeny, & Treadwell, 2001) which assesses DSM-IV symptoms of PTSD. The measure correlates strongly with an existing measure of PTSD and is internally consistent, with a reported alpha of .89. The scale can provide measures of both the number and severity of symptoms. In addition, there is a 7-item scale assessing functional impairment in areas such as relationships, schoolwork, chores, and hobbies. The Cronbach's alpha in this study was .82.

Children's symptomatology. Both mother and child reports of pre-attack, post-attack, and follow-up symptomatology were obtained. Evidence suggests that mothers and children provide differing perspectives on children's symptomatology, with mothers providing more accurate reports on externalizing problems and children being better reporters of their own internalizing problems (e.g., Cole, Truglio, & Peeke, 1997; Edelbrock, Costello, Dulcan, Kalas, & Conover, 1985; Hinshaw, Simmel, & Heller, 1995; Stanger & Lewis, 1993). Mothers reported on children's anxious/obsessive, depressed and externalizing (delinquent and aggressive behavior subscales) problems using the Child Behavior Checklist (CBCL, Achenbach, 1991a) at both time points. The CBCL has been shown to be both a valid and reliable measure of children's behavior problems, with one-week test-retest reliabilities ranging from .82 to .95 (Achenbach, 1991a). Separate anxiety and depressive symptom subscales were created based on prior evidence that distinct dimensions could be reliably and

validly assessed using CBCL items (Lengua, Sadowski, Friedrich, & Fisher, 2001). Pre-attack alphas for mother report anxious/obsessive, depression and externalizing problems were .72, .70 and .81, respectively. Post-attack alphas were .74, .71 and .77, respectively.

Children reported on their own anxiety, depression, and conduct problems. Anxiety symptoms were assessed using the Revised Children's Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1978). Children indicated whether they experienced symptoms (yes or no) such as 'I am nervous,' or 'I have trouble making up my mind.' The pre- and post-attack alphas for the RCMAS were .86 and .84, respectively. A nine-month test-retest reliability of .68 has been reported (Reynolds & Richmond, 1978). Depression was assessed using the 27-item Child Depression Inventory (CDI, Kovacs, 1981). Alphas for the scale have ranged from .71 (Kovacs, 1981) to .94 (Saylor, Finch, Spirito, & Bennet, 1984), and a one-month test-retest reliability of .72 has been reported (Kovacs, 1981). The alphas for pre- and post-attack child report depression were .81 and .79, respectively. Child-report conduct problems were assessed using the delinquent and aggressive behavior subscales (25 items) of the Youth Self Report (YSR, Achenbach, 1991b). The YSR has been found to discriminate clinic referred and non-referred adolescents, and a two-week test-retest reliability of .81 is reported (Achenbach, 1991b). The pre- and post-attack alphas in the current study for child report conduct problems were .84 and .76, respectively.

Child positive adjustment. Mothers and children reported on children's pre-attack social competence and self-esteem. Social competence was assessed using mother- and child-report on the 34-item Social Skills Rating Scale (SSRS, Gresham & Elliot, 1990) which assesses cooperation, assertion, responsibility, empathy (child-report only) and self-control. Four-week test-retest reliabilities of .68 to .87 are reported (Gresham & Elliot, 1990). Alphas for mother and child report of social competence were .85 and .88, respectively. Children reported on their own self-esteem using the 6-item global self-worth subscale of the Perceived Competence Scale for Children (Harter, 1982), which assesses the extent to which a child is happy with the way he or she is leading his or her life, is generally happy with the way he or she is, and likes her/himself. Internal consistency reliability in this study was .70. Mothers reported on children's self-esteem using the 24-item Self esteem Questionnaire (DuBois, Felner, Brand, Phillips, & Ruby, 1996). The measure includes 4 subscales: peer, family, school and global self-esteem. Internal consistency reliability in this study was .92.

Child temperament. Child temperament was assessed prior to the 9/11 terrorist attacks using parent and child report questionnaires. Because there is no measure of Rothbart's model of temperament designed for this age group, we selected subscales from two measures appropriate for children who are slightly older and younger than those in this sample. These measures included mother and child report on the fear, irritability, and attention regulation subscales of the Early Adolescent Temperament Questionnaire (EATQ; Capaldi & Rothbart, 1992), and the impulsivity and inhibitory control subscales of the Child Behavior

