

CHILDREN'S DISTRESS, ATTRIBUTIONS, AND  
COPING AFTER A NATURAL DISASTER

By

LAURA ANNE KNIGHT

Bachelor of Arts  
Roger Williams University  
Bristol, Rhode Island  
1989

Master of Arts  
Roosevelt University  
Chicago, Illinois  
1999

Submitted to the Faculty of the  
Graduate College of the  
Oklahoma State University  
in partial fulfillment of  
the requirements for  
the Degree of  
MASTER OF SCIENCE  
May, 2002

CHILDREN'S DISTRESS, ATTRIBUTIONS, AND  
COPING AFTER A NATURAL DISASTER

Thesis Approved:

*Maureen Sullivan*  
Thesis Advisor

*Wade Wuy*

*Melanie C. Page*

*Timothy J. Petterson*  
Dean of the Graduate College

## ACKNOWLEDGEMENTS

I would like to thank my major advisor, Dr. Maureen Sullivan, for her guidance on this project. Her expertise, encouragement, and support were invaluable. I would also like to my committee members, Dr. Trish Long and Dr. Melanie Page, for their thought-provoking comments and suggestions.

Special thanks go to Mrs. Roxie Brookman of Okarche Elementary School and Mrs. Dianna Fisher of Hennessey Elementary School for graciously opening their schools and offering their assistance. Thanks also to the parents and children who generously gave of their time to participate in this study.

I would like to express my gratitude to Megan Dunlap, Melissa Blundell, and Chuck Edgington for their thoughtful feedback and their much-appreciated assistance with data collection. I am also grateful to Brandi Bullard and Robin Aupperle for their assistance in the research lab.

Finally, I would like to thank my parents for their loving support and extraordinary patience. Their faith in me has meant more than words can express.

## TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION .....	1
II. REVIEW OF THE LITERATURE.....	3
Posttraumatic Stress Disorder in Children.....	3
PTSD: Criteria .....	3
Diagnostic Utility of DSM-IV Criteria.....	5
Common Symptoms of Posttraumatic Stress in Children .....	7
Trauma Research with Children and Adolescents .....	8
The Stages of Psychological Response to Disasters .....	10
Long-term Impairments in Functioning.....	12
Factors Determining Short- and Long-term Distress.....	14
Characteristics of Disaster Exposure as Predictors of Distress.....	14
Demographic Factors Associated with the Development of PTSD.....	16
Assessment Limitations .....	17
Conclusion .....	18
Attributions: The Need for Meaning.....	19
Attributions and Distress.....	19
Affective Reactions Associated with Blame.....	20
Attribution Categories.....	21
Perceived Control and Coping .....	22
Attributions as Coping Strategies .....	23
Limitations in Attribution Research.....	23
The Need for a New Attribution Assessment Measure.....	24
Coping.....	26
Coping Strategies .....	26
Coping and PTSD Symptomatology.....	27
Coping Assistance.....	28
Age-related Changes in Use of Coping Strategies.....	30
Gender Differences in Coping Strategies.....	31
Use of Coping Strategies and Symptom Severity.....	31
Limitations and Future Directions .....	32
Summary .....	33

Chapter	Page
III. CURRENT INVESTIGATION .....	37
IV. METHOD .....	41
Recruitment.....	41
Measures .....	41
Procedure .....	45
Participants.....	46
V. RESULTS .....	49
Time 1 .....	49
Time 2 .....	59
VI. DISCUSSION.....	69
Interpretations of Results .....	69
Clinical Implications.....	83
Limitations and Strengths .....	83
Areas for Future Research.....	87
REFERENCES .....	89
TABLES .....	97
APPENDICES .....	107
APPENDIX A—Demographic Questionnaire.....	107
APPENDIX B—Tornado Exposure Questionnaire—Parent Report.....	110
APPENDIX C—Tornado Exposure Questionnaire—Child Report .....	115
APPENDIX D— Frederick Reaction Index .....	118
APPENDIX E—Kidcope.....	121
APPENDIX F—Natural Disaster Attribution Checklist.....	123
APPENDIX G—Informed Consent and Assent Forms .....	127
APPENDIX H—IRB Approval Form .....	132

## LIST OF TABLES

Table	Page
1. Parents' Perceptions of Tornado Severity.....	97
2. Parents' Perceptions of Their Child's Fear During and Since the Tornadoes .....	97
3. Degree of PTSD Symptoms as Measured by the Reaction Index.....	98
4. Kidcope Frequency Endorsements with Chi-Square Analyses of Change from Time 1 to Time 2.....	99
5. Efficacy Ratings Given by Children Who Endorsed Use of Kidcope Coping Strategies.....	100
6. Correlations between Reaction Index Scores and Use of Kidcope Coping Strategies.....	101
7. Correlations between Scores on the Reaction Index and Scores on the Natural Disaster Attribution Checklist.....	102
8. Relationships between Use of Coping Strategies as Measured by the Kidcope and Presence of Attributions as Measured by the NDAC.....	103
9. Summary of Stepwise Regression Analysis for Kidcope Frequency Scores and NDAC Scale Scores Predicting the Reaction Index Total Score .....	104
10. Summary of Stepwise Regression Analysis for Kidcope Frequency Scores Predicting the Reaction Index Total Score at Follow-up.....	106

## CHAPTER I

### INTRODUCTION

In recent years, the United States has suffered a number of disasters, both natural and man-made. Disasters have received increasingly comprehensive media coverage, resulting in a national awareness of the resulting emotional and physical devastation. The increasing awareness of disasters has led parents and mental health professionals to reconsider the effects that disasters have on children. Whereas children's reactions were once considered mild and transitory, mental health professionals now report that the effects can be severe (Frederick, 1983; Terr, 1983a; Vogel & Vernberg, 1993). A disaster does not end when the impact is over; it is a series of events preceding and following the impact of the disaster whose sequelae are likely to be experienced over time by exposed individuals and by the community in which the disaster occurred (Melick, Logue, & Frederick, 1982).

Along with the increase in knowledge about the psychological effects of surviving a disaster has come a pressing need to understand how to help individuals, especially children, cope with those effects. Emotional consequences of a disaster may continue to emerge for years after the disaster. Children are especially prone to drawing inaccurate conclusions about the cause of the disaster and their response to it (Ehrenreich, 1999). The attributions that a child makes for a disaster and the events that surround it are of particular interest to researchers (Dollinger, 1986; Joseph, Brewin, Yule, & Williams, 1993), as are the ways in which children cope with their feelings about the disaster (Vernberg, La Greca, Silverman, & Prinstein, 1996), because both may influence the level of the child's distress.

The purpose of this paper is to examine the psychological effects on children of surviving a disaster. Posttraumatic stress disorder symptomatology will be addressed, as will mediating factors that affect symptom presentation. The types of attributions made by individuals following traumatic experiences will be explored. In addition, a review of coping strategies and their effects on posttraumatic distress will be presented.



## CHAPTER II

### REVIEW OF THE LITERATURE

#### Posttraumatic Stress Disorder in Children

##### PTSD: Criteria

Since the inclusion of Posttraumatic Stress Disorder (PTSD) in the Diagnostic and Statistical Manual of Mental Disorders, 3<sup>rd</sup> edition (DSM-III; American Psychiatric Association, 1980), mental health professionals have sought to operationally define the characteristics of this disorder as it is manifested in children and adolescents. Current PTSD criteria (DSM-IV; American Psychiatric Association, 1994) reflect revisions of the adult-based criteria found in DSM-III (American Psychiatric Association, 1980). To receive a diagnosis of PTSD, a child must first have been exposed to a traumatic event during which the child experienced or witnessed actual or threatened death or injury, or learned about a significant other being exposed to such an event. The child's reaction to the event must include intense fear, horror, helplessness, or disorganized or agitated behavior.

Disasters are often associated with PTSD diagnoses. Disasters are relatively sudden, disruptive, time-limited events that affect children from multiple families (Vogel & Vernberg, 1993). Vernberg et al. (1996) found that 3 months after Hurricane Andrew, 86% of the elementary school-aged children they assessed reported at least mild disaster-related posttraumatic stress symptoms; more than 55% reported moderate to very severe levels of these symptoms. Researchers have reported prevalence rates of PTSD symptoms in children in the months following a disaster ranging from 5% (Shannon, Lonigan, Finch, & Taylor, 1994) to 85% (Shaw, Applegate, & Schorr, 1996) depending on the methods used to assess PTSD, the population sampled, and the amount of time

passed since the disaster (American Academy of Child and Adolescent Psychiatry, 1998). Ehrenreich (1999) stated that 90% or more of victims can be expected to exhibit some psychological distress in the days following a disaster; by 3 months postdisaster, 20% to 50% of victims may still exhibit significant posttraumatic distress. Examples of posttraumatic stress-inducing disasters include human violence, such as sniper shootings; natural disasters such as hurricanes, tornadoes, and earthquakes; and failures of technology or human error, such as plane crashes or industrial accidents.

PTSD diagnostic criteria require that the child exhibit a specific number of symptoms from each of three categories: reexperiencing, avoidance/numbing, and increased arousal. The child must exhibit one of the reexperiencing symptoms, which include recurrent and intrusive distressing recollections of the event (in young children, this may be manifested by repetitive play in which themes or aspects of the trauma are expressed); recurrent distressing dreams of the event or frightening dreams without recognizable content; acting or feeling as if the event were recurring (in children may be manifested by trauma-specific reenactment); intense psychological distress at exposure to cues that symbolize or resemble an aspect of the traumatic event; and physiological reactivity on exposure to those cues (American Psychiatric Association, 1994).

Furthermore, the child must exhibit three symptoms of avoidance of stimuli associated with the event and numbing of general responsiveness. Symptoms include efforts to avoid thoughts, feelings, or conversations associated with the trauma; efforts to avoid activities, places, or people that provoke memories of the trauma; inability to recall important aspects of the trauma; loss of interest or participation in activities; feelings of detachment or estrangement from others; restricted range of affect; and a sense of foreshortened future (American Psychiatric Association, 1994).

Finally, the child must exhibit at least two symptoms of increased arousal, which may be indicated by sleep difficulties, irritability or angry outbursts, difficulty concentrating, hypervigilance, and exaggerated startle response. Symptoms must be present for at least 1 month and cause clinically significant distress or impairment in functioning (American Psychiatric Association, 1994).

Research on children traumatized by various catastrophic situations has yielded evidence that there are differences in the manifestation of PTSD in children versus adults (American Academy of Child and Adolescent Psychiatry, 1998). Children are less likely to report amnesia for details of the traumatic event, numbing, or intrusive flashbacks and more likely to exhibit posttraumatic play and reenactment (Terr, 1983a).

#### Diagnostic Utility of DSM-IV Criteria

Despite the DSM-IV revisions, debate continues regarding the utility of the diagnostic criteria with children. Lonigan, Anthony, and Shannon (1998) evaluated the diagnostic efficacy of posttraumatic symptoms in children exposed to a hurricane. Their results indicated that children who reported symptoms associated with behavioral and emotional avoidance were those most likely to be experiencing a severe posttraumatic reaction. Symptoms with the highest efficacy for a diagnosis of a severe posttraumatic reaction were behavioral avoidance, bad dreams, emotional avoidance, and repetitive thoughts about the disaster. The avoidance/numbing cluster had the highest diagnostic utility and was a much better inclusion criterion than the reexperiencing or increased arousal clusters. Lonigan et al. suggested that children may experience a number of symptoms associated with PTSD without meeting full diagnostic criteria, and that a revision of the criteria may be necessary to adequately identify children suffering from PTSD.

Anthony, Lonigan, and Hecht (1999) stated that although it has been demonstrated that children and adolescents suffer significant posttraumatic reactions, whether their reactions are characterized by the DSM's definition of PTSD into reexperiencing, numbing/avoidance, and arousal symptom clusters has not been determined. After conducting factor analyses on PTSD symptoms and symptom clusters, Anthony et al. put forth a new model for describing posttraumatic stress reactions in children and adolescents exposed to a natural disaster. They concluded that posttraumatic stress reactions are characterized by intrusive phenomena coupled with active avoidance of such negative experiences (Intrusion/Active Avoidance cluster), emotional numbing along with passive avoidance of emotionally unrewarding activities (Numbing/Passive Avoidance cluster), and arousal (similar to DSM-IV Increased Arousal cluster).

Their proposed model differs from the DSM-IV criteria in 2 ways: it distinguishes between active avoidance (i.e., purposefully engaging in activities unrelated to the trauma as a way of avoiding the trauma) and passive avoidance (i.e., not engaging in social interactions), and it places fear of recurrence/hypervigilance on the intrusion/active avoidance cluster rather than the arousal factor. Anthony et al. (1999) reported that their model was robust across populations, types of trauma, and assessment instruments.

Results of factor analyses suggest that posttraumatic stress lies on a continuum of disturbance severity; therefore, categorical measures (i.e., PTSD vs. no disorder) may not be the best index of symptom quality (Anthony et al., 1999). Terr (1983b) suggested that psychic trauma is not an all-or-nothing condition; rather, it is a spectrum of conditions ranging from fright to trauma depending on the type and number of ego functions (e.g., sense of time, visual perception, coping mechanisms including denial, repetitive play, or repeated dreams) compromised by the shock of the traumatic event.

