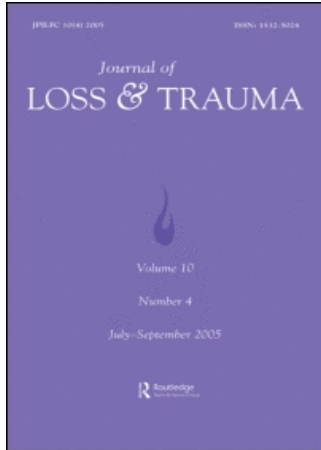


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Attributions, Coping, and Exposure as Predictors of Long-term Posttraumatic Distress in Tornado-Exposed Children

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ATTRIBUTIONS, COPING, AND EXPOSURE AS PREDICTORS OF LONG-TERM POSTTRAUMATIC DISTRESS IN TORNADO-EXPOSED CHILDREN

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Previous research has implicated a number of factors in why a child might or might not develop a negative reaction to a traumatic situation. The current study was designed to examine multiple factors and their effect on the long-term distress in children 8–12 years old who were exposed to a devastating tornado. The factors of initial exposure to the tornado, attributions about the tornado, and coping style were examined using multiple regression analyses, the number and types of attributions a child makes were found to explain the most amount of variance in long-term distress.

The vast majority of children who survive a natural disaster will suffer negative effects, with these effects persisting well beyond the immediate postdisaster period for some children. This may include the posttraumatic stress symptoms (PTSS) of reexperiencing the disaster, persistent avoidance of stimuli related to the disaster, and increased physiological arousal (Pynoos, 1994). Many factors, including initial exposure to the trauma, attributional style, and coping strategies, have been both proposed as possible determinants and found to be significantly related to long-term distress (e.g., Vernberg et al., 1996; Greening, Stoppelbein, & Docter, 2002). The current study was undertaken to examine the predictive

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ability of these three factors in children who were exposed to a natural disaster.

Little work has addressed the role of attributions, commonly defined as reasons or explanations for an occurrence, in disaster situations. Instead, many of the findings in other areas of attribution research have been generalized to traumatic situations. The little specific research that exists suggests that attributions can play a significant role in one's reactions to a trauma or disaster (Greening et al., 2002), but the exact relation of the two is still unclear. Several studies have suggested a relationship between number of attributions made for a situation and level of distress over the situation (e.g., Dollinger, 1986), with the general finding that people who either make more attributions or are more concerned with attributions tend to be more distressed. While Rubonis and Bickman (1991) found that blaming an external source for a traumatic event was related to a higher incidence of pathology than self-blame, attributions to God or chance have not been found to be associated with more distress (Dollinger, 1986). More recent studies have found that those people who demonstrate trauma-specific attributions that are global, stable, and internal are more likely to experience PTSS after a disaster (Gray, Pumphrey, & Lombardo, 2003).

Coping strategies, or specific ways that children deal with stressors or traumatic events, can either help or hinder a child's recovery after a disaster (Altshuler & Ruble, 1989). One study that examined children's reactions after a hurricane found depressive symptoms to be associated with using coping strategies such as withdrawal from social contact, blaming oneself, and a reduction in emotional expression (Jeney-Gammon, Daugherty, Finch, Belter, & Foster, 1993). The same study also found that coping strategies such as cognitive restructuring and seeking social support were associated with fewer depressive symptoms. Vernberg and colleagues (1996) found that coping strategies accounted for over 20% of the variance in total PTSS, and that those children who employed more coping strategies had a higher level of PTSS.

A considerable list of environmental and demographic factors has been associated with an increased risk of developing posttraumatic stress disorder (PTSD). Vernberg et al. (1996) found that disaster exposure, as based on children's self-reports, accounted for some 35% of the variance in PTSS. This positive relationship between degree of exposure and symptom severity has been found

in children following other disasters (e.g., La Greca, Silverman, & Wasserstein, 1998). However, other studies have reported that factors such as self-reports of negative emotions (Lonigan et al., 1994) or changed family functioning (McFarlane, 1987) are better able to predict the resulting level of PTSS. These apparent discrepancies may be due in part to the different definitions of degree of exposure used in these studies.