Questionnaire (CBQ; Rothbart, Ahadi, Hershey, & Fisher, 2001). Subscale internal consistency reliabilities ranging from .65 to .79 have been reported for these measures. Mother and child reports of the dimensions were combined to address the effects of shared method variance and reporter bias on the observed associations and to reduce the number of variables investigated. Reports were combined by averaging the standardized mother- and child-report scores. Internal consistency reliabilities for mother and child report of pre-attack fearfulness were .55 and .58, respectively. The correlation between mother and child report of fearfulness was .25 ($p < .01$). The composite alpha (calculated taking into account the alpha and variance for each contributing scale as well as the covariance between the scales; Millsap, R., & West, S., personal communication, January 11, 1998) for the scales combined across reporter was .65. Internal consistency reliabilities for mother and child report of pre-attack irritability were .75 and .70, respectively. The correlation between mother and child report of irritability was .19 ($p < .05$). The composite alpha for the scales combined across reporter was .77. Internal consistency reliabilities for mother and child report of pre-attack attention regulation were .79 and .67, respectively. The correlation between mother and child report of attention regulation was .30 ($p < .001$). The composite alpha for the scales combined across reporter was .79. Internal consistency reliabilities for mother and child report of pre-attack inhibitory control were .85 and .68, respectively. The correlation between mother and child report of inhibitory control was .46 ($p < .001$). The composite alpha for the scales combined across reporter was .86. Internal consistency reliabilities for mother and child report of pre-attack impulsivity were .72 and .65, respectively. The correlation between mother and child report of impulsivity was .47 ($p < .001$). The composite alpha for the scales combined across reporter was .79.

Results

Overview

The aims of the study were to describe children's stress responses, examine degree of indirect exposure as a correlate of stress responses, and identify prospective predictors of those responses. First, children's post-attack worries, PTS symptoms and adjustment were examined. Second, the relation between children's indirect exposure to the attacks and children's response was examined. Third, pre-attack adjustment and temperament were tested as predictors of children's post-attack PTS symptoms. Finally, post-attack PTS symptoms were examined as predictors of subsequent symptomatology measured approximately 6 months following the 9/11 terrorist attacks.

Children's worries, symptoms and adjustment

Children's worries. Parents and children rated the extent to which children thought and worried about the attacks on a 1–4 scale (see Table 1). Fifty-nine

percent of children reported thinking pretty much or a lot about the attacks in the week following the attacks, and 18% of the children continued to think about it pretty much or a lot in the week that they were interviewed. Parents reported that 45% of children talked pretty much or a lot about the attacks in the week following the attacks, and 7% of children continued to talk about it pretty much or a lot in the week that they were interviewed.

Thirty-four percent of children reported being upset pretty much or a lot by the events in the week following the attacks, and 14% of the children continued to be upset pretty much or a lot in the week they were interviewed. Parents reported 14% of their children were upset pretty much or a lot by the events in the week following the attacks, and 4% of their children were upset pretty much or a lot in the week they were interviewed.

Seventy-seven percent of children reported having worried, whereas parents reported 53% of children as having worried following the attacks. Fifty-five percent of children reported being worried about the safety of family or friends, and 53% worried about their own safety. Parents rated 33% of children as being worried about the safety of family or friends and 16% as being worried about their own safety. Common worries children reported in an open-ended question asking what they were worried about included: similar events happening in the future (33%), similar events happening closer to home (30%), and going to war or consequences of war (21%).

PTS symptoms. The means, standard deviations and ranges of the CPSS are presented in Table 2. The percent endorsement of PTS symptom items from the CPSS are also presented in Table 2. To provide perspective on the levels of symptoms endorsed by children in this sample, responses were compared to the sample used to develop the CPSS. When compared to a sample of children who had experienced directly a serious earthquake in Northridge, CA,¹ children in the present sample demonstrated comparable levels of re-experiencing symptoms. However, the children in this sample endorsed having

¹ The standardization sample of the CPSS included 75 children ages 8 through 15 years ($M = 11.8$) recruited from a parochial school in Northridge, CA. Fifty-nine percent of the participants were female, 41% were male. Eighty-nine percent of the participants were Caucasian, 11% were of other ethnicities. Participants had experienced a 40-second earthquake on January 17, 1994 that struck at approximately 4:31 a.m. and measured 6.6 on the Richter scale. All participants were within three miles of the epicenter and were sleeping in their homes the morning of the earthquake. They experienced more than 2000 aftershocks in the weeks following the earthquake, and the region was without running water or electricity for 3 days. The participants' homes sustained moderate to severe damage; 39% of the children were displaced from their homes for more than three months due to damage to their homes; and their school was condemned for more than 8 months (Foa et al., 2001).