### Common Symptoms of Posttraumatic Stress in Children

Controversial criteria aside, a diagnosis of PTSD requires information from multiple sources. A single score on any instrument is insufficient to diagnose PTSD because a child could have extremely high levels of symptoms in one category but none in another. It is difficult to ascertain avoidant and numbing symptoms from children's self-reports, resulting in a significant risk of underdiagnosing PTSD (American Academy of Child and Adolescent Psychiatry, 1998). Diagnostic interviews place prohibitive time constraints on researchers; therefore, studies on posttraumatic reactions typically evaluate subjects for posttraumatic stress symptoms, rather than PTSD diagnoses (La Greca, Silverman, & Wasserstein, 1998; Lonigan et al., 1998; Shannon et al., 1994; Shaw et al., 1996; Vernberg et al., 1996).

While every child exposed to a disaster will not meet diagnostic criteria for PTSD, most children will exhibit some signs of posttraumatic distress. The most common short-term psychological and behavioral symptoms include difficulty sleeping or refusal to go to bed, nightmares, persistent thoughts of the trauma, repetitive play which represents part of the disaster experience, belief that another traumatic event will occur, conduct disturbances (e.g., aggressiveness, defiance), hyperalertness, avoidance of other children, sights, or objects associated with the disaster, withdrawal, difficulty concentrating, and somatic complaints (e.g., headaches, stomach aches, vague aches and pains) (Ehrenreich, 1999; Frederick, 1985; Terr, 1981). Younger children may exhibit regression to earlier developmental stages, as indicated by thumbsucking, enuresis, and separation anxiety. In more severely disturbed children, some symptoms may persist beyond the short-term postdisaster period.

### Trauma Research with Children and Adolescents

Lenore Terr's reports on posttraumatic stress symptoms in children and adolescents strongly influenced conceptualization of PTSD in children (Vogel & Vernberg, 1993). Following her seminal case studies of victimized children, most notably 26 children from Chowchilla, California who survived being kidnapped from their school bus and held captive in a truck trailer that had been buried underground (1981; 1983a), Terr (1991) delineated four characteristics common to most cases of childhood trauma that are now encompassed in the DSM-IV diagnostic criteria for PTSD. These characteristics are experiencing strongly visualized or repeatedly perceived memories, engaging in repetitive behaviors, exhibiting trauma-specific fears, and holding changed attitudes about people, aspects of life, and the future. These symptoms were seen in various forms throughout Terr's (1981; 1985) follow-up investigations with the kidnapping victims.

For example, five to 13 months following the kidnapping, Terr (1981) found that each child suffered posttraumatic stress symptoms, most commonly fear: fear of losing their parents, fear of dying, fear of further trauma, and even "fear of the mundane," (e.g., fear of the dark, strangers, vehicles, confined spaces, open spaces, and of being alone). Repetitive trauma-related dreams and nightmares were also common, as were "playing" the kidnapping experience and reenacting fears, fantasies, or actual behaviors that occurred just before or during the kidnapping.

Terr's extensive work with traumatized children led her to distinguish between two different types of trauma (1991). Type I traumatic conditions follow from unanticipated events, like disasters or car accidents. These single, shocking, intense terrors are fully etched in memory and are often accompanied by misperceptions of the time regarding the event. Following this type of shock, children often seek to understand why the trauma

happened and what signs were missed that would have signaled that the trauma was coming. Terr was the first to identify such “omen formations.” An omen is a retrospectively formed warning gathered from experiences just prior to trauma, from occurrences or thoughts long before the trauma, or from dreams, actions, or ideas after the trauma (Terr, 1983c). Terr postulated that omen formation indicates that the child is unable to cope with the present and seeks instead to control some portion of time in the past. The child attempts to gain retrospective mastery over the randomness of and the lack of control over the trauma. Terr found that 19 of the 26 children who were victims of the Chowchilla kidnapping reported omen formation.

Omen formation is a coping strategy that may develop following a Type I trauma. Type II traumatic conditions follow from long-standing repeated exposure to extreme external events and are accompanied by a sense of expectation and anticipation. Examples of Type II traumas include long-term physical or sexual abuse, warfare, or community violence. The repetitive nature of a Type II trauma requires different coping strategies than the single incident Type I trauma (Terr, 1991). Coping strategies are addressed elsewhere in this paper.

The trauma resulting from a natural disaster is not limited to the impact of the physical event, but may continue for an extended period of time and may include additional traumas and adjustments (Green, 1982). Type I traumas can produce ongoing stressors that result in symptoms characteristic of Type II traumas. For example, a tornado is considered a Type I trauma because it occurs suddenly, with little warning, and lasts only minutes. The damage resulting from the tornado, however, may take months or years to repair, if reparation is possible. Shaw et al. (1996) found that 21 months after Hurricane Andrew, not only did 70% of their sample of school-aged children continue to

demonstrate moderate to very severe posttraumatic stress symptoms, there were increased indices of pathology as compared with the immediate postdisaster period. Shaw et al. postulated that the increases in pathology as time passed were associated with exposure to Type II stressors such as traumatic reminders, continuing adversity, and demoralization. The death or serious injury of family members or friends, serious injury to oneself, or the destruction of one's community present traumas that are ongoing and of unlimited duration. In these cases, features of both types of trauma may be present.

#### The Stages of Psychological Response to Disasters

Disasters are not static events; each phase, from impact through reconstruction, presents different emotional and physical challenges to the victims. Physical challenges unique to disasters include evacuation, loss of personal items, residence in temporary living quarters, performance of cleanup and other physical labor associated with restoring the original condition of the affected area, and exposure to dangerous environmental conditions, such as food and clean water shortages, raw sewage, and dust (Melick et al., 1982). These challenges present themselves at different stages of the recovery process, which results in different symptom presentations at different times. In the immediate hours following a disaster, activity is focused on rescuing victims and stabilizing the situation. Victims may seem stunned and in disbelief, and may exhibit many symptoms of numbing of general responsiveness. Intense feelings of fear and heightened physiological arousal are common. During this stage, victims are trying to comprehend the reality of the situation (Ehrenreich, 1999; Frederick, 1983).

The next stage is referred to as the inventory stage, as victims assess the damage and begin to consider long-term solutions (Ehrenreich, 1999) or the honeymoon stage, during which victims feel a need to share their experiences with others and gain support



(Frederick, 1983). The honeymoon stage is followed closely by a period of disillusionment, during which feelings of anger, resentment, and frustration surface. Victims must make a realistic appraisal of the long-term consequences of the disaster and may be in mourning for lost loved ones, homes, or possessions. Depression and hopelessness are common among those most severely affected. Reexperiencing symptoms appear. Symptoms of increased arousal and numbing of responsiveness may continue. These symptoms are comparable to those described as resulting from Type II traumas (Terr, 1991).

The reconstruction phase begins a year or more after the disaster, when the focus shifts to the new, stable pattern of life that has emerged (Ehrenreich, 1999). Victims begin to realize that their recovery depends on their own efforts to rebuild their lives (Frederick, 1983). In some individuals, PTSD symptoms persist. Krug et al. (1998) found that suicide rates increased substantially in the 4-year period following floods, hurricanes, and earthquakes. Rates increased 24.9% among individuals aged 10 to 29 years old. However, there were no statistically significant increases in suicides in the affected counties after tornadoes.

There are a number of possible reasons why people might commit suicide months or years after a natural disaster: injuries to self or family; loss of family members, friends, property, or jobs; long-lasting alterations of day-to-day life; and the disruption of social networks. Symptoms of depression or anxiety and changes in social or academic functioning may be apparent in individuals who no longer meet full PTSD criteria. These long-term impairments are described further below.

### Long-term Impairments in Functioning

Studies have shown that children's posttraumatic stress reactions to disasters are not merely transitory events; distress often persists to cause long-term problems in functioning for children and their families (Green, 1982; La Greca et al., 1998). Self-reported school performance has been noted to decline significantly for children with posttraumatic stress symptoms versus children without such symptoms (Shannon et al., 1994). Using teacher reports of school performance, McFarlane, Policansky, and Irwin (1987) found that achievement declined between 8 months and 26 months after a bushfire disaster and that underachieving children had significantly more posttraumatic stress symptoms than adequately achieving children at 8-month follow-up. Inattention and poor academic achievement were also found to contribute to posttraumatic stress reactions after a hurricane disaster (La Greca et al., 1998). McFarlane (1987) reported that level of behavioral disturbance and anxiety at school, but not at home, at 2 months and 8 months postdisaster were significantly associated with the severity of PTSD symptoms at 26-month follow-up. At 26-month follow-up, distractibility and restlessness were consistent predictors of posttraumatic stress symptoms, suggesting that disturbed attention may have a long-term impact on the course of morbidity in children (McFarlane et al., 1987).

Above and beyond academic achievement, disaster victims are vulnerable to impairments in social functioning. Disaster victims experience relocation, disruption in their routine social activities, and job and school loss that removes them from their social networks. Disaster-related erosion of social support has been identified as a contributor to depressive symptomatology in disaster victims (Kaniasty & Norris, 1995). Lower levels of social support were related to greater PTSD symptomatology in children exposed to a hurricane (Vernberg et al., 1996). For adolescents, loss of social support

resources (i.e., free time and access to friends) was significantly associated with PTSD symptoms (Garrison, et al., 1995). However, seeking social support is not always associated with fewer distress symptoms. Polusny et al. (1999) found that posttraumatic stress symptoms were predicted by greater use of social support for children, although not for adolescents.

Following a disaster, children have been observed displaying aggressive and assaultive behaviors (Galante & Foa, 1986) and engaging in repetitive posttraumatic play and reenactment that frightened or physically endangered other children (Terr, 1983a). Furthermore, Terr (1981; 1991) reported changes in children's attitudes toward families and friends. For example, previously easygoing children became increasingly irritable following a traumatic event. Shaw et al. (1996) found that boys experienced significant reductions in PTSD symptoms at 21-month postdisaster follow-up, but displayed increases in teacher-reported social withdrawal and social problems, suggesting that the boys' distress manifested in other ways. Lonigan, Shannon, Taylor, Finch, and Sallee (1994) found that children who experienced high levels of negative emotions during a hurricane were especially at risk for the development of emotional numbing, avoidance, and isolation and suggested that these children might tend to compound their traumatic reactions by withdrawing from usual sources of social support.

Four years after the Chowchilla kidnapping, Terr (1985) found that every child continued to experience PTSD symptoms, the manifestations of which were strikingly similar despite different developmental levels. Common symptoms included thought suppression (i.e., conscious avoidance of thoughts about the kidnapping), sense of foreshortened future, repetitive nightmares, repetitive posttraumatic play, reenactment, somatic disturbances (e.g., bladder problems, stomachaches, weight problems), and

family relationship problems. Furthermore, Terr found that some symptoms became more evident as time progressed: intense shame, thought suppression, denial and repression of posttraumatic symptoms, memories of misperceptions, sense of foreshortened future, death dreams, and posttraumatic play and reenactment.

#### Factors Determining Short- and Long-term Distress

Children and adolescents exposed to trauma, including natural disasters, exhibit a wide-range of posttraumatic stress symptoms with varying degrees of severity (Shannon et al., 1994). Green et al. (1991) identified the primary factors that interact to determine short-term response and long-term adaptation to a traumatic event: (a) the characteristics of the stressor (e.g., loss, life threat, and physical disruption); (b) one's cognitive processing of the event (e.g., attributions, intrusive images, avoidance of reminders); (c) individual characteristics (e.g., age, sex, coping style, intelligence, temperament); and (d) characteristics of environment (e.g., reactions of family members, interruption of routine, peer and school support systems, life events). An important consideration in the evaluation of these factors is the victim's perception or evaluation of the experience (Melick et al., 1982). Numerous researchers have investigated the relationship between these factors and posttraumatic distress symptoms.

#### Characteristics of Disaster Exposure as Predictors of Distress

Research has shown that there are several characteristics of exposure to a disaster that influence the development of posttraumatic stress symptoms. Vernberg et al. (1996) evaluated hurricane exposure by children's self-reports of life-threatening events experienced during the hurricane, by the loss of property or possessions, and by disruption of personal relationships and normal routines in the weeks following the hurricane. Vernberg et al. found that exposure variables accounted for 35% of the

variance in PTSD total symptom scores; greater exposure to hurricane-related traumatic experiences was associated with more PTSD symptoms. Additional researchers have identified children's perceptions of life threat, experience of life-threatening events, and loss and disruption experienced following a hurricane (Garrison et al., 1995; La Greca et al., 1998) and a tornado (Polusny et al., 1999) as associated with more severe posttraumatic stress symptoms. Two years after the collapse of a slag dam caused the death of 125 people and the destruction of a town, Green et al. (1991) found that life threat was the most powerful predictor of ongoing posttraumatic stress symptoms; loss of home or property, however, did not predict PTSD symptoms.

Other studies do not corroborate life threat and loss of possessions as the best predictors of PTSD symptoms. Children's reports of negative emotionality (i.e., being sad, worried, scared, or feeling alone) during a hurricane have been reported as more strongly associated with the development of severe post-traumatic reactions than any of the actual hurricane exposure factors (Lonigan et al., 1994). Separation from parents in the days immediately after the disaster, maternal preoccupation with the disaster, and changed family functioning were reported as more powerful determinants of posttraumatic phenomena than were exposure or losses sustained (McFarlane, 1987).