Overall, research on the factors that put a child at risk for the development and maintenance of PTSD symptoms has not been conclusive. More research with children and disasters is needed before one can feel confident saying that any particular factor undoubtedly puts one at risk for the development of PTSS. The current study was designed to address this gap by examining multiple factors and their predictive ability for long-term distress in children exposed to a devastating tornado. The factors examined were initial exposure to the tornado, attributions about the tornado, and coping style. It was hypothesized that each of these factors would be significantly related to long-term distress, but specific hypotheses regarding the relative and combined effects were not made due to the lack of previous research and theory to draw upon.

Method

Participants

Participants in this study were recruited from two rural elementary schools in Oklahoma that had sustained considerable damage from tornadoes in the fall of 2001. Children in Grades 3 through 6 and their parents were targeted as participants. Of the approximately 250 families solicited, a total of 102 children and 96 parents participated in the study.

Procedure

After gaining approval both from an institutional review board and the participating schools for review, introductory packets containing a letter describing the study and soliciting participants were sent home with all third through sixth graders. Parents were instructed to return completed packets and consent forms to the school. On the day of the data collection, 13 months after the

tornadoes, children with parental consent were taken to a separate classroom, informed about the study, and asked for their assent to participate. Those children who assented were then read the questionnaires aloud by the authors to facilitate comprehension, while several undergraduate research assistants who had been trained in the administration of the questionnaires circulated in the room to assist children who were having difficulty. Administration of all measures required approximately 35 minutes.

Measures

TORNADO EXPOSURE QUESTIONNAIRE (TEQ)

Parents completed a brief measure designed to assess the family's degree of exposure to the tornado as well as provide basic demographic information about the child and family (TEQ-P). The parents gave information about a number of issues concerning the tornado, including subjective severity of the tornado, presence and degree of damage to their home, and indication regarding whether and what kind of psychological services were received. A child version of the TEQ (TEQ-C) was used to assess information pertaining to perceived life threat, life-threatening experiences, and loss-disruption experiences in an appropriate format for third through sixth graders.

FREDERICK REACTION INDEX (RI)

The RI (Frederick, Pynoos, & Nader, 1992) is a 20-item self-report measure designed to assess PTSD symptoms in children. Rather than measuring diagnosable PTSD, the RI assesses the presence and degree of symptoms such as bad dreams, repetitive thoughts, emotional isolation, and somatic symptoms in age-appropriate language for children. It is one of the most commonly used measures of PTSD symptoms after a disaster (Mercuri & Angeli-que, 2004) and has been shown to have strong psychometric properties (Lack, Sullivan, & Knight, in press). The RI uses a Likert-type scale that measures the presence and severity of PTSD symptoms on a scale of 1 (none of the time) to 5 (most of the time). Each response is assigned a numerical value, and responses are summed to attain a single score between 0 and 80. Scores are divided into five categories of response severity: doubtful (scores of 0–11), mild (12–24), moderate (25–39), severe (40–59), and very severe (60–80).

TRAUMA ATTRIBUTION CHECKLIST (TAC)

In order to assess the children's attributions regarding the tornado, the TAC (Knight & Sullivan, in press) was used. The TAC is a 28-item self-report measure that asks questions concerning internal versus external causes for the trauma, the importance of attributing responsibility, expectations, hypervigilance, meaning coming from the trauma or trauma-related events, omen formation, and one open-ended question concerning the cause of the trauma. The checklist items are rated on a 3-point Likert-type scale. The TAC was found to have a correlation of .79 with scores on the RI in a sample of trauma-exposed children (Knight & Sullivan, in press). The TAC has a total score range of 0 to 48, with each scale having its own range. For the Attribution of Responsibility scale, the range is 0 to 18, while the subscales that compose it have ranges of 0 to 8 (self-blame), 0 to 4 (other blame and God blame), and 0 to 2 (no blame). The Importance of Attributing Responsibility scale ranges from 0 to 6; both the Expectations/Hypervigilance and Search for Meaning scales range from 0 to 10. The expectations subscale ranges from 0 to 6, with the hypervigilance subscale ranging from 0 to 4. Finally, the Omen Formation scale has a range of 0 to 4.