Table 1 Parent and child ratings of children's worries about the 9/11 terrorist attacks

Item	Percent responses				M	s.d.
	Hardly at all 1	A little 2	Pretty much 3	A lot 4		
Child report						
Thought about attacks in week following	8	34	26	33	2.84	.98
Thought about attacks this week	43	39	13	5	1.81	.87
Upset by events in week following	19	46	23	11	2.26	.90
Upset by events this week	55	31	13	1	1.61	.77
Parent report						
Talked about attacks in week following	14	41	28	17	2.47	.94
Talked about attacks this week	63	30	5	2	1.45	.68
Upset by events in week following	40	46	13	1	1.75	.72
Upset by events this week	79	17	1	3	1.27	.62

Table 2 Percent endorsement and descriptive statistics for the CPSS

CPSS symptom item	Seattle, WA 9/11 Terrorist attack sample	Northridge, CA Earthquake sample ¹			
1. Upsetting thoughts	39	25			
2. Nightmares	12	32			
3. Flashbacks	26	28			
4. Upset by reminders	68	24			
5. Feelings in body	26	23			
6. Trying not to talk	48	39			
7. Avoid activities	20	24			
8. Can't remember	19	23			
9. Loss of interest	6	13			
10. Emotional distance	4	19			
11. Restricted affect	14	23			
12. Future plans	13	25			
13. Trouble sleeping	19	40			
14. Irritable	22	33			
15. Concentration	22	36			
16. Overly careful	36	40			
17. Jumpy	25	48			
Functional impairment items					
1. Doing prayers	5	9			
2. Chores and duties	2	9			
3. Relationships w/friends	8	7			
4. Fun and hobbies	5	15			
5. Schoolwork	6	11			
6. Relationships w/family	3	9			
7. General happiness with life	8	21			
CPSS Scale Scores:	M	s.d.	Range	M	s.d.
Total score	5.61	5.35	0–26	7.6	8.1
Re-experiencing	2.26	2.12	0–11	1.9	2.7
Avoidance	1.72	2.06	0–10	2.7	3.4
Arousal	1.63	2.22	0–11	2.7	2.7
Functional impairment	.36	1.00	0–7	—	—

¹Reported in Foa, Johnson, Feeny, & Treadwell (2001).

more upsetting thoughts (item 1) and being more upset by reminders (item 4), but having fewer nightmares (item 2) than the children experiencing the earthquake. Following the terrorist attacks children in this sample endorsed fewer avoidance

symptoms (items 6–12), with the exception of greater endorsement of trying not to talk about the event (item 6). Children in this sample also demonstrated fewer arousal symptoms (items 13–17). The average total score and the range on the measure were lower for the Seattle sample than for the sample of children experiencing the Northridge earthquake. The level of functional impairment was also lower in the Seattle sample. When the CPSS was scored according to DSM-IV symptom diagnostic criteria for PTSD (excluding the criteria of persistence for 1 month), including functional impairment, 8% of the sample reported symptoms consistent with a PTSD diagnosis. When the CPSS scored according to DSM-IV diagnostic criteria, not taking functional impairment into account, 15% of the sample reported symptoms consistent with a PTSD diagnosis.

Children who indicated that they were upset pretty much or a lot in the week following the attacks were significantly more likely to meet criteria for PTSD (without functional impairment, $\chi^2(1) = 5.58, p < .05$), with 24% of children who reported being upset meeting criteria for PTSD compared to 9% of children who were not upset or mildly upset meeting criteria for PTSD. This relation was not significant when parents reported on children's level of upset, $\chi^2(1) = .55, n.s.$

Adjustment. Children's depression, anxiety and externalizing symptoms were assessed prior to and after the 9/11 terrorist attacks, and mean differences between pre- and post-attack symptom levels were examined. Children and parents reported significantly lower levels of depression, anxiety and externalizing following the attacks when compared to levels of symptoms prior to the attacks (Table 3). It was possible that this decrease in symptoms reflected a general trend in the longitudinal sample. To determine this, mean differences in symptoms across 1 year were examined in the portion of the current sample who had completed two interviews prior to the 9/11 attacks (i.e., families for whom the pre-attack interview was their second interview in the ongoing longitudinal study; $n = 72$). None of the

Table 3 Mean differences between pre-, post-attack, and follow-up symptom levels

	Pre-attack		Post-attack		Pre v. post	Follow-up		Post v. FU
	M	s.d.	M	s.d.	T(144)	M	s.d.	T(141)
Child report								
Depression	5.62	5.27	3.22	3.89	6.93**	4.00	4.49	2.41**
Anxiety	24.03	4.39	21.79	3.39	7.10**	22.18	3.64	1.77
Conduct probs.	4.83	4.31	2.15	2.69	8.94**	3.77	3.12	6.87**
Mother report								
Depression	2.73	2.47	1.88	2.27	4.38**	2.69	2.43	4.57**
Anxiety	4.69	3.19	2.93	2.80	7.70**	4.05	2.93	4.80**
Externalizing	4.10	3.54	2.54	2.78	8.21**	3.68	3.51	5.43**

** $p < .01$.

mean differences from time-1 to time-2 on mother and child report of depression, anxiety and externalizing symptoms was significant. Thus, the significantly lower levels of symptoms reported in the post-attack interviews were not a general trend in the longitudinal data of this sample. In addition, the lower post-attack symptomatology scores suggest reactivity of responses after the 9/11 terrorist attacks when compared to the symptomatology scores at follow-up, approximately 6 months later. These scores were significantly higher than the post-attack scores (see Table 3).