Extensive home damage (Lima et al., 1989; Lonigan et al., 1994; Shannon et al., 1994), continued displacement (Lima et al.; McFarlane, 1987; Lonigan et al., 1994), and parental unemployment as a result of the disaster (Lonigan et al., 1994) have been reported as significantly associated with the presence of most PTSD symptoms. Results are consistent across a variety of disasters: tornado (Polusny et al., 1999), a blizzard followed by a flood (Burke, Moccia, Borus, & Burns, 1986), hurricane (Lonigan et al., 1994; Garrison et al., 1995; La Greca et al., 1998; Shannon et al.; Vernberg et al., 1996),

bushfire (McFarlane) and earthquake (Lima et al., 1989).

The interrelationship of these variables may contribute to some of the conflicting findings of these studies. Life threat and loss of home or property are not mutually exclusive. Victims who were inside their home at the time it was destroyed suffered serious life threat, extensive property damage, and loss of possessions. In addition, these victims may have suffered more negative emotionality than those victims who were not in danger of losing their lives or homes. Those children whose families suffered extensive property damage may have been more likely to suffer separation from parents and changed family functioning than those children whose families did not lose their homes. Variance in researchers' operational definitions for disaster exposure may lead to conflicting results. Empirical evidence indicates that a variety of factors contribute to the development of PTSD symptoms; therefore, assessment of multiple dimensions of postdisaster sequelae is warranted.

#### Demographic Factors Associated with the Development of PTSD

Major natural disasters in the United States over recent years have allowed researchers to examine the differences in the development of posttraumatic stress symptoms in children. Multiple studies have found gender, age, and race differences in the development and duration of posttraumatic stress symptoms. Females typically experience more PTSD symptoms at a greater severity (Garrison et al., 1995; Green et al., 1991; Lonigan, Shannon, Finch, Daugherty, & Taylor, 1991; Shannon et al., 1994) and for a longer duration (Burke et al., 1986; Shaw et al., 1996; Vernberg et al., 1996). At 10-month follow-up with victims of a blizzard and flood disaster, Burke et al. found evidence of continued emotional distress in girls and hypothesized that the time course of PTSD may differ in girls and boys. Burke et al. suggested that boys might experience a

more persistent course that resolves gradually, while girls experience a quicker recovery but a more severe recurrence of posttraumatic stress symptoms upon reexposure to a similar situation (i.e., the return of winter). Other studies, however, found no significant gender differences (La Greca et al., 1998; Polusny et al., 1999).

Several researchers have also found age effects in PTSD symptomatology, with younger children at the highest risk for symptoms (Lonigan et al., 1991; McFarlane, 1987; Shannon et al., 1994). However, Green et al. (1991) found that age group did not add to prediction of PTSD symptoms after gender and severity of stressors were controlled. Garrison et al. (1995) found that the frequency of PTSD symptoms increased significantly with age, and speculated that this could be due to the inability of younger children to articulate their symptoms. Green et al. found that level of parental symptom severity had highest influence on children aged 2 years through 7 years and suggested that PTSD symptoms in young children are best assessed via an evaluation of parental functioning.

Some researchers have found racial differences in the presence of PTSD symptoms. After controlling for the effects of disaster exposure, some researchers found that African-American children had higher rates of PTSD symptoms (La Greca et al., 1998; Lonigan et al., 1991; Shannon et al., 1994), whereas other researchers have not found these differences (Garrison et al., 1995; Vernberg et al., 1996). Overall, these differences are not well understood and are in need of further investigation (American Academy of Child and Adolescent Psychiatry, 1998).

#### Assessment Limitations

Self-report is the most common method used to assess PTSD symptoms in children; however, this method has some limitations. Children may be prone to exaggerate their

responses (Shannon et al., 1994), or those who were more severely impacted by the disaster may be less likely to participate in research (Garrison et al., 1995). Despite these possibilities, children's self-reports provide important information (Vogel & Vernberg, 1993). Evidence exists that parents deny (Burke, Borus, Burns, Millstein & Beasley, 1982) or underestimate (Romero & Sullivan, 1991) their children's problems. Sullivan, Romero, and Hutchison (1993) found that parents reported significantly lower levels of PTSD symptoms for their children than their children self-reported 1 year after a tornado. Moreover, Vernberg et al. (1996) found that during testing, a number of children remarked that they did not share their distress with their parents because they did not want to bother them or further upset them. This evidence indicates that parent-report measures may underestimate the severity of PTSD symptoms in children. Whereas parent- or teacher-report assessment methods may provide adequate information regarding externalizing behaviors, self-report remains the only available method to assess internalizing symptoms. Therefore, a child's self-report is vital to the assessment of PTSD symptoms.

Lonigan et al. (1991) suggested that a common flaw in disaster research is the failure to discriminate between disaster victims who experienced high or low levels of exposure to the disaster. This may contribute to the contradictory conclusions of some researchers.

### Conclusion

Survival of the assault is only the first of many challenges faced by children exposed to trauma. The resulting devastation, including loss of home, possessions, and social support; injuries to self or loved ones; prolonged disruption of daily routines; and trauma-related fears can significantly impair a child's functioning for weeks, months, or years. The meaning that a child ascribes to a trauma can affect the amount of psychological



distress that the child endures. The focus of this paper now turns to the effects of attribution on postdisaster distress.

#### Attributions: The Need for Meaning

After a disaster, many people find themselves searching for an explanation or a reason for the disaster's occurrence. The readjustment process often focuses around themes of searching for meaning in the experience and attempting to regain mastery over the event. The search for meaning is an effort to understand the event and its impact. One of the ways that meaning is addressed is through causal attributions (Taylor, 1983), which are statements identifying a factor or factors that contributed to a given outcome (Joseph et al., 1993). Research on the relationship between attributions and distress experienced after a traumatic event is explored below.

#### Attributions and Distress

Attribution research has demonstrated that frustration or failure and unexpected outcomes often promote attribution searches. Evidence suggests that people ask "why" questions after these types of outcomes even when not specifically directed to do so (Taylor, 1983; Wong & Weiner, 1981), but this finding is not universal. Downey, Silver, and Wortman (1990) challenged the assumption that it is important to understand why a negative event occurs with their study of parents' attributions following the Sudden Infant Death Syndrome (SIDS) death of their child. Their results revealed that a sizable minority (45%) was unconcerned about attributing blame. Significant differences in levels of distress were found between parents who made attributions and parents who did not. At each assessment (3 weeks, 3 months, and 18 months postloss), parents who were concerned with attributing blame were more distressed than those who were not; more distressed parents tended to blame themselves or someone else. Attributions of

responsibility to God or to chance, however, were not significantly associated with distress.

Dollinger (1986) interviewed adults and children who witnessed lightning strike the field during a soccer match, killing one child. Dollinger found that children who made any attribution for the disaster were more upset than those who made no attribution. Furthermore, those giving more than one attribution were more upset than those giving just one attribution. Dollinger hypothesized that greater distress leads one to search for an attribution. The particular attribution seemed to make little difference; the fact of having any attribution was more predictive of emotional upset.

Joseph et al. (1993) assessed adolescent survivors at 5 months and 12 months after the cruise ship on which they were sailing collided with another ship and sank, killing four people. They found that more internal causal attributions for negative events that occurred during the disaster (e.g., blaming oneself for needing help during the rescue or being unable to help others) were associated with higher scores on measures of posttraumatic symptomatology at both follow-up times.

#### Affective Reactions Associated with Blame

Weiner, Graham, and Chandler (1982) have identified three dimensions of causality that determine an individual's affective reaction to an event: locus (i.e., whether the cause is internal or external to the individual), stability (i.e., whether the cause is temporary or enduring), and controllability (i.e., whether the cause is subject to influence). Empirical evidence suggests that an affective response of pity is associated with uncontrollable and stable causes, whereas guilt and anger are associated with controllable causes. Self-blame is associated with guilt; other-blame is associated with anger. In both cases the cause is perceived as controllable; the difference lies in the locus of the event. Dollinger,

Staley, and McGuire (1981) assessed fifth and sixth grade children's evaluations of the defense mechanisms used by other children in hypothetical conflict situations and found that reactions associated with blame of others were perceived much less favorably than reactions of self-blame. This suggests that a child's attributions may affect both the child's self-perception and the child's peer relationships.

#### Attribution Categories

There is little consistency in the measurement or categorization of attributions. Assessment varies from open-ended interview questions to self-report checklists, limiting the comparability of study findings. With this caveat in mind, some broad categories of attributions appear to generalize across events. Despite the differences in the traumatic events in question (paralysis as a result of an accident, Bulman & Wortman, 1977; fatal lightning strike disaster, Dollinger, 1986; SIDS death of a child, Downey et al., 1990; cruise ship sinking, Joseph et al., 1993) some commonalities in attribution categories are apparent. All four studies examined whether negative events were attributed to the self (internal) or other causes (external). Joseph et al. limited their attribution analysis to internal or external causes. Bulman and Wortman, Dollinger, and Downey et al. found that subjects made external attributions to chance and to God. The remaining attribution categories found by Dollinger were specific to the weather and location of the soccer match. Bulman and Wortman found unique categories including predetermination, probability, deservedness, and reevaluation of the event as positive. Their results indicated that the category of the attribution was not important. What did appear important was ascribing meaning to the event in a manner that was satisfying to the victim. Taylor's research (1983) appears to replicate this finding: None of the attributions made by breast cancer patients for the development of their cancer was correlated with

overall psychological adjustment. No single attribution stood out as more functional than any other. However, Taylor noted that when a positive meaning could be construed from the negative event, it produced significantly better psychological adjustment.

#### Perceived Control and Coping

Attributions of blame for a negative event to external sources are associated with higher levels of pathology, suggesting an association between decreased perceptions of control over a negative event and distress (Rubonis & Bickman, 1991). Bulman and Wortman (1977) examined the types of attributions made by severe accident victims and found that other-blame attributions for the accident were associated with poor coping. Perceived controllability was also associated with poor coping. Although many of the subjects in this study were victims of events out of their control (e.g., several were passengers in automobiles or were shot by other parties), the majority nevertheless accepted some degree of responsibility for their accident. Bulman and Wortman hypothesized that people may have an exaggerated notion of their own causal powers and suggested that if the immediate cause of an accident is not avoidable or controllable, the victim may look for a prior cause that is.

Similarities appear to exist between the search for controllability over an uncontrollable event and the notion of omen formation discussed by Terr (1983c; 1991). Following a threatening event, the individual attempts to regain mastery over the event. Gaining a sense of mastery refers to gaining a feeling of control over the threatening event so as to manage it or keep it from occurring again (Taylor, 1983). Omen formation indicates an attempt to gain retrospective mastery over a random, unexpected, and uncontrollable trauma (Terr, 1983c). While it is not specifically referred to as omen formation, the belief that one could have avoided an unavoidable accident appears aimed

toward achieving mastery. Exaggerated feelings of personal control may generally be adaptive when outcomes are flexible, but can be maladaptive when an outcome is permanent and nonmodifiable, as evidenced by poorer coping in individuals who perceived controllability over their accident (Bulman & Wortman, 1977) and in individuals who reported omen formation (Terr, 1991).

#### Attributions as Coping Strategies

The type of attribution that one makes for the occurrence of a disaster and disaster-related events provides an indication of the type of coping strategies one uses to deal with the aftermath of a disaster. Self-blame has been identified as both a coping strategy (Jeney-Gammon, Daugherty, Finch, Belter, & Foster, 1993; Spirito, Stark, & Williams, 1988; Vernberg et al., 1996) and an attribution (Bulman & Wortman, 1977; Dollinger, 1986; Downey et al., 1990; Joseph et al., 1993). Jeney-Gammon et al. found that children who endorsed the use of self-blame after a hurricane experienced more depressive symptomatology than did children who used other coping strategies. Vernberg et al. assessed coping after a hurricane and found that although blame and anger were reportedly the least frequently used coping strategies, they were the types of coping linked with the highest level of PTSD symptomatology. In fact, blame and anger accounted uniquely for 13% of the variance in total PTSD symptoms. Dollinger reported that the child who made a clear self-blaming attribution for the lightning strike disaster was among those most severely upset. Dollinger's small sample size, however, prevents his findings from generalizing to a larger population.

#### Limitations in Attribution Research

Research in the field of attributions has typically focused on achievement events or social outcomes (see Palmer & Rholes, 1989 for a review). Very little attention has been

focused on the attributions made by victims of natural disasters for disaster-related incidents; results of other studies have typically been generalized to natural disaster situations. In discussing the relationship between attributions and personal control, Wortman (1976) stated that victims of natural disasters often experience feelings of guilt for their misfortune. However, Wortman did not support this statement with empirical evidence from natural disaster victims; research with victims of rape and the Hiroshima bombing were cited instead. She stated that there are relatively few studies in which victims have been questioned about their assignments of causality for negative events.