KIDCOPE (KC)

The KC (Spirito, Stark, & Williams, 1988) is a 15-item checklist developed to assess the frequency of use of different types of coping strategies and the relative effectiveness of each. Ten coping strategies are assessed, five by two items (distraction, social withdrawal, problem solving, emotional regulation, and wishful thinking) and five by a single item (cognitive restructuring, self-criticism, blaming others, social support, and resignation). The KC has both a frequency scale ("Did you do this?") and an efficacy scale ("How much did it help?") and has variable wording to reflect coping in response to a specific event. Studies conducted on the reliability of the KC indicate adequate psychometrics (Spirito et al., 1988).

Results

Participants

The majority of the sample was Caucasian (90.9%), with American Indian (5.5%) being the second largest racial group. Participating

children were in Grades 3 through 6, with an age range of 8–12 ($M = 10.40$, $SD = 1.23$). Children were split fairly evenly across sex (47.3% male, 52.7% female) and grade (21.8% in 3rd grade, 15.5% in 4th grade, 25.5% in 5th grade, 37.3% in 6th grade). Analyses were performed to determine how similar the participants from the different schools were and if their data could be combined or would be best analyzed separately; there were no unexpected differences. Thus, for all analyses, the samples from the two towns were combined.

Tornado Exposure Questionnaire

Although the majority of participants reported no damage to their homes (68.3%), five of the families in the sample experienced a total loss. Parent report of child fear during the tornado ranged from not at all scared (14%) to somewhat scared (20.6%), scared (24.3%), very scared (21.5%), and terrified (19.6%). Only 15% of the parents reported that their child did not currently worry about tornadoes happening, while 33% described their child as currently very or extremely worried about tornadoes. On children's self-report of fear during the tornado, 17.6% reported being not at all scared, 44.1% reported being somewhat scared, 14.7% reported being scared, and 23.5% reported being very scared.

Frederick's Reaction Index

The average RI total score was 27.20 ($SD = 14.19$), in the moderate range, with scores ranging from 1 to 70. According to their self-reports, 9.8% of children experienced no PTSS, 38.2% experienced mild symptoms, 31.4% experienced moderate symptoms, 17.6% experienced severe symptoms, and 2.9% experienced very severe symptoms.

Trauma Attribution Checklist

The average TAC score was 14.30 ($SD = 7.91$), with a range from 0 to 38. The Attribution of Responsibility scale had a mean of 4.67 ($SD = 2.86$). It was divided into the subscales of self-blame ($M = 1.84$, $SD = 1.80$), other blame ($M = 0.54$, $SD = 0.83$), God blame ($M = 1.02$, $SD = 0.95$), and no blame ($M = 1.14$,

$SD = 0.89$). The Importance of Attributing Responsibility scale had a mean of 0.71 ($SD = 1.17$). The Expectations/Hypervigilance scale mean score was 3.78 ($SD = 1.48$). The expectations subscale had a mean of 2.00 ($SD = 1.56$), and the hypervigilance subscale had a mean of 1.78 ($SD = 1.40$). The Search for Meaning scale had a mean of 3.13 ($SD = 2.56$), and the Omen Formation scale had a mean of 1.37 ($SD = 1.06$).

Kidcope

The mean number of coping strategies endorsed on the KC was 7.60 ($SD = 3.10$). Wishful thinking, cognitive restructuring, and distraction were the coping strategies reported most frequently, while self-criticism and blaming others were the least frequent. The strategies of social support, cognitive restructuring, and distraction were reported to be the most efficacious, while other blame and self-criticism were reported to be the least effective.