Because the pre-attack interviews occurred at varying times prior to 9/11, we examined the relation between the time since the previous interview and children's post-attack symptoms. Correlations among the time variables and symptoms are presented in Table 4. Time since previous interview was significantly positively correlated with parent report of externalizing, indicating that externalizing problems were increasing over time. It was expected that symptoms following the attacks, particularly symp-

toms of stress and anxiety, might diminish as time since the attacks increased, so that children who were interviewed later might demonstrate lower levels of symptoms. Time since the attacks was not correlated with symptom measures. It was also possible that children's symptoms might have changed in relation to the start of the US air strikes on Afghanistan since a number of children indicated that they worried about the US response to the attacks. Symptomatology was not significantly related to whether the post-attack interview occurred before or after the start of the air strikes. Because of their relations to symptoms, time since previous interview and time since the 9/11 attack were controlled in subsequent regression analyses.

Correlations between pre-attack symptoms and post-attack symptoms are presented in Table 4. Also, pre-attack well-being and social competence were examined as potential correlates of post-attack stress symptoms. Pre-attack child- and mother-report depression and mother-report externalizing were significantly positively correlated with

Table 4 Correlations among race, gender, time variables, pre-attack symptoms and post-attack symptoms

	Child-report post-attacks symptoms				Parent-report post-attacks symptoms		
	PTS Sx's	Depression	Anxiety	Conduct probs.	Depression	Anxiety	Externalizing
Race (African-Am. = 1, Euro-Am. = 0)	.18*	.19*	.21*	.25**	-.05	.10	.18*
Gender (boys = 1, girls = 0)	-.05	.09	.03	.28**	-.01	.08	.29**
Time since previous interview	-.08	-.05	-.03	-.05	.01	.03	.18*
Time since 9/11 attacks	-.06	-.08	-.14 ^t	-.06	-.12	-.02	-.02
Start of air strikes in Afghanistan ¹	-.11	-.06	-.11	-.01	-.08	-.02	-.09
Previous adjustment							
Child report							
Depression	.21**	.62**	.54**	.32**	.26**	.15	.20**
Anxiety	.11	.51**	.55**	.29**	.19*	.09	.25**
Conduct problems	.05	.47**	.45**	.54**	.06	.07	.37**
Well-being	-.15	-.28**	-.21**	-.14	-.26**	-.22**	-.14
Social competence	-.22**	-.41**	-.30**	-.30**	.03	-.05	-.24**
Mother Report							
Depression	.22**	.12	.17*	.05	.50**	.39**	.22**
Anxiety	.07	.05	.07	.06	.39**	.57**	.20*
Externalizing	.22**	.33**	.29**	.43**	.22**	.24**	.75**
Self-esteem	-.21**	-.27**	-.31**	-.27**	-.33**	-.28**	-.36**
Social Competence	-.11	-.19*	-.26**	-.32**	-.17	-.25**	-.48**

¹Coded as 0 = before air strikes, 1 = after air strikes. * $p < .05$; ** $p < .01$.

post-attack PTS symptoms. Pre-attack child-report social competence and mother-report self-esteem were related to lower levels of post-attack PTS symptoms. Pre-attack depression, anxiety, and externalizing were moderately correlated with post-attack symptoms, suggesting moderate levels of stability in the symptoms.

Race, gender, and post-attack adjustment. Correlations among race, gender and post-attack PTS and symptomatology are presented in Table 4. Given the small number of participants representing race or ethnic groups other than African-Americans and European-Americans in this sample, only those two groups were examined. African-American children reported significantly greater severity of PTS symptoms. African-American children reported greater numbers of avoidant symptoms ($r = .18, p < .05$). African-American children demonstrated higher levels of self-report depression and anxiety and parent- and child-report conduct problems. However, there was no difference in rates of children meeting criteria for PTSD between African-American and European-American children, $\chi^2(1) = .04, n.s.$ African-American children were more likely to report being upset pretty much or a lot following the attacks, $\chi^2(1) = 5.06, p < .05$, with 58% compared to 31% of European-American children reporting being upset. This relation was not significant when parents reported on children's level of upset, $\chi^2(1) = .01, n.s.$ Although race was related to symptomatology we did not include race as a control variable in regression analyses because it would result in a loss of the 18% of the sample which identified as being of an ethnicity or race other than African-American.