The influence of having experienced a disaster on subsequent development, including on belief systems as to what controls events and optimism or pessimism about the future is an area in need of further research (Vogel & Vernberg, 1993). Children are prone to drawing inaccurate conclusions about the cause of a disaster or their own actions in relation to the disaster (Ehrenreich, 1999), which has implications for their postdisaster functioning and may indicate the presence of posttraumatic stress symptoms (Dollinger, 1986). Attributions may reflect how children process a victimizing event and may be a factor that mediates symptom development (Mannarino, Cohen, & Berman, 1994).

#### The Need for a New Attribution Assessment Measure

The study of attributions poses some challenges for the researcher. Mannarino et al. (1994) cautioned that victimized children may develop unique attributions and perceptions related to their victimization experience that are not assessed by symptom-oriented measures. Attribution assessment encompasses a diverse collection of methods, including presenting participants with hypothetical success or failure scenarios (Russell, 1982; Wong & Weiner, 1981), evaluating participants' written accounts of actual incidents (Benson, 1988; Joseph et al., 1993; Weiner et al., 1982), and interviewing

participants about specific events using open-ended questions (Bulman & Wortman, 1977; Dollinger, 1986; Taylor, 1983).

Current methods of assessing attributions have some limitations. Studies using hypothetical situations may provide little insight into children's attributions for actual outcomes (Palmer & Rholes, 1989) and are of limited relevance to understanding the relationship between attributions and adjustment following traumatic events (Downey et al., 1990). Open-ended questions present reliability challenges. Dollinger, Staley, and McGuire (1981) found that their open-ended attribution question attained only moderate reliability and subsequently dropped it from analysis. Joseph et al. (1993) reported 90% interrater agreement using an attributional coding system to review written accounts of the sinking of a cruise ship; however, the attributions generated by this method were limited to internal or external categorization.

Downey et al. (1990) developed a measure to assess the attributions made by parents after the SIDS death of their infant. This measure used sets of closed-ended questions to assess parents' attributions of responsibility and meaning for the death of their child. An additional closed-ended question measured the importance of attributing responsibility. Parents were also asked open-ended questions regarding any theories they had about why their baby died. Downey et al. found that parents who were concerned with attributing blame were more distressed than those who were not concerned with attributing blame and suggested that their results are likely to generalize to events that are serious, unexpected, and irrevocable.

Despite the various methods available to assess attributions, there is no published attribution measure specifically for use with child survivors of natural disasters. This is an area in need of further attention and investigation.

## Coping

Individual coping styles can mitigate or exacerbate the impact of a stressor on personal functioning (Altshuler & Ruble, 1989). Coping styles are relatively unchanging personality characteristics that influence the range of coping strategies (i.e., the specific ways in which children cope with stressors) from which children are likely to select (Ryan-Wenger, 1992).

Both the characteristics of the person and the characteristics of the situation influence coping. Compas and Epping (1993) described both internal and external efforts involved in coping. Problem-focused coping refers to efforts to change some aspect of the stressful relationship between the person and the environment (e.g., rebuilding damaged possessions). Emotion-focused coping refers to efforts to manage or regulate the negative emotions associated with a stressor (e.g., seeking reassurance from parents). While there has been very little study of the sequential patterns of children's coping across time with disasters, evidence suggests that the types of coping strategies employed change over the course of a stressful episode (Compas & Epping, 1993).

### Coping Strategies

A variety of coping strategies have been operationally defined in the coping literature. The Kidcope (Spirito et al., 1988), a widely used assessment of children's coping, measures ten specific coping strategies: problem solving, social support, emotional regulation, distraction, social withdrawal, cognitive restructuring, self-criticism, blaming others, wishful thinking, and resignation. Stark, Spirito, and Stamoulis (1988) reported that the most frequently used coping strategies across a sample of 9- and 10-year-olds were wishful thinking (92%), cognitive restructuring (82%), emotional regulation (80%), problem solving (77%), distraction, and social support. Least frequently used were



blaming others (20%) self-criticism (22%), and resignation (32%). Romero and Sullivan (1992) reported similar frequency results in their study of coping strategies employed by 8- to 12-year-old girls 14 months after a tornado. Clearly, children use a variety of different strategies to cope with any given problem. Those rated as being most helpful were problem solving, wishful thinking, social support, emotional regulation, and cognitive restructuring. Romero and Sullivan's efficacy results were similar, but differed with regard to wishful thinking, which was perceived as not helpful to their subjects.

Children questioned about the coping strategies they preferred for positive (e.g., waiting for something desirable) and negative (e.g., waiting for a medical procedure) events mentioned behavioral distraction strategies most frequently (Altshuler & Ruble, 1989). Three months after a hurricane, children reported that they used wishful thinking coping most frequently, followed by positive coping strategies, social withdrawal, and blame-anger, respectively (Vernberg et al., 1996). Altshuler and Ruble found that children faced with uncontrollable situations were more likely to employ avoidance tactics to alleviate their emotional distress.

#### Coping and PTSD symptomatology

The coping strategies that children employ after a natural disaster can affect their posttraumatic symptomatology. Social withdrawal, self-blame, and emotional regulation were associated with increased depressive symptoms, while cognitive restructuring and seeking social support were associated with fewer depressive symptoms following exposure to a hurricane (Jeney-Gammon et al., 1993).

After a similar disaster, Vernberg et al. (1996) examined the predictive value of four types of coping on a measure of children's trauma-related stress. The four coping variables were Positive Coping (e.g., trying to seeing the good side of things, try to feel

better by spending time with others, trying to fix the bad things by doing something or talking to someone), Blame and Anger (e.g., blaming myself for causing the bad things; blaming others for causing the bad things; yell, scream, or get mad), Wishful Thinking, and Social Withdrawal. Vernberg et al. found that coping accounted for 21% of the variance in PTSD total symptom scores; higher levels of each of the coping variables were associated with more PTSD symptoms. Blame and Anger accounted for 36% of the total effects for the set of coping variables.

Because disaster victims experience different posttraumatic stress symptoms over time, they are likely to change the coping strategies they employ over time. Differences in psychological outcomes for different types of coping may emerge during the course of adapting to traumatic experiences (Vernberg et al., 1996). Compas and Epping (1993) stated that future research should seek to study coping with disasters at different points in time as the demands of the stressor and the resources available to the children change. A disaster presents many different challenges; therefore, it would be useful to examine how children cope with the different stressful aspects of a disaster over the different response stages.

#### Coping Assistance

In addition to identifying children's coping strategies, researchers are examining ways in which others help children cope with their distress. Prinstein, La Greca, Vernberg, and Silverman (1996) identified three types of coping activities involving parents, teachers, and friends that were prevalent in coping research and literature: emotional processing, reinstatement of familiar roles and routines, and distraction. Emotional processing was defined as physical, cognitive, and affective actions that lead to the absorption of emotional disturbances; this often involves exposure to reminders of

the distressing event. Reinstitution of familiar roles and routines involves an effort to gain control over a stressful environment. Distraction involves helping the child to think about things other than the distressing event. Prinstein et al. found that reinstitution of familiar roles and routines was the most frequent type of coping assistance and that parents most frequently provided this type of assistance. Family support systems are important to children in coping with disaster (Ehrenreich, 1999); quickly reestablishing daily routines has been demonstrated to be associated with quicker recovery from disaster-related distress (Galante & Foa, 1986) and has been identified as significantly related to the development of posttraumatic stress symptoms (Green et al., 1991).

Children with moderate to very severe levels of PTSD reported higher levels of distraction coping assistance from parents, friends, and teachers (Prinstein et al., 1996). Parents provided more distraction than teachers or friends. The Positive Coping variable used by Vernberg et al. (1996) contained several distraction items. Positive coping strategies were the second most frequently employed, after Wishful Thinking. Positive Coping accounted for about 3% of the variance in PTSD symptoms.

Emotional processing was most frequently provided by friends for all children; children with moderate to very severe levels of PTSD reported greater frequencies of emotional processing coping assistance from both parents and friends (Prinstein et al., 1996). Polusny et al. (1999) found that for children, PTSD symptoms were predicted by greater use of social support for emotional processing.

Compas and Epping (1993) outlined the relationship of family characteristics and processes with coping, and stated that family members serve as resources for children who are coping with a disaster through provision of social support and information. Family members can also serve as models for coping strategies that may be employed by

the child. However, some family characteristics may be maladaptive to adjustment. Family members can impede the coping process by interrupting or constraining the coping efforts of a child or by turning to the child for help in ways that exceed the child's developmental capacity. Researchers have found that the level of parental distress directly affects the child's distress following a disaster, with greater parental distress related to greater distress in the child (Green et al., 1991; McFarlane, 1987). Parental emotional reactions to the traumatic event and parental support of the child can be powerful mediators of the child's PTSD symptoms (American Academy of Child and Adolescent Psychiatry, 1998). The coping efforts of individual family members may affect and be affected by the coping efforts of other members in addressing a common problem (Compas & Epping).

#### Age-related Changes in Use of Coping Strategies

The use of coping strategies appears to differ with age. Altshuler and Ruble (1989) noted age-related increases in the ability to manage emotions in uncontrollable situations by means of mental, in contrast to behavioral, activities and reported that increases in cognitive abilities allow older children considerably more flexibility in coping with stress. Young children, in contrast, may have difficulty even thinking of effective coping strategies under highly stressful situations.

Nine- to 11-year-old children used a variety of coping strategies, most commonly cognitive restructuring, problem solving, emotional regulation, and wishful thinking, more often than younger or older children, regardless of the problem (Spirito, Stark, Grace, & Stamoulis, 1991). Furthermore, Altshuler and Ruble (1989) found that in negative stressful situations, young children preferred adult support, 7- and 8-year-old children preferred peer support, and 10- and 11-year-old children preferred adult support.

Third grade children reported significantly more emotional processing than fourth and fifth grade children after a hurricane (Prinstein et al., 1996).

#### Gender Differences in Coping Strategies

Stark, Spirito, Williams, and Guevremont (1989) examined the use of coping strategies in adolescents and found that males used wishful thinking more than females, while females used social support more frequently than males. There was an interaction effect on emotional regulation, indicating that males and females use this strategy for different problems. Males are more likely than females to perceive resignation (Stark et al., 1989) and distraction (Spirito, Overholser, & Stark, 1989) as effective coping strategies. Stark et al. concluded that females are more expressive and seek more social support than males do to deal with stressful situations.

#### Use of Coping Strategies and Symptom Severity

Children and adolescents who are experiencing posttraumatic distress use more coping strategies than children who are not experiencing posttraumatic distress (Jeney-Gammon et al. 1993; Polusny et al., 1999). Vernberg et al. (1996) found a strong positive relationship between greater psychological distress and greater use of coping efforts, even after controlling for exposure to trauma, demographics, and social support. Vernberg et al. suggested that a high level of distress following a novel, intense, ongoing stressor might initially elicit a variety of coping strategies, both positive and negative.

Spirito et al. (1989) examined coping strategies in groups of suicidal, distressed, and nondistressed adolescents and found that the groups differed on their frequency of use of social withdrawal, problem solving, wishful thinking, and resignation. Adolescents who had attempted suicide used withdrawal significantly more often than adolescents who had not attempted suicide, suggesting that social withdrawal is a particularly maladaptive

coping strategy that may indicate more severe distress. Furthermore, adolescents who had attempted suicide and distressed adolescents used wishful thinking more than nondistressed adolescents. To the extent that distressed adolescents used wishful thinking, their use of problem solving may have been rendered less effective.

#### Limitations and Future Directions

Children's coping mechanisms after disasters represent a prominent gap in the disaster literature (Vogel & Vernberg, 1993). Patterns of coping after disasters may differ from those found in research on coping with familiar, discrete, time-limited events (e.g., medical procedures, academic achievement, task performance), because disasters are highly novel events that influence multiple aspects of children's lives and produce ongoing disruptions (Vernberg et al., 1996). Coping has not been extensively investigated in children; therefore, it is difficult to determine exactly how coping varies over time (Prinstein et al., 1996) or across situations (Compas & Epping, 1993). While some researchers have found an association between the number of coping strategies employed and level of distress (Jeney-Gammon et al., 1993; Polusney et al., 1999; Vernberg et al.), this area is in need of further exploration.

The findings of Vernberg et al. (1996) regarding children's coping are among the first reported in disaster literature, however, they are not without some limitations. Most notably, the 3-month measurement limits the generalizability of findings. Future research should focus on children's reactions to disasters over a more extended period of time using longitudinal designs. Vernberg et al. stressed that further investigation of children's coping strategies following major disasters is needed to investigate possible connections between various coping strategies and PTSD symptoms.

### Summary

The vast majority of children who survive a disaster will suffer some negative effects. For many children, these effects will be short-lived and relatively minor. For other children, short-term symptoms persist well beyond the immediate postdisaster period, causing significant distress and impairment in functioning. Symptoms such as withdrawal, conduct disturbance, difficulty concentrating, and persistent thoughts of the disaster can lead to impairments in social relationships and academic functioning which can have serious long-term consequences. Identification of children who are suffering posttraumatic distress is imperative if these children are to receive the help they need to prevent negative long-term consequences.