Relationship Between Distress and Predictor Variables

To test the hypothesis that the degree of PTSS would be affected by several factors, several analyses were used. First, a series of correlational analyses were conducted to determine the relationship between posttraumatic distress and the level of exposure the child had to the tornado. Statistically significant relationships were found between the total RI score and parent report of both how scared the child was during the tornado and how worried he or she had been since the tornado, $r(98) = .238$, $p = .018$, and $r(98) = .240$, $p = .017$, respectively. A significant relationship was also found between total RI score and the child's report of how scared he or she was during the tornado, $r(102) = .480$, $p < .001$. RI total scores were then correlated with the total exposure scores for the TEQ-P and TEQ-C. While a significant relationship was found between child-reported total exposure score and total RI score, $r(102) = .411$, $p < .001$, the same was not found for parent-reported total exposure, $r(97) = .106$, $p = .302$). This again points to the importance of the child's perception in influencing the level of posttraumatic distress. These results suggest that while parents can ascertain to a certain degree how scared their child was, the

degree to which the child reports he or she was scared is more strongly related to PTSD symptoms experienced.

Next, analyses were conducted to examine the relationship between PTSS and coping. A correlation coefficient between RI total score and total number of coping strategies endorsed on the Kidcope was found to be statistically significant, $r(102) = .435$, $p < .001$. This result supports the hypothesis that there is a relationship between posttraumatic distress and coping strategies. Finally, analyses were conducted to examine the relationship between PTSS and attributions. A statistically significant correlation was found between RI severity score and total score on the TAC, $r(102) = .714$, $p < .001$. Further analyses revealed each scale and subscale of the TAC, with the exception of the no blame subscale, to be significantly related to RI scores. These results support the hypothesis of positive relationship between posttraumatic distress and attributions.

Regression Analyses

Stepwise multiple regression analyses were used to examine the predictive relationship between level of exposure, number of coping strategies and attributions, and degree of posttraumatic distress.

TABLE 1 Correlation Between RI Total Score and TAC Scales and Subscales

TAC scales and subscales	<i>r</i>	<i>p</i>
Attribution of responsibility	.478**	< .001
Self-blame	.429**	< .001
Other-blame	.227*	.005
God-blame	.322*	.002
No-blame	.149	.135
Importance of attributing responsibility	.357**	< .001
Hypervigilance/Expectations	.603**	< .001
Hypervigilance	.626**	< .001
Expectations	.471**	< .001
Search for meaning	.644**	< .001
Omen formation	.362**	< .001
Total score	.714**	< .001

Note: * = significant at the .01 level, ** = significant at the .001 level.

The TAC total score was entered in the first step and accounted for a total of 48.7% of the variance in the total RI score ($F = 78.915$, $p < .001$). The child's report of how scared he or she was during the tornado was entered in the second step and contributed an additional 5.4%, for a total R^2 of .541 for the model ($F = 49.291$, $p < .001$). The number of coping strategies was not found to significantly contribute to the prediction of posttraumatic distress.

To further examine the use of the TAC to predict total RI scores, the five scales of the TAC and the child's self-reported fear during the tornado were entered into a stepwise multiple regression analysis. The TAC Search for Meaning scale alone accounted for 40.0% of the variance in total RI score ($F = 59.636$, $p < .001$). The child's self-reported fear contributed an additional 7.8% to the model in the second step ($F = 41.255$, $p < .001$), while the Attribution of Responsibility scale added an additional 7.6% in the third step ($F = 37.452$, $p < .001$). The Expectations/Hypervigilance scale was added in Step 4 for another 1.7% ($F = 30.254$, $p < .001$) and, in the final step, the Omen Formation scale was added and contributed an additional 1.5% ($F = 25.938$, $p < .001$), for a total R^2 of .586 for the model. The TAC Importance of Attributing Responsibility Scale was not found to significantly contribute to the prediction of posttraumatic distress.