Gender was related to parent- and child-report conduct problems, with boys having higher scores on these measures. There was no difference between boys and girls in the number of children meeting criteria for a diagnosis of PTSD, $\chi^2(1) = .00, n.s.$ Girls were significantly more likely than boys to report being upset pretty much or a lot by the attacks, $\chi^2(1) = 9.46, p < .01$, with 46% of girls compared to 22% of the boys reporting being upset by the attacks. This relation was not significant when parents reported on children's level of upset, $\chi^2(1) = .17, n.s.$ Gender was controlled in subsequent analyses.

Degree of indirect exposure to the attacks

Degree of indirect exposure to the attacks was assessed both as knowing someone near the attacks and media exposure. The percentage of children who knew someone in New York or Washington, DC, in the World Trade Center or Pentagon, or who died during the attacks was examined using parents' and children's reports. The majority of children did not know anyone (parents: 63%, children: 71%). Approximately a third of the sample knew someone

in New York City or Washington, DC (parents: 37%, children: 29%). Thirteen percent of parents and 11% of children reported that the child knew someone in the World Trade Center during the attacks; 2% of parents and 4% of children indicated the child knew someone in the Pentagon. A small number of children knew someone who died in the attacks (parents: 3%, children: 2%). Parents' report of children knowing someone who died was significantly or marginally associated with higher post-traumatic symptoms ($r = .16, p = .06$), child-report depression ($r = .15, p = .06$), and parent- ($r = .17, p < .05$) and child-report anxiety ($r = .22, p < .01$). None of the other indicators of knowing someone more directly affected by the attacks were related to symptoms.

Media exposure was also used to assess indirect exposure to the attacks. Fifty-eight percent of parents indicated that they tried to protect their children from information and images of the attacks and 60% reported limiting television viewing; and these were related to amount of media exposure. Attempts to protect children from information and images of the attack correlated with parent ($r = -.32, p < .001$) but not child ($r = -.13, n.s.$) report of the amount of news and media viewed in the week following the attack, and with child ($r = -.17, p < .05$) but not parent ($r = -.10, n.s.$) report of amount of news and media viewed in the week the child was interviewed. Parent report of limiting television viewing was related to parent ($r = .22, p < .01$) and child ($r = .22, p < .01$) report of children being upset about the attacks, but was unrelated to measures of symptomatology with one exception. Parents were less likely to limit television viewing for children who were higher in parent ($r = -.21, p = .01$) and child ($r = -.17, p < .05$) report of externalizing problems. Attempts to protect children from information and images of the attacks were also negatively correlated with parent ($r = -.17, p < .05$) and child ($r = -.19, p < .05$) externalizing problems. However, children who reported being higher in externalizing problems reported viewing less television both in the week of the attacks ($r = -.22, p < .01$) and in the week of the interview ($r = -.18, p < .05$).

Parent report of the amount of media viewed in the week of the attack was related to parent report of how upset the child was about the attack ($r = .22, p < .01$), but child report of amount of media viewed in the week of the attack was unrelated to measures of child upset. Parent report of amount of media viewed in the week of the interview was related to parent report of how upset the child was in the week of the interview ($r = .24, p < .01$), and child report of amount of media viewed in the week of the interview was related to child report of how upset the child was in the week of the interview ($r = .39, p < .001$). Parent report of amount of media viewed during the week of the attacks was related to lower post-traumatic symptoms ($r = -.15, p = .05$), and child report of amount of media viewed during the week of the

attacks was associated with lower child-report anxiety ($r = -.17, p < .05$). Amount of media viewed in the week of the interview was unrelated to measures of symptomatology except with externalizing as noted above.

Prospective predictors of post-attack adjustment

Multiple regression analyses were used to examine whether pre-attack temperament would identify children with increased likelihood of demonstrating symptoms approximately 1 month after the attacks. Child age, gender and time variables were controlled; pre-attack symptoms were included in the 2nd step; and temperament variables (fear, irritability, attention regulation, inhibitory control, and impulsivity) were entered in the 3rd step of the regression. Child-report pre-attack symptoms were controlled when examining child-reported PTS symptoms to provide the most conservative test of the effects of the temperament variables. Results of these analyses are presented in Table 5. Younger children reported fewer PTS symptoms. Child-report pre-attack anxiety predicted higher levels of post-attack PTS symptoms when depression and conduct problems were controlled. Mother-report pre-attack externalizing predicted higher levels of post-attack PTS symptoms. There was a marginal, non-significant association between pre-attack inhibitory control and post-attack PTS symptoms.