A variety of methodological issues have limited the generalizability of previous research. Methods of assessing PTSD range from unstructured interviews to projective testing to self-report checklists. The method used to assess PTSD symptoms will affect the nature and degree of the symptoms reported. Variability also exists regarding the specific aim of the assessments. Some researchers have assessed specific PTSD criteria, while others have assessed general posttraumatic stress symptoms of varying degrees. Furthermore, previous studies have differed on the method of subject selection, number of subjects included, and subject classification. Some researchers discriminated between subjects who experienced high or low levels of exposure to the disaster; other researchers did not. Evidence suggests that disaster victims differ in symptom severity on the basis of age, gender, race, and exposure level. However, the evidence is not conclusive. These methodological differences may contribute to the contradictory conclusions in the disaster literature. The use of standardized procedures for the definition and assessment of posttraumatic stress reactions is essential for the comparability of research across

disasters and across subgroups of disaster survivors.

The use of multiple informants in the assessment of posttraumatic stress symptoms provides more reliable and complete information than can be gained from a single informant. Children's self-report has some limitations, most notably the potential to elicit inaccurate responses. Parent- and teacher-reports may provide important information regarding externalizing symptoms, but are not valid measures of internalizing symptoms. The results of many studies are limited because data were collected from only one source. Additional research is needed in which children's posttraumatic stress symptoms are assessed through self- and other-reports.

The nature of a disaster imposes some limitations on the conducting of disaster research. Disasters strike with little warning, forcing disaster researchers to organize their studies quickly; the devastation and disruption resulting from disasters often force researchers to collect data as unobtrusively as possible. Researchers seldom have any information on their subjects' predisaster functioning. Therefore, the extent to which postdisaster distress can accurately be attributed to the disaster is unknown. The researcher must often rely on subjects' reports for information about their predisaster functioning; these reports are rarely objectively verified. Control groups may provide approximate information regarding predisaster functioning for a sample similar to the experimental group, but are seldom included in disaster research. Additional research is needed in which control groups, matched on demographic factors but without the disaster exposure, are assessed for distress levels and coping and compared to the disaster group. This would allow researchers to draw conclusions about the differences in distress levels between nondisaster and disaster groups.



Very little long-term data exists in the disaster literature, but that which does exist indicates that a significant number of children experience long-term persistent distress. Long-term follow-up beyond 1 year is necessary to determine how posttraumatic distress symptoms manifest over time, how victims cope over time, and what changes take place in symptomatology and coping.

Despite recent interest in the manifestation of PTSD in children, children's coping with posttraumatic stress symptoms has received little attention and coping with disaster sequelae has received even less attention. Disasters provide many different challenges with which victims must cope. Children's use of coping strategies may affect the severity and duration of their posttraumatic distress as well as the extent of impairment to their social and academic functioning. Research is needed to identify which types of coping strategies are most effective in different situations and which are associated with greater levels of distress. Identifying the types of coping strategies used by children who are and are not suffering posttraumatic distress may aid in the identification of distressed children and provide important information for their treatment.

Attributions of blame and omen formation fall within the hierarchy of coping strategies. Blame is an attribution of responsibility for a particular event, which impacts how the victim copes with the event. Individuals who report placing blame for a negative outcome appear to suffer greater distress than individuals who do not make attributions of blame. Moreover, individuals who blame others for negative outcomes appear to suffer greater distress than individuals who blame themselves for negative outcomes. Omen formation indicates an inability to cope with the present and a desire to control some portion of time in the past. Omen formation is often seen in victims of traumatic events and is associated with poor coping. Additional research is needed to determine whether

attributions of blame and omen formation are consistently associated with poor coping in children.

Attributions, in and of themselves, appear to be related to the presence and severity of posttraumatic distress. Individuals who make any attribution for a negative outcome appear to suffer greater distress than individuals who do not make an attribution for a negative outcome. Attribution research has primarily focused on social interactions and academic achievement; the literature on children's attributions for disaster-related events is sparse. Additional research is needed to verify the validity of the association between attributions and distress for child victims of disasters. This research has important implications for the identification of children suffering from posttraumatic distress. The presence of an attribution for a negative event may be easily established by parents and may signal the need for a psychological evaluation.

### CHAPTER III

#### CURRENT INVESTIGATION

The present research was conducted to add to the literature on children's long-term posttraumatic distress, coping, and attributions following a natural disaster and to address some of the limitations in the existing research. Two studies were designed to assess posttraumatic distress and coping in children exposed to a series of catastrophic tornadoes that devastated Central Oklahoma on May 3, 1999. As many as 45 tornadoes passed through the area, many rated F-4 or F-5 with winds clocked as fast as 318 miles per hour. Altogether, some 750 Oklahomans were injured and 41 killed. It was the nation's highest tornado-related death toll in more than a decade. Property damage totaled about \$1 billion (Time Magazine, May 19, 1999).

The first study had two primary purposes. One purpose was to assess the posttraumatic distress symptomatology of school-age children in Central Oklahoma and to examine the relationship between persisting distress and the use of specific coping strategies. At the time of the first assessment, 18 to 19 months had passed since the tornadoes struck. This study examined the types of coping strategies the children had employed since the tornadoes struck and the long-term relationship between coping and symptoms of posttraumatic distress.

The first study was also designed to assess the attributions made by children about the tornadoes, the damage, and the ensuing disruption in their lives. The relationships between the presence of attributions, degree of posttraumatic distress, and employment of specific coping strategies were examined. In addition to demographic factors and the child's level of exposure to tornado-related trauma, the child or family's receipt of services in the months since the tornadoes was also assessed, as this is likely to affect the

degree of posttraumatic distress symptoms present (Green, 1982).

The specific goals of the first study were to test four hypotheses. The first hypothesis predicted a relationship between the number and type of coping strategies employed and degree of posttraumatic distress symptomatology. It was hypothesized that children with more severe posttraumatic distress would endorse a greater number of coping strategies and that they would rate these coping strategies as generally less effective compared to children with less severe symptoms of posttraumatic distress. The second hypothesis predicted a relationship between attributions and the severity of posttraumatic distress symptoms. It was hypothesized that children with more severe posttraumatic distress would make more attributions for negative tornado-related events, feel more concerned with making attributions and finding meaning in the negative events, have higher expectations for recurrence, and experience more omen formation than children with less severe symptoms of posttraumatic distress. The third hypothesis stated that children coping with ongoing tornado-related trauma (e.g., death or serious injury of family member, relocation, loss of parent's income) would exhibit more severe posttraumatic distress symptomatology than children no longer coping with tornado-related trauma. Finally, it was hypothesized that there would be a difference in symptom level between children who received postdisaster psychological services and children who did not receive services. Receipt of psychological services may contribute to lower scores on measures of posttraumatic distress or may indicate that children with severe symptoms were more likely to receive psychological services than children with mild symptoms. Those children who received crisis debriefing immediately following the tornado may score lower on measures of posttraumatic stress than those children who did not receive crisis debriefing. On the other hand, children who received individual psychological

services may have done so because they experienced poorer long-term functioning compared to those who did not receive individual services. It was hypothesized that the severity of posttraumatic stress symptoms would differ between children who received immediate crisis debriefing, children who received individual psychological services, children who received both services, and children who received no services.

The second study was a follow-up assessment of the children who participated in the first study. At the time of the second assessment, almost 2 years had passed since the tornadoes struck, and it was tornado season in Oklahoma. Oklahomans are bombarded with frequent reminders of the onset of tornado season: Television and radio stations broadcast warning signals, local newscasts air footage of tornado coverage, sirens are tested regularly, and thunderstorms are intense and frequent. Furthermore, the anniversary of the May 3, 1999 tornadoes may trigger heightened emotional or physiological reactivity. The recurrence of tornado season is likely to activate traumatic reminders of past tornadoes and to create anticipation of future tornadoes; therefore, it was predicted that tornado season would affect levels of posttraumatic distress. Burke et al. (1986) hypothesized that gender differences in children's distress levels 10 months after a blizzard may have been due to girls experiencing a more severe recurrence of posttraumatic distress symptoms upon reexposure to winter. No other available research has examined seasonal changes in posttraumatic distress symptom levels; however, this may have important implications for victims of seasonal natural disasters.

The goal of the second study was to test two hypotheses. It was expected that scores of posttraumatic distress symptomatology would be increased for the majority of children during tornado season assessment compared to non-tornado season assessment. Furthermore, it was expected that children identified at Time 1 as having moderate to

severe posttraumatic distress symptoms would have greater increases in posttraumatic distress scores compared to children who were identified at Time 1 as having no or mild symptoms of posttraumatic distress. Whereas a decrease in symptoms over time is expected for most children with posttraumatic distress (Vogel & Vernberg, 1993), victims of seasonal disasters may experience an increase in symptoms as the threat of a recurrence increases.

## CHAPTER IV

### METHOD

#### Recruitment

Several school districts in North Central Oklahoma suffered significant damage during the May 3, 1999 tornadoes. Affected elementary schools were contacted to determine their willingness to participate in the study. Information on established procedures for permitting outside research was obtained from the interested schools. Two elementary school districts, Okarche and Hennessey, consented to participate. Children in grades three through six and their parents were targeted as participants, as this range is consistent with that in previous natural disaster research and self-report measures are considered unreliable for use with children under the age of 8 years.

#### Measures

##### Parent Forms

Demographic questionnaire. Parents who agreed to allow their child to participate completed a demographic questionnaire that assessed the following information about themselves and their spouse or partner: age, race, and relationship to child, education level completed, marital status, and income. In addition, the child's age, race, gender, and grade in school were assessed.

Tornado Exposure Questionnaire-Parent Report. Parents completed a brief self-report measure assessing the family's degree of exposure to the tornado. The questionnaire was modified for this study from a similar questionnaire used in previous research with tornado victims (Romero & Sullivan, 1992). It assessed the following information: the family's location during the tornado, the subjective severity of the tornado, the presence and degree of home damage sustained, injuries sustained, the family's current living

situation, whether the child had been separated from relatives, and tornado-related parental unemployment. In addition, whether medical, financial, or clean-up assistance was obtained after the tornado, and whether and what types of psychological services the child or members of the family received after the tornado were assessed. This information was obtained via a multiple-choice format. Furthermore, stressful life events unrelated to the tornadoes occurring since the tornadoes were assessed via an open-ended question, as these may impact a child's posttraumatic stress symptoms as measured by the Reaction Index.

#### Child Forms

Tornado Exposure Questionnaire-Child Report. The child form assessed information pertaining to perceived life threat, life-threatening experiences, and loss-disruption experiences in an age-appropriate format. This questionnaire is similar in content and structure to the Hurricane-Related Traumatic Experiences questionnaire used by Vernberg et al. (1996) in their work with elementary school-age children after Hurricane Andrew.

Frederick Reaction Index (RI; Frederick, Pynoos, & Nader, 1992). The RI is a 20-item self-report measure of PTSD symptoms in children. The original version of the Reaction Index was developed to assess adults for PTSD symptoms using the DSM-III criteria (Frederick, 1985b). The RI was standardized in 750 childhood cases of stressful events; the correlation with established cases of PTSD among children was .91 (Frederick, 1985a). The child version measures the presence and severity of PTSD symptoms using a five-point scale (i.e., none of the time—most of the time). The RI does not measure diagnosable PTSD; rather, it assesses the presence and degree of symptoms including bad dreams, repetitive thoughts, emotional isolation, and somatic complaints in



language modified to facilitate comprehension of the items by children. In a study of children exposed to a tornado, interrater reliability for the RI was .97 and all children rating moderate to severe posttraumatic stress received subsequent diagnoses of PTSD from a psychiatrist (Nader, 1997). The RI is the most commonly used measure of children's PTSD symptoms after disasters (Vogel & Vernberg, 1993), which will facilitate comparison of the present study with the existing disaster literature. The RI was administered at the initial and follow-up assessments.

Kidcope. (Spirito, Stark, & Williams, 1988). The Kidcope is a 15-item checklist developed to assess the frequency of use of different types of coping strategies and the relative effectiveness of each. Five strategies are assessed by two items (Distraction, Social Withdrawal, Problem Solving, Emotional Regulation, and Wishful Thinking), and five are assessed by a single item (Cognitive Restructuring, Self-Criticism, Blaming Others, Social Support, and Resignation). Studies conducted on the reliability of the Kidcope indicated adequate test-retest reliability; correlations ranged from .56 to .75 after an interval of 3 days to .15 to .43 after an interval of 10 days. Validity studies indicate moderate to high correlations (range = .33 to .77) with other coping measures (Spirito et al., 1988). The younger version of the Kidcope is designed for children between the ages of 7 and 12 years. The Kidcope has 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 (e.g., the tornado). The Kidcope was administered at the initial and follow-up assessments.

Natural Disaster Attribution Checklist. The questionnaire method was selected to assess tornado-related attributions. The interview method was considered impractical for the current investigation due to time constraints, and did not appear to add sufficient

information to consider its use. Gong-Guy and Hammen (1980) compared attributions obtained in interviews with dichotomous-scale questionnaire attributions and concluded that there was reasonable correspondence between spontaneously presented causal attributions for personal stressors and subsequent questionnaire attribution scores. Existing attribution assessment methods were inappropriate for the nature of the current investigation; therefore, a brief attribution questionnaire was written and pilot tested with a small sample of children.