Discussion

The purpose of the current study was to examine the predictive ability of three factors previously shown to be highly related to posttraumatic distress: attributions, coping strategies, and degree of exposure to the traumatic event. The hypothesized relationship between level of exposure to the tornado and degree of posttraumatic distress was supported; as the child's self-report of fear and the parents' report of their child's fear during the tornado increased, so did the degree of posttraumatic distress. In particular, the child's self-reported fear was more highly related to degree of posttraumatic distress than either parent-reported child fear or parent-reported exposure, suggesting that perceived, rather than actual, exposure to the disaster may be more important in determining how severe a reaction a child will have to a natural disaster. The greater relationship between child-reported fear and subsequent distress found in this study is consistent with the report

of Lonigan et al. (1994), who found child-reported negative emotions after a hurricane to be more associated with posttraumatic distress than actual exposure. It is also consistent with literature showing that parents report their child as experiencing little distress after a natural disaster (Burke et al., 1986).

The number of coping strategies used by children was also hypothesized to be related to amount of posttraumatic distress. This was supported by the current study, which found a strong positive relationship between the two. This suggests that those children with higher levels of distress continue to search for effective coping strategies to help manage that distress, while children with little or no distress use only a small number of strategies. This result corresponds to findings indicating that children with higher levels of depression use a greater number of coping strategies (Jeney-Gammon et al., 1993).

Another supported hypothesis of the study was that a positive relationship would exist between use of attributions and posttraumatic distress. For the most part, any type of attribution was strongly related to levels of posttraumatic distress. Only the attributions concerning assigning no blame for the disaster were found to be unrelated to level of distress, which may be a result of those who blame no one being better adjusted than those who make any type of attribution. It could also be due to blaming no one not technically being an attribution, since no blame was attributed. While previous research in the field of attributions in children is limited, results from the current study support past findings. Knight and Sullivan (in press) found assigning no blame to be related to less distress, as in the current study, but also found attributions of blame to God not to be related to distress. In the current study, however, blaming God was found to be significantly related to distress. This supports early research showing that making any attribution is more predictive of emotional distress, and that the specific type of attribution made does not matter (Bulman & Wortman, 1977). The relationship between attributions and posttraumatic distress not only supports one of the hypotheses of this study, but provides general support for the fact that children do make attributions for negative events and that these can be measured through a self-report measure. Also, based on the results of this study, it appears that the measurement of what attributions are being made may be important in intervening with children

exposed to some type of trauma, consistent with the little previous literature in this area.

Regression analyses were conducted to examine the predictive ability of the three main variables hypothesized to have a relationship with posttraumatic distress: exposure, attributions made, and coping strategies used. The current findings suggest that over longer periods of time (at least 12 months), attributions may play a stronger role in maintenance of distress than exposure or coping skills. The results of the current study support the idea that the attributions one makes for a disaster, even in children as young as 8 years old, explain a substantial amount of the variance in long-term distress (over 48%). Similar relationships between distress levels and attributions have been found in adult samples that experienced a natural disaster (Bödvarsdóttir & Elklit, 2004). The current study is one of only a very few studies to examine attributions in children, particularly attributions for a disaster. The point should be made that the researchers do not consider exposure unimportant in determining distress. Indeed, regression analyses showed that a combination of attributions and perceived exposure was most predictive of long-term distress. Instead, it may be that the attributions a child makes are driven by his or her level of perceived exposure, and that those attributions in turn drive distress. In effect, attributions may be the middle link in the exposure-distress chain, mediating exposure to the disaster and the subsequent distress due to that exposure. This link was first proposed by Dollinger (1986), who hypothesized that negative events would be likely to generate efforts to make attributions for the disaster. The current study provides support for this proposed relationship. Future longitudinal research that includes measures of all three of these areas (exposure, coping, and attributions) is needed to address this possibility.

In summary, the current study supported the relationship between posttraumatic distress and the factors of exposure, coping, and attributions. While all of these factors were highly related to levels of distress, the presence of attributions for the disaster was found to be most predictive, especially searching for meaning to the disaster. This relationship between attributions and distress was found to be above and beyond even that of perceived exposure and distress, suggesting that exposure may drive attributions, which in turn drive distress.

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