Post-attack PTS symptoms as a predictor of adjustment at follow-up

Multiple regression analyses were used to examine whether post-attack PTS symptoms would predict adjustment at a follow-up assessment, approximately 6 months later. Child age, gender and time variables were controlled as in previous analyses. Pre-attack symptoms were included in the 2nd step of the regression, and the measure of PTS symptoms was entered in the 3rd step of the regression. Child-report pre-attack symptoms were controlled when examining child-report PTS symptoms. Results of these analyses are presented in Table 6. Pre-attack symptomatology predicted symptomatology at follow-up, indicating moderate to high stability of the adjustment measures. PTS symptom severity, which was self-reported by children, predicted higher levels of subsequent child-report anxiety and conduct problems, but was unrelated to parent report of symptomatology.

Discussion

The aims of this study were to assess the psychological response of children following the 9/11 terrorist attacks and to examine prospective predictors of children's post-attack responses. Children across

the country were affected by the attacks (Schuster et al., 2001; Whalen et al., 2004), and children as far away as Washington state demonstrated worries and PTS symptoms. In fact, rates of worry and PTS symptoms were similar to those found in studies of children directly experiencing a disaster (Vogel & Vernberg, 1993). In response to the 9/11 terrorist attacks in New York City and Washington, DC, a large majority of children in Seattle, Washington, reported thinking about the attacks and having specific worries related to the attacks. Children worried about the safety of friends or family, their own safety, and future terrorist attacks occurring closer to home, suggesting that children personalized the attacks and viewed themselves and their loved ones as potential victims. A substantial number of children reported being upset by the attacks and by reminders of the attacks, and children reported having more re-experiencing PTS symptoms than children who had directly experienced a serious earthquake. These findings are consistent with previous studies that have shown that the most common responses following traumas or disasters include specific fears, anxiety, and PTS symptoms, including re-experiencing and upset (Vogel & Vernberg, 1993). In particular, the most common symptoms in children mildly or indirectly exposed to a trauma or disaster include being upset by reminders of the event and re-experiencing (Shannon et al., 1994; Vogel & Vernberg, 1993), as was the case in this study. Consistent with previous studies, parents underestimated extent to which children were upset or worried about the 9/11 terrorist attacks. These findings suggest that communities should attend to children's mental health needs when there is a national or regional disaster, and that children who are geographically remote from the disaster nonetheless may be affected by it.

The degree of indirect exposure to the attacks was related to children's responses. Children who knew someone who died in the attacks demonstrated higher levels of PTS symptoms, depression, and anxiety, as well, indicating that more direct exposure to the events was related to greater stress symptoms. Also, media exposure was related to children's responses. Parents attempted to protect their children and limited media exposure more in children who were more upset by the attacks, and consequently it appears that children who experienced more PTS and anxiety symptoms had less media exposure in the week of the attacks. However, children who were exposed to more media regarding the attacks in the week the child was interviewed (2 weeks to 2 months following the attacks) were more upset or worried about the attacks in the week of their interview. It is unclear whether children who were more upset by the attacks were drawn to viewing more media or whether being exposed to more media resulted in greater distress. It is also important to note that the measures of media exposure used in this study were

Table 5 Proportion of variance accounted and standardized regression coefficients from regression analyses examining prospective predictors of post-attack PTS symptoms

	PTS symptoms
Step 1 – Covariates: R ²	.05
Child age	-.22**
Child gender	-.05
Time since previous interview	.03
Time since 9/11	-.04
Step 2 – Previous symptoms: R ² Δ	.13**
Child-report Depression	.03
Child-report Anxiety	.31**
Child-report Conduct problems	.07
OR	
Step 2 – Previous symptoms: R ² Δ	.04
Mother-report Depression	-.05
Mother-report Anxiety	-.02
Mother-report Externalizing	.22*
Step 3 – Temperament: R ² Δ	.03^t
Fearfulness	-.05
Irritability	-.05
Attention regulation	.06
Inhibitory control	-.16 ^t
Impulsivity	.13

p* < .05; *p* < .01.

Note: Regression coefficients for temperament variables are controlling for child report of symptoms.

qualitative (rated on a 1 to 4 scale representing 'hardly' to 'a lot') rather than quantitative (e.g., number of hours of media exposure), limiting the findings of this study. More detailed assessment of media exposure is needed in future studies.