Items were constructed to measure dimensions identified in attribution research, including internal or external cause and perceived controllability (Weiner et al., 1982). Additional items assessing meaning of the event were based on those used by Downey et al. (1990). Participating children were given a checklist with questions addressing responsibility for the tornado or bad things that happened during the tornado (internal/external cause; items 1-9), the importance of attributing responsibility (items 10-12), expectations (items 13, 15-16), hypervigilance (items 14 and 17), meaning gathered from the tornado or tornado-related events (items 18-23), and omen formation related to the tornado or tornado-related events (perceived controllability; items 24-27). In addition, the children were asked one open-ended question regarding the cause of the tornado or tornado-related events. Checklist items were rated on a three-point likert scale with corresponding numerical values ranging from 0 – 2 points.

The NDAC yielded scores on five attribution dimensions: Attributions of Responsibility, Importance of Attributing Responsibility, Search for Meaning, Expectations/Hypervigilance, and Omen Formation. Coefficient alpha was calculated to determine internal consistency for this measure because questions have more than two possible responses. The internal consistency coefficient was .5726, lower than the

coefficient alpha of .70 that is generally considered adequate among researchers (McIntire & Miller, 2000). However, the NDAC measures several dimensions; therefore, estimates of internal consistency are likely to be low, and the coefficient alpha was considered acceptable for this study. The NDAC was administered at the initial assessment only.

### Procedure

Packets containing assessment materials and research protocols were provided to the participating schools for review. After approval from school personnel, packets containing an introductory letter describing the study and soliciting participants were sent home to the parents of children enrolled in grades three through six. Packets also contained consent forms for the parent's and the child's participation, the demographic questionnaire, and the Tornado Exposure Questionnaire-Parent Report. Parents were notified that families would be entered into a drawing for \$50.00 as compensation for their participation. Completed packets and parental consent forms were returned to the schools. On the day of data collection at the school, completed parent packets were collected and children with written parental consent were given information about the study and asked for their assent. Those who agreed to participate completed their questionnaires at that time with the assistance of the experimenter and her colleagues. The experimenter read the questionnaires aloud to the children to ensure comprehension. The children followed along with their questionnaires and marked their choices. Colleagues of the experimenter were available to answer any questions the children had. Administration time for the questionnaires was approximately 35 minutes per group. A drawing was held for each school about 3 weeks after data collection and money orders were mailed to the winning families.

The follow-up assessment was conducted in the same manner. Approximately 3 months after the first assessment, the participating schools were contacted to arrange the follow-up assessment. Approximately one month later, a letter describing the follow-up study was sent home with the children who participated in the first assessment. Follow-up packets also contained consent forms for the child's participation. Parents were not required to provide any additional information. Parents were notified that families would again be entered into a drawing for \$50.00 as compensation for their child's participation. Completed parental consent forms were returned to the schools. On the day of data collection at the school, approximately 4 to 5 months after the first assessment, completed consent forms were collected and children with written parental consent were given information about the follow-up study and asked for their assent. Those who agreed to participate completed their questionnaires at that time with the assistance of the experimenter and her colleagues. Administration time for the follow-up questionnaires was approximately 20 minutes per group. A drawing was held for each school about 3 weeks after data collection and money orders were mailed to the winning families.

### Participants

Participants in this study were children in grades three through six and their parents. Participants were solicited from elementary schools in the two school districts that agreed to participate. These districts, Okarche and Hennessey, are located in North Central Oklahoma and were near the path of the most severe tornadoes.

Of approximately 150 families solicited, 68 parents gave permission for their child to participate, resulting in a return rate of 45%, higher than the 25-35% rate reported in previous Oklahoma disaster research (Romero & Sullivan, 1992; Sullivan et al., 1993). Five parents elected not to participate themselves, but gave permission for their children

to participate. Sixteen children who had parental permission were either absent on the day of data collection or chose not to participate. Those parents whose children did not participate were dropped from analyses, resulting in a final sample size of 52 children and 47 parents.

Mothers completed nearly all parent forms (91.5%). Respondents were married in 89.4% of families, and their spouse was the child's biological parent in 74.4% of families. Participating parents ranged in age from 26 to 53 years ( $M = 37.13$ ,  $SD = 5.99$ ); their spouses ranged in age from 24 to 55 years ( $M = 38.93$ ,  $SD = 6.28$ ). The majority of the parent sample was Caucasian (93.6% of respondents, 90.9% of spouses). Education level varied widely for the reporting parents, ranging from a third grade education to post-graduate study. The mean education level was 13.23 ( $SD = 2.51$ ), which is equivalent to a high school diploma and one year of college coursework. The spouses' education level ranged from third grade to college graduate, with a mean education level of 12.52 ( $SD = 2.57$ ), which is equivalent to a high school diploma and less than one year of college coursework. The majority of families reported an income level of over \$2,001 per month (65.9%); 26.8% reported an income of \$1,001 to \$2,000, while 7.3% reported an income of less than \$1,000.

Several variables were recategorized to more accurately reflect the distribution of the data. Parent, spouse, and child race were collapsed into "Caucasian" or "Other" due to the absence of African- or Asian-Americans and the small number of Hispanic/Latinos (4.3% of parents, 9.1% of spouses, and 4.3% of children) and American Indians (2.1% of parents, 0% of spouses, 2.1% of children) in the sample. Respondent relationship to child was collapsed into "Mother" or "Other" due to the small number of fathers (6.4%) or others (2.1%) in the sample. The spouses who were stepparents (23.3%) or adoptive

parents (2.3%) of the participating child were combined into “Other.” Marital status was collapsed into “Married” or “Other,” which included the few respondents who were divorced (6.4%), single (2.1%), or living with a partner (2.1%). Family income was recategorized from six to three response options due to the small number of respondents in five of the categories. Less than \$800 (2.4%) and \$800 to \$1,000 (4.9%) were collapsed into “less than \$1,000”; \$1,001 to \$1,500 (19.5%) and \$1,501 to \$2,000 (7.3%) were collapsed into “\$1,001 to \$2,000”; and \$2,001 to \$2,500 (17.1%) and over \$2,501 (48.8) were collapsed into “over \$2,001 per month.”

Participating children were in grades three through six and ranged in age from 8 to 12 years, with a mean age of 9.11 years ( $SD = .96$ ). Of the 52 children in the sample, only six children were in grades five or six. Seventeen children were male and 30 were female. Like their parents, the children were predominantly Caucasian (91.5%).

---

## CHAPTER V

### RESULTS

#### Time 1

##### Tornado Exposure Questionnaire-Parent Report (TEQ-PR)

The level of tornado exposure was low for most participating families. Parents reported no damage to their homes (80.3%) or relatively minor damage (19.7% reported home damage of 10% or 30%). Eight families reported being forced out of their home due to tornado damage for one week or less; two were reportedly out of their homes for longer than 6 months. Most families were living in the same home, having suffered no damage (79.5%); 13.6% of families repaired the damage to their homes, and 6.8% lived in a new home. No parent reported unemployment resulting from the tornadoes.

Parents reported that at the time of the tornadoes, their children were home (54.3%), at school or a friend or relative's home (17.4%), in a storm shelter (26.1%), or elsewhere (2.2%). The parents themselves reported being at home (58.7%), at school or at a friend or relative's home (15.2%), in a storm shelter (19.6%), or elsewhere (6.5%). The majority of parents reported no damage at their child's location during the tornado (60.9%), while others reported little damage (21.7%), moderate damage (13%), or total destruction (4.3%). No parents reported injury to themselves or their child during the tornadoes, although one child reportedly witnessed an injury to another person. Over 91% of parents reported that they did not think they might die during the tornadoes. Parents' perceptions of the severity of the tornadoes varied, with 53.4% of parents of the opinion that the tornadoes were very severe or catastrophic. The remaining parents were evenly split between mild, moderate, and severe levels (See Table 1). Most parents (60%) reported that their child was "somewhat scared" during the tornadoes and half

(50%) reported that their child had been “somewhat scared” since the tornadoes (See Table 2). No parent reported being separated from his/her child during or after the tornadoes.

The majority of families did not receive any services after the tornadoes. One family reported receiving financial assistance, medical assistance, and clean-up assistance after the tornado. One family reported that their child and another family member received individual psychological counseling after the tornadoes. No other family reported receiving any other mental health services or tornado-related assistance. Eight families reported experiencing unrelated stressful events since the tornado.

Analyses were conducted to determine whether families whose child had permission but did not participate differed from those whose child did participate. A significant difference in the child’s fear during the tornadoes was noted. Significantly more parents of nonparticipating children reported that their child was “Not scared at all” or “Scared” during the tornadoes, while significantly more parents of participating children reported that their child was “Somewhat scared” during the tornadoes. The families did not differ significantly on any other variable.

#### Tornado Exposure Questionnaire-Child Report (TEQ-CR)

Participating children completed a child version of the Tornado Exposure Questionnaire (TEQ-CR), several items of which overlap with the parent version. Chi-square analyses were conducted to determine consistency between child and parent reports of the child’s location during the tornado, the child’s fear during the tornado, and the amount of home damage. The child’s location during the tornado category was collapsed to match the parent version. There was some disagreement between parents and children regarding the child’s location during the tornadoes,  $\chi^2(9, N = 46) =$



22.177,  $p < .05$ ; responses were somewhat different with no consistent pattern. Chi-square analyses indicated a significant difference between parent and child report of the child's fear during the tornadoes,  $\chi^2(12, N = 45) = 23.645, p < .05$ . Some parents overestimated their child's fear, while other parents underestimated it. Again, there was no consistent pattern to the differences in responses.

Dichotomous items on the TEQ-CR were assigned a value of one point for each "yes" answer and zero points for each "no" answer and summed to achieve the child's total self-reported exposure score. For example, if a child endorsed "yes" to the question, "Did you get hurt during the tornado?" one point would be added toward that child's total exposure score. Exposure scores ranged from a minimum of 0 to a maximum of 15. The majority of children (61.5%) received a total exposure score of 0. The remaining children received scores of one (21.2%), two (1.9%), three (5.8%), four (7.7%), or six (1.9%). Three children endorsed broken windows at their location. One child reported being injured during the tornadoes, being hit by flying debris, and witnessing an injury to another. Two other children who reported witnessing injuries to others and a third child who did not witness injuries all reported having to go outside because their building was damaged. Four children endorsed damage to his or her home; one child had to move to a new home and one child's pet was killed because of the tornadoes. Another child reported that a pet was hurt or killed, one child reported that a pet ran away or had to be given away, and one child reported both. Four children who did not endorse home damage reported damage to toys or clothes as a result of the tornadoes. Six children reported having difficulty seeing friends after the tornadoes and four reported having difficulty getting food or water. No child reported having to move to a new school or being separated from his or her parents as a result of the tornadoes.

The exposure scores derived from the TEQ-CR were compared with scores derived in a similar manner from dichotomous items on the TEQ-PR. Parent report items were also assigned a value of one point for each “yes” answer and zero points for each “no” answer and summed to achieve a parent-reported exposure score for each child. The parent-derived exposure score and the child-derived exposure score were not significantly related, which may be explained by the relatively low number of overlapping items on the TEQ parent and child versions,  $r(46) = .089, p > .05$ .

#### Reaction Index (RI)

The average RI total score at the first assessment was 29.31 ( $SD = 14.35$ ), with scores ranging from 5 to 60 on this measure, which has a range of possible scores from 0 to 80 (See Table 3). According to their self-reports, 3 children experienced no symptoms of PTSD, 21 experienced mild PTSD symptoms, 14 experienced moderate PTSD symptoms, 13 experienced severe PTSD symptoms, and 1 experienced very severe PTSD symptoms.

#### Kidcope

The mean number of coping strategies endorsed was 4.75 ( $SD = 2.47$ ). Group mean frequency scores were computed for each of the 10 strategies on this scale in order to determine which coping strategies children reported using most often after the tornadoes. In addition, group mean efficacy scores were computed for each of the strategies to determine how effective the children believed the strategies had been. These data are presented in Tables 4 and 5. Visual inspection of the means indicated that children reportedly used distraction, wishful thinking, and cognitive restructuring most often. Blaming others and self-criticism were reportedly used least often. Wishful thinking, social support, and emotional regulation were given the highest efficacy ratings of the

strategies measured, while blaming others, self-criticism, and resignation were given the lowest ratings.

#### Natural Disaster Attribution Checklist (NDAC)

The average NDAC total score at the first assessment was 14.02 ( $SD = 9.29$ ), with scores ranging from 2 to 46 on this measure, which has a range of possible scores from 0 to 48. The NDAC has five scales, two of which are further divided into subscales. The Attributions of Responsibility scale has a range of 0 to 18; the mean score was 4.17 ( $SD = 3.19$ ). This scale is comprised of four subscales: Self-blame, which ranges from 0 to 8 ( $M = 1.54$ ,  $SD = 1.9$ ); Other-blame (range = 0-4,  $M = .48$ ,  $SD = .85$ ); God-blame (range = 0-4,  $M = 1.17$ ,  $SD = 1.00$ ); and No-blame (range = 0-2,  $M = .98$ ,  $SD = .98$ ). The Importance of Attributing Responsibility scale has a range of 0 to 6; the mean score was .94 ( $SD = 1.30$ ). The Expectations/Hypervigilance Scale ranges from 0 to 10 ( $M = 4.37$ ,  $SD = 3.09$ ). The Expectations subscale ranges from 0 to 6 ( $M = 2.5$ ,  $SD = 1.96$ ), while the Hypervigilance subscale ranges from 0 to 4 ( $M = 1.87$ ,  $SD = 1.37$ ). The Search for Meaning scale ranges from 0 to 10 ( $M = 3.08$ ,  $SD = 2.96$ ), and Omen Formation ranges from 0 to 4 ( $M = 1.46$ ,  $SD = 1.24$ ). Visual inspection of the means suggests that while some children did seek causal explanations for the damage and disruption of the tornadoes, they did not place high importance on doing so. Furthermore, the highest elevations were on the Expectations and Hypervigilance subscales, which were expected, given Oklahoma's location in "Tornado Alley."