Previous studies have rarely demonstrated elevations in general symptomatology or behavior problem checklists (Vogel & Vernberg, 1993). This may be related to the nature of the samples examined, which typically have been non-selected community samples. Increases in symptomatology have been ob-

served when children were identified as high-risk or special needs prior to the disaster (e.g., Burke et al., 1982). In fact, children and parents in this study reported decreases in symptomatology following the terrorist attacks. This has been shown in other studies as well. For example, 2 months following a bushfire disaster, the prevalence of behavioral and emotional behavior problems was lower in the effected group than in a control group (McFarlane et al., 1987). Shaw et al. (1995) showed decreases in problem behaviors at school in a group of children after Hurricane Andrew. Children also showed decreases in anxiety 3 months after Hurricane Andrew from a prior assessment, although the statistical significance of the difference was not examined (La Greca et al., 1998). It is possible that immediately after such events, individuals evaluate their psychological problems against the larger and more immediate problems related to the traumatic event, and downplay their general symptomatology in comparison. Interviewers in this study indicated that many parents and children wanted the researchers to know that their children were adjusting well to the event, and their reports on symptom measures may have reflected this. The data from this study suggest that the lower post-attack scores were not simply a result of symptom attenuation related to the use of questionnaire measures (e.g., Lucas et al., 1999; Piacentini et al., 1999). First, there were no significant differences between the time 1 and time 2 assessments in the larger study that were conducted one year apart and occurred prior to the 9/11 attacks. Second, the symptomatology scores at follow-up were significantly higher than those at the post-attack assessment. Thus, reactivity of responses in relation to the attacks appears likely. Elevations in PTS symptoms have been found in the absence of

Table 6 Post-attack post-traumatic symptoms predicting follow-up measures of child symptoms

	Follow-up assessment of symptoms					
	Child-report			Parent-report		
	Depression	Anxiety	Conduct probs.	Depression	Anxiety	Externalizing
Step 1 – Covariates: R ²	.02	.03	.11**	.03	.05	.11**
Child age	-.04	-.05	-.07	-.09	-.07	-.13
Child gender	.06	-.13	.29**	-.05	.02	.28*
Time since previous interview	-.13	-.06	-.12	-.11	-.20*	.14
Time since 9/11	-.03	-.09	-.04	-.15	-.14	.09
Step 2 – Pre-attack symptoms: R ² Δ	.41**	.34**	.20**	.11**	.04*	.09**
Child-report Depression	.63**	.49**	.14	.40**	.22*	.20*
Child-report Anxiety	-.09	.08	-.11	-.06	.04	-.03
Child-report Conduct problems	.17 ^t	.10	.46**	-.25*	-.19*	.19*
OR						
Step 2 – Pre-attack symptoms: R ² Δ	.06*	.07*	.08*	.54**	.47**	.58**
Mother-report Depression	.09	.02	-.17 ^t	.67**	.16*	.09
Mother-report Anxiety	-.06	-.07	.00	.07	.62**	-.02
Mother-report Externalizing	.24**	.29**	.31**	.09	-.07	.76**
	Controlling for child-report symptoms			Controlling for parent-report symptoms		
Step 3 – Post-attack PTS Symptoms	.00	.08**	.02*	.01	.00	.00
PTS Symptoms	.02	.32**	.16*	-.07	-.01	-.03

elevations in other symptomatology. Thus, following a disaster or traumatic event, individuals in a community sample appear to show stress-related symptoms without an increase in general symptomatology. It is also important to note that studies utilizing more rigorous methodology, such as pre-/post-disaster assessments or control-group comparisons and standardized measures, tend to show smaller effect sizes of trauma on symptomatology (Rubonis & Bickman, 1991), which may help explain the pattern of findings in this study, as well.

A strength of this study was the availability of measures of adjustment and temperament prior to the 9/11 terrorist attacks allowing prospective prediction of children's post-attack adjustment. Pre-attack symptomatology predicted children's post-attack PTS symptoms. When controlling for other symptomatology, child-report anxiety and parent-report conduct problems predicted children's PTS symptoms after the attacks. This is consistent with other evidence that pre-trauma functioning, and anxiety in particular, predicts children's adjustment following a disaster or trauma (e.g., Burke et al., 1982; La Greca et al., 1998). Indicators of positive adjustment have rarely been investigated as predictors of children's post-trauma adjustment. Whalen et al., 2004 found that pre-disaster optimism predicted post-disaster PTS symptoms. In this study, pre-attack self-esteem and social competence were related to lower PTS symptoms, and may serve as protective factors when a disaster or traumatic event occurs. The role of pre-disaster positive adjustment in facilitating adaptive post-disaster adjustment should be examined in the future. Another factor to consider when examining PTS symptoms following a disaster is prior experience of trauma which predict higher levels of PTS symptoms following a disaster (Pfefferbaum et al., 2003). Unfortunately, we did not assess prior traumas in this sample, limiting the conclusions we can draw about observed levels of post-attack PTS.