#### Relationship between Posttraumatic Distress and Coping

To test the hypothesis that there is a relationship between the number and type of coping strategies employed and the degree of posttraumatic stress symptomatology, two analyses were conducted. First, a Pearson product-moment correlation coefficient for

symptom severity scores on the RI and number of coping strategies endorsed on the Kidcope was calculated. There was a significant relationship between the number of strategies endorsed and RI score,  $r(52) = .635, p < .05$ . Further analyses revealed that children classified as experiencing no or mild posttraumatic distress endorsed a mean of 3.42 coping strategies ( $SD = 2.45$ ), while children categorized as experiencing moderate to very severe distress endorsed a mean of 5.89 coping strategies ( $SD = 1.87$ ). This difference was significant,  $t(50) = 4.128, p < .05$ . Results indicate that children with higher posttraumatic distress scores employed a greater number of coping strategies than children with lower posttraumatic distress scores.

Second, a Pearson product-moment correlation coefficient was calculated for symptom severity scores on the RI and efficacy scale scores on the Kidcope. It was predicted that children with higher posttraumatic distress scores would consider the coping strategies they employed as generally ineffective; therefore, it was predicted that mean efficacy ratings across all coping strategies endorsed by each child would be significantly negatively related to their RI scores. This hypothesis was not supported by the data. A mean efficacy rating was calculated for each child from the efficacy ratings given to each of the ten coping strategies. The mean rating ranged from 0 (did not help at all) to 2 (helped a lot). The relationship between mean efficacy rating and RI score was not significant,  $r(52) = .065, p > .05$ . Moreover, there was no significant difference in efficacy ratings between children classified as experiencing no or mild posttraumatic distress ( $M = 1.41, SD = .4413$ ) and children categorized as experiencing moderate to very severe distress ( $M = 1.44, SD = .4397$ ),  $t(45) = .191, p > .05$ . Mean efficacy ratings were also calculated for each coping strategy. There was no significant relationship between RI score and mean efficacy ratings for any of the 10 coping strategies measured.

Frequency scores for each coping strategy on the Kidcope were compared with RI scores to determine whether a relationship existed between the severity of PTSD symptoms and the use of particular coping strategies. Significant relationships were found between RI score and the use of distraction, cognitive restructuring, problem solving, emotional regulation, wishful thinking, and social support; however, after Bonferroni correction for familywise error was made, cognitive restructuring and social support were no longer significant ( $p > .005$ ; See Table 6 for correlation coefficients). Due to the many correlations computed and the interrelationships between Kidcope strategies, Bonferroni corrections were employed as a more conservative approach to calculating statistical significance. Results indicate that children who reported greater distress after the tornadoes used distraction, problem solving, emotional regulation, and wishful thinking more frequently than children who reported less distress. There was no significant relationship between RI score and the use of social withdrawal, self-criticism, blaming others, or resignation. With the exception of social withdrawal, very few children endorsed these strategies; therefore, the sample size may not have been sufficient to detect a relationship with reported distress.

#### Relationship between Posttraumatic Distress and Attributions

In order to test the hypothesis that there would be a relationship between attributions and severity of posttraumatic stress symptomatology, Pearson product-moment correlation coefficients were calculated using overall symptom severity scores on the RI and scale scores on the NDAC. Significant correlations were found between RI score and all five scales on the NDAC; all correlations remained significant after Bonferroni corrections were made ( $p < .001$ ). Further correlational analyses indicated significant relationships between RI score and the Self-blame and Other-blame subscales of the

Attributing Responsibility scale (See Table 7 for correlation coefficients). These results supported the hypothesis and indicated that children with higher posttraumatic distress scores made more attributions of responsibility for negative events that resulted from the tornado, were more concerned with making attributions and finding meaning in the negative events, had higher expectations of a tornado recurrence, were more watchful for signs that a tornado might occur, and experienced more omen formation compared to children with less severe symptoms.

#### Relationship between Posttraumatic Distress and Exposure

Correlational analyses were conducted to examine the relationship between degree of PTSD symptom severity and parent reports of child fear during and since the tornadoes. The correlations between the child's total RI score and parent-reported child fear during and since the tornado were nonsignificant,  $r(45) = .185, p > .05$  and  $r(46) = .227, p > .05$ , respectively. There was a significant relationship between total RI score and child self-reported fear during the tornado,  $r(52) = .477, p < .05$ . Child self-reported fear during the tornado was not significantly related to parent-reported child fear during or since the tornado. These results suggest that children were better informants than parents regarding the degree of fear they experienced, as parents were likely to over- or underestimate the fearfulness of their child.

There was a significant relationship between total RI score and degree of child-reported tornado exposure as measured by the exposure items on the TEQ-CR,  $r(52) = .566, p < .05$ . However, there was no significant relationship between the child's total RI score and degree of parent-reported tornado exposure as measured by the exposure items on the TEQ-PR,  $r(45) = .089, p > .05$ . As previously stated, there are few overlapping items on the two versions of the TEQ. Additionally, the child version assesses details

that may be more salient to children than parents (e.g., hard to see friends, clothes or toys ruined); therefore, the child version may be a more accurate indicator of the child's perception of tornado exposure than is the parent version, which provides a more objective measure of exposure. The significant relationship between RI score and child-reported exposure suggests that the child's perception of exposure may have a stronger relationship to fear than actual exposure.

It was predicted that children experiencing ongoing trauma (e.g., death of a family member, serious injury to self or family member, or the destruction of their home) would have significantly higher posttraumatic distress scores than children who experienced trauma of fixed duration (e.g., home or school damage that has been repaired). The sample of participants who experienced ongoing trauma was too small to provide an adequate test of this hypothesis.

It was predicted that the severity of posttraumatic distress symptoms would differ between children who received postdisaster psychological services and children who received no services. Only one participant endorsed having a child or family member who received postdisaster psychological services; therefore, this hypothesis could not be tested with this sample.

Eight parents reported experiencing stressful events unrelated to the tornadoes during the time between the tornadoes and the first assessment. An independent samples *t*-test indicated that there were no significant differences in RI scores between children who had and had not experienced stressful life events unrelated to the tornado,  $t(44) = -.515$ ,  $p > .05$ .

### Relationship between Coping and Attributions

Pearson product-moment correlation coefficients were calculated using the frequency scale scores for each of the ten coping strategies on the Kidcope and the scale scores on the NDAC to examine the relationship between the types of coping strategies employed and the presence of attributions (See Table 7 for correlation coefficients). Several significant correlations were found prior to Bonferroni corrections; after corrections, only three correlation coefficients remained significant ( $p < .001$ ), whereas several others approached significance ( $p < .005$ ). The strongest relationship was between Expectation/Hypervigilance and problem solving,  $r(52) = .572, p < .001$ , indicating that as children's anticipation of future tornadoes increased, they were more likely to use problem solving as a coping strategy. Also strong was the relationship between Search for Meaning and emotional regulation,  $r(52) = .525, p < .001$ . Perhaps finding meaning in the negative events helped these children to better handle their emotions, or conversely, those with a need for emotional control spent more time searching for meaning.

### Regression Analyses: Coping Strategy Use, Attributions, and Prediction of Posttraumatic Distress

Exploratory regression analyses were conducted to determine the variance in posttraumatic distress that could be attributed to coping strategies and attributions. Due to the small sample size, any conclusions from these analyses are tentative and are reported here as suggested areas for future research.

A stepwise multiple regression analysis was used to examine the relationships between use of coping strategies, presence and importance of attributions, and degree of posttraumatic distress, as measured by the RI total score. The NDAC



Expectations/Hypervigilance score alone explained 53.3% of the variance in RI score from the first assessment. Attributing Responsibility was added on step 2. It was found that making attributions of responsibility accounted for an additional 5.6% of the variance. Use of distraction and self-criticism explained an additional 9.1% of the variance, resulting in a total of 68% for those four variables (See Table 9). Exposure, frequency of use of other coping strategies, importance of making attributions, searching for meaning, or omen formation did not contribute significantly to the prediction of posttraumatic distress. This suggests that a child's expectations of tornado recurrence and hypervigilance for signs of recurrence may be the best predictors of a child's level of distress following a tornado.

The exploratory nature of these analyses precludes any conclusions about the direction of causal relationships. Any inferences based on analyses of the current data are put forth as possible interpretations of the data and as suggestions for areas of future research. These analyses should not be considered indicative of causal relationships.

### Time 2

Little evidence exists regarding the long-term implications of experiencing natural disaster trauma; follow-up data seldom extend beyond 1 year and do not address possible seasonal changes associated with weather-related disasters or traumas. Therefore, additional descriptive information from this study was analyzed for exploratory purposes as warranted by the data obtained.

### Participants

Of the 52 children who participated in the first assessment, 28 children participated in the follow-up assessment, resulting in a return rate of approximately 54% of the original respondents and approximately 19% of the whole sample solicited. Demographic data

provided at the first assessment were reanalyzed to determine if those families whose child did not return for the follow-up assessment differed from those families whose child completed both assessments. Independent samples  $t$ -tests were conducted comparing parents on the basis of respondent age and education, spouse age and education, and child age. No significant differences were found. Chi-square analyses were conducted to determine if there were differences between families on other demographic and TEQ-PR variables. A significant difference was noted in respondent's relationship to child,  $\chi^2(1, N = 28) = 6.443, p < .05$ . Mothers were the respondents for all children who returned for the follow-up assessment. No other differences were found between the two samples on demographic or TEQ-PR data. Furthermore, there was no significant difference in mean exposure scores derived from the TEQ-CR for children who did and did not complete the follow-up assessment ( $M = .71, SD = 1.24$  and  $M = 1.00, SD = 1.64$ , respectively),  $t(50) = .713, p > .05$ .

#### Reaction Index

The mean RI score (obtained at the first assessment) for the sample that did not complete the follow-up assessment was 29.58 ( $SD = 15.80$ ), while the mean RI score (obtained at the first assessment) for the sample who did return for follow-up was 29.07 ( $SD = 13.29$ ). An independent samples  $t$ -test indicated that there was no significant difference in RI scores between the two groups,  $t(50) = .127, p > .05$ . As mentioned previously, the mean RI score at the first assessment was 29.31 ( $SD = 14.35$ ). This indicates that the participants who completed the follow-up assessment were similar in RI scores to the total sample at Time 1 and were not significantly different from the participants who did not complete the follow-up assessment.

Additional analyses were conducted to determine whether other, subtler differences

existed between the follow-up group and the total Time 1 group. Correlational analyses were conducted to examine the relationship between the severity of PTSD symptoms assessed by the RI at follow-up and the following variables assessed at Time 1: parent-reported child fear during the tornadoes, parent-reported child fear since the tornadoes, child self-reported exposure, and child self-reported fear during the tornadoes. At Time 1, only child-reported exposure and fear had any significant relationship with RI scores. Consistent with the first assessment, child self-reported fear during the tornado was significantly related to RI score at follow-up,  $r(28) = .442, p < .05$ . However, the relationship between child-reported exposure and follow-up RI score was not significant,  $r(28) = .332, p > .05$ , nor was the relationship between parent-reported child fear during the tornado and follow-up RI score,  $r(27) = .333, p < .091$ .

Only one significant difference between the follow-up group and the total sample at Time 1 was noted. At follow-up, there was a significant relationship between parent-reported child fear since the tornadoes and second RI score,  $r(28) = .510, p < .05$ . For the participants who completed the second assessment only, there was a significant relationship between parent-reported child fear since the tornado and Time 1 RI score,  $r(28) = .481, p < .05$ . This implies that parents who allowed their child to participate in the follow-up assessment were more accurate judges of their child's level of fear since the tornado than were parents who did not allow their child to participate in the follow-up, which may have influenced their willingness to allow participation at Time 2.

Overall, the follow-up sample is comparable to the total Time 1 sample. It is possible that intervening factors unrelated to the tornadoes had an impact on Time 2 RI scores; however, the occurrence of stressful events between the first and second assessments was not assessed. Therefore, it is unclear the extent to which distress at follow-up might have

been affected by unidentified factors.