Over and above prior levels of symptomatology, there was a marginal association between inhibitory control and PTS. Inhibitory control is a key component of self-regulation and may be relevant in the modulation of emotional arousal following significant stressors, may facilitate appropriate processing of event information, and may increase the likelihood of adaptive coping responses. Taken together, children who demonstrate adjustment problems prior to a disaster or trauma and who are lower in inhibitory control may be at increased risk of developing PTS symptoms following a traumatic event, whereas, children who demonstrate higher levels of social competence and self-esteem prior to a disaster or trauma may develop fewer post-stress symptoms. This information may be useful in identifying children who have an increased likelihood for adverse outcomes following a trauma and who might be targeted for intervention.

The role of PTS symptoms following the 9/11 terrorist attacks in predicting adjustment approximately 6 months later was also examined. PTS symptoms predicted subsequent anxiety and conduct problems after controlling for pre-attack levels of symptomatology. However, these associations were significant only within child self-report of problems. These findings replicate the findings from prior studies that show that children with more adverse acute responses following a disaster tend to demonstrate more adjustment problems later on (e.g., La Greca et al., 1996; Shannon et al., 1994). Along with children's characteristics and adjustment prior to a disaster, post-disaster stress response can be used to identify children at risk for developing subsequent problem.

Previous evidence of race differences in PTS symptoms was replicated in this study. African-American children reported more avoidant symptoms, although they were not more likely to meet criteria consistent with a PTSD diagnosis. They also reported being more upset following the attacks. African-American children demonstrated higher levels of depression, anxiety and conduct problems; however, this likely reflects stability in symptoms from prior to the attacks, as African-American children also demonstrated higher levels of pre-attack symptomatology. Although these findings are consistent with previous evidence of differences in PTS symptoms across race and ethnicity (Shannon et al., 1994; Silverman et al., 1995), there has been little effort to understand these differences. It is likely that the higher levels of pre-attack symptomatology in African-American children place them at greater risk for developing PTS symptoms. It is also possible that other sociodemographic risk factors, including a higher likelihood of the presence of contextual risk factors (Lengua, 2002), may leave African-American children with fewer resources to deal with disasters or traumas when they occur over and above existing stressors. However, it is also possible that the race differences reflect a cultural difference in reporting of worries and upset that has not been adequately investigated. Greater understanding of these race or cultural differences is needed. Gender differences that emerged were higher levels of externalizing problems in boys, which was also true prior to the attacks, and a greater number of girls reporting being upset by the attacks, which might reflect girls being more willing to acknowledge being emotionally upset.

Studies of prospective predictors of children's response to traumatic events or disasters are critical for several reasons. First, they enhance conceptual understanding of post-traumatic symptoms and the development of problems following a disaster or catastrophic event. Understanding the individual, relational, and contextual factors that contribute to adjustment problems or positive adaptation following such events provides a theoretical model for the

development of PTS and other post-trauma symptoms (e.g., La Greca et al., 1998). Second, the examination of prospective predictors of children's post-trauma responses facilitates the identification of children who are most likely to develop problems following a trauma or disaster, allowing for targeted interventions aimed at those most in need. Results of this and other studies suggest that children demonstrating PTS symptoms following a disaster and those demonstrating symptomatology prior to the trauma or disaster, particularly higher levels of anxiety, are at greater risk for developing PTS and other symptoms. In this study, there was also a marginal relation between inhibitory control and PTS symptoms, suggesting that the ability to inhibit prepotent responses and replace them with more appropriate ones may reduce PTS symptoms. Indicators of self-regulation, such as inhibitory control, previously have not been examined as predictors of children's post-trauma responses. These might prove useful in the identification of children at risk for developing PTS symptoms. Third, prospective studies of the development of adjustment problems following trauma allow the identification of factors to be targeted in interventions aimed at facilitating adaptive responses to traumatic experiences. Strategies for reducing anxiety, including building attention regulation and inhibitory control skills, might be targets of intervention in the future.

This study provided evidence of children's post-traumatic responses to the September 11, 2001 terrorist attacks in children experiencing the events from a distance. Few children in this sample had a direct connection with the attacks, yet the data show that they were still deeply affected by them. The identification of prospective predictors of children's PTS symptoms, including previous symptomatology, emotionality and self-regulation, may be useful in understanding children's responses to traumatic events, identifying children who may require attention or intervention following a trauma or disaster, and may inform interventions aimed at preventing adjustment problems in children who experience traumas or disasters.

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