The mean RI score at the second assessment was 28.64 ( $SD = 15.35$ ), with scores ranging from 0 to 54 (See Table 5). There was a significant relationship between the first and second RI scores,  $r(28) = .849, p < .01$ . According to their self-reports at the second assessment, 3 children experienced no symptoms of PTSD, 10 experienced mild PTSD symptoms, 7 experienced moderate PTSD symptoms, 8 experienced severe PTSD symptoms, and none experienced a very severe level of PTSD symptoms. There was no significant difference between RI scores obtained at the first and second assessments,  $t(27) = .280, p > .05$ . Overall, there was no significant difference or change in RI scores from Time 1 to Time 2.

#### Kidcope

Group mean frequency scores were again computed for each of the 10 strategies to determine which coping strategies children reported using most frequently at follow-up. Additionally, group mean efficacy scores were computed for each of the strategies to determine how effective the children believed the strategies had been (See Tables 4 and 5). Consistent with the original data, visual inspection of the means indicated that distraction, wishful thinking, and cognitive restructuring were reportedly used most often. Once again, blaming others and self-criticism were reportedly used least often. Social support, problem solving, and distraction were given the highest efficacy ratings of the strategies measured (with the exception of self-criticism, the rating of which was based on only 4 respondents). Resignation, social withdrawal, and blaming others had the lowest efficacy ratings.

Chi-square analyses were conducted to determine whether there were any significant differences in the coping strategies employed from Time 1 to Time 2. Distraction,

blaming others, wishful thinking, and social support were the only coping strategies that demonstrated a relationship from Time 1 to Time 2. Those children who used distraction, wishful thinking, and social support at Time 1 continued to do so at Time 2, while those children who did not use blaming others at Time 1 did not do so at Time 2. There was significantly more variability in the use of the other coping strategies, with less consistency in endorsements from Time 1 to Time 2 (See Table 4).

#### Relationship between Posttraumatic Distress and Coping at Follow-up

In order to determine whether there was a relationship between the number of coping strategies employed and degree of posttraumatic distress symptomatology at follow-up, a Pearson product-moment correlation coefficient was calculated for symptom severity scores on the RI and number of coping strategies endorsed on the Kidcope at follow-up. The mean number of coping strategies endorsed was 5.54 ( $SD = 1.82$ ). Consistent with the first study, there was a significant relationship between the number of strategies endorsed and RI score,  $r(28) = .635, p < .05$ . Further analyses revealed that children classified as experiencing no or mild posttraumatic distress at follow-up endorsed a mean of 4.69 coping strategies ( $SD = 1.97$ ), while children categorized as experiencing moderate to very severe distress at follow-up endorsed a mean of 6.27 coping strategies ( $SD = 1.33$ ). This difference was significant,  $t(26) = 2.502, p < .05$ . Results indicated that at follow-up, children with higher posttraumatic stress symptom scores continued to employ a greater number of coping strategies than did children with lower posttraumatic stress symptom scores.

Frequency scores were compared with RI scores to determine whether a relationship existed between the severity of distress symptoms and the use of particular coping strategies at follow-up. Consistent with the first assessment, significant relationships

were found between RI scores and the use of distraction, emotional regulation, and wishful thinking (See Table 6 for correlation coefficients). In addition, a significant relationship was also found between RI score and self-criticism; however, after a Bonferroni correction was made, none of these coefficients remained significant. The relationships between RI score and cognitive restructuring, problem solving, and social supports found at Time 1 were no longer significant at follow-up. Again, there was no significant relationship between RI score and the use of social withdrawal, blaming others, or resignation, indicating that level of posttraumatic distress was unrelated to use of these strategies.

Mean efficacy ratings were calculated for each child from the efficacy ratings given to each of the 10 coping strategies at follow-up. Consistent with Time 1 analysis, the relationship between mean efficacy rating and RI score was not significant,  $r(28) = .158$ ,  $p > .05$ . Mean efficacy ratings were also calculated for each coping strategy; there were no significant relationships between RI scores and mean efficacy ratings for any of the coping strategies measured.

Exploratory analyses were conducted to determine whether differences in use or efficacy of coping strategies could be identified for children whose RI scores stayed the same, increased, or decreased from Time 1 to Time 2. Seven children demonstrated a decrease in RI scores greater than five points, nine children demonstrated an increase of five points or more, and 12 children remained within five points of their first score. Analyses with the Kidcope indicated that there was a significant relationship between use of social support as a coping strategy and change in RI score,  $\chi^2(2, N = 28) = 6.028$ ,  $p < .05$ , with greater use of social support among children whose scores did not change and less use of social support among children whose scores increased five points or more

from Time 1 to Time 2. The difference in the use of wishful thinking between children whose RI scores increased five points or more and children whose scores decreased five points or more approached significance,  $\chi^2 (1, N = 16) = 4.747, p = .063$ . The groups did not differ in mean number of coping strategies employed,  $F (2, 25) = 2.464, p > .05$  (no change group  $M = 6.00, SD = 1.65$ ; decrease group  $M = 4.29, SD = 2.43$ ; increase group  $M = 5.89, SD = 1.82$ ).

Further exploratory analyses were conducted to determine whether any differences existed in efficacy ratings for children whose RI scores increased versus children whose RI scores decreased. The difference between groups approached significance for the efficacy of wishful thinking,  $t (11) = 2.309, p = .05$ , with the decreasing group endorsing it as more helpful than the increasing group did (Mean efficacy rating of 2.0 versus 1.33). Overall mean efficacy ratings did not differ between the increasing and decreasing groups ( $M = 1.05$  and  $1.02, SD = .456$  and  $.195$ , respectively). However, the mean efficacy rating for the no change group was 1.428 ( $SD = .337$ ) and a one-way ANOVA identified a significant difference in mean efficacy ratings between the three groups,  $F (2, 24) = 3.777, p < .05$ .

#### Relationship between Changes in Posttraumatic Distress and Other Variables

For children whose RI scores changed from Time 1 to Time 2, the relationship between parent-reported fear since the tornadoes and second RI score was strengthened,  $r (16) = .692, p < .01$ . A one-way ANOVA revealed a significant difference in parent-reported fear since the tornadoes between the no change, increase, and decrease groups,  $F (2, 25) = 4.819, p < .05$ . Post hoc analyses (Tukey HSD test) indicated that the children whose scores decreased ( $M = .57, SD = .53$ ) were significantly lower than those whose score did not change ( $M = 2.0, SD = 1.28$ ), demonstrating that parents of children whose

RI scores decreased rated their child as less fearful since the tornadoes than did parents of children whose scores remained constant. Children whose scores increased ( $\underline{M} = 1.33$ ,  $\underline{SD} = .71$ ) did not significantly differ from either group.

The differences between the groups in parent-reported fear during the tornadoes approached significance,  $\underline{F} (2, 24) = 3.391$ ,  $p < .051$ . A Tukey HSD test revealed a significant difference between children whose RI scores decreased ( $\underline{M} = 1.0$ ,  $\underline{SD} = .00$ ) and children whose scores remained the same ( $\underline{M} = 2.17$ ,  $\underline{SD} = 1.19$ ), demonstrating that parents of children whose scores decreased again rated their child as less fearful than did parents of children whose scores remained constant. Children whose scores increased ( $\underline{M} = 1.63$ ,  $\underline{SD} = .92$ ) did not significantly differ from either group. Differences in exposure and child report of fear during the tornadoes remained nonsignificant for all groups.

On the NDAC, independent samples t-tests revealed that children whose RI scores increased endorsed Search for Meaning as significantly more important than children whose RI scores decreased,  $t (14) = -.2534$ ,  $p < .05$ ; however, this difference was no longer significant when the no change group was included in a one-way ANOVA,  $\underline{F} (2, 25) = 2.560$ ,  $p > .05$ . Visual inspection of the means indicated that children whose RI scores increased or remained constant also had higher expectations for recurrence and were more hypervigilant, although these differences failed to reach significance.

#### Relationship between Posttraumatic Distress and Time of Assessment

To test the hypothesis that scores of posttraumatic distress symptomatology would be increased for the majority of children during tornado season assessment compared to non-tornado season assessment, a single-factor within-subjects ANOVA was conducted. Time of assessment was considered the independent variable; RI scores were considered the dependent variable. It was predicted that a significant relationship would exist



between the time of assessment and the severity of posttraumatic stress symptoms; however, this prediction was not supported,  $F(1, 27) = .078, p > .05$ . Visual inspection of the RI scores indicates that while some children's scores increased, other children's scores decreased; the scores for the majority of the sample, however, remained at approximately the same symptom level.

The second hypothesis in this study stated that there would be differences in RI scores between children identified at Time 1 as having posttraumatic distress compared to children who were identified at Time 1 as not having posttraumatic distress. To test this hypothesis, a 2 (group) X 2 (time) mixed-design ANOVA was conducted. An interaction was predicted, with children who were identified at Time 1 as experiencing moderate, severe, and very severe levels of posttraumatic stress symptoms (as indicated by scores on the RI; Group 1) having greater increases in posttraumatic stress scores at Time 2 than children identified at Time 1 as experiencing no or mild symptoms (Group 2). Analyses revealed no main effect for time of assessment,  $F(1, 26) = .103, p > .05$ . There was a significant main effect for group, as was expected,  $F(1, 26) = 244.980, p < .05$ , with higher scores in Group 1. There was no significant interaction between group and time,  $F(1, 26) = .061, p < .05$ . Although the two groups differed in degree of posttraumatic distress symptoms at the time of the first assessment, there was no difference between groups in the amount of change in symptoms over time.

#### Regression Analyses: Coping Strategy Use and Prediction of Posttraumatic Distress at Follow-up

Regression analyses were conducted with follow-up data to determine the variance in posttraumatic distress that could be attributed to the use of specific coping strategies. Sample size was much smaller at follow-up than at the first assessment; therefore, these

results are strictly exploratory. Furthermore, no conclusions regarding causal relationships can be made based on the current data. The results presented here are interpreted in light of the existing research in this area and are not sufficient to identify causality.

A stepwise multiple regression analysis was used to examine the relationship between use of coping strategies and degree of posttraumatic distress, as measured by the total RI score at follow-up. Use of distraction explained 22.4% of the variance in follow-up RI scores and social support explained an additional 18.2%, for a combined total of 40.6% of the variance in follow-up RI score. None of the other coping strategies measured in the Kidcope contributed significantly to the prediction of RI scores at follow-up. An additional stepwise regression analysis examined the contribution of RI score and NDAC collected at the first assessment to RI score at follow-up. First RI score explained 71.1% of the variance in follow-up RI score, which is consistent with the strong correlation between the two scores. The NDAC scale Search for Meaning explained an additional 5.4% of the variance. No other NDAC scales contributed significantly to the prediction of RI scores at follow-up (See Table 10).

## CHAPTER VI

### DISCUSSION

The present study was designed to assess posttraumatic distress, attributions, and coping in school-age children exposed to a series of tornadoes that devastated Central Oklahoma on May 3, 1999. The study had two primary purposes. The first purpose of the study was to examine the possibility that children in tornado-affected areas may have elevated levels of posttraumatic distress as a function of the types of coping strategies they used and the types of tornado-related attributions they made. The second purpose was to examine possible seasonal influences on posttraumatic distress. This study also provided additional long-term follow-up data on distress and coping. The follow-up assessment was conducted shortly before the second anniversary of the May 3 tornadoes, a time of year when threats of a recurrence are frequent. Longitudinal studies of posttraumatic distress typically report a decline in symptom levels; however, the possibility that levels might increase with the onset of disaster season has been largely ignored.

#### Interpretations of Results

Prior to examining distress, attributions, and coping, parent and child data were compared to gain a more complete understanding of the family's experiences during and in the aftermath of the tornadoes. Parents and children were asked about their experiences via self-report questionnaires. The data demonstrated only moderate correspondence between parent and child report on several items, most notably the degree of child fear during the tornadoes. Analyses indicated a significant difference between parent and child report on this item, suggesting that some parents incorrectly estimated their child's degree of fear. In fact, the parent's report of child fear during the

tornadoes was not significantly related to the child's report of his or her own fear during the tornadoes, nor was it significantly related to the child's report of distress at either Time 1 or Time 2. Furthermore, at Time 1, only the child's report of his or her own fear demonstrated any significant relationship with distress. Parent report of child fear since the tornadoes, which was not significantly related to RI score at Time 1, was significantly related to RI score at Time 2. For those participants who returned for the follow-up, parent report of fear since the tornadoes was also significantly related to RI score at Time 1. Perhaps parents' willingness to allow their child to participate at both times was influenced by their awareness of their child's level of distress. Greater awareness of their child's reaction to the tornadoes may have predisposed some parents to allow participation in both assessments, which may explain the stronger relationship between RI score and parent-reported fear since the tornadoes for those participants. This speculation cannot be tested, as analyses on the data obtained indicated that the follow-up sample did not differ from the participants who did not complete follow-up.

Tornado exposure was assessed via parent and child reports of types of damage and disruption common to tornado victims, and again, discrepancies were found between parent and child reports. For example, three children reportedly witnessed an injury to another person, while only one parent reported that their child witnessed an injury. Four children reported damage to their homes, whereas 10 parents reported home damage. There was also some disagreement between parents and children regarding the child's location during the tornadoes. There was no consistent pattern to the discrepancies between parent and child reports; however, 18 to 19 months had passed since the tornadoes at the time of the initial assessment, which is likely to have affected the accuracy of the reports.

One might theorize that differences in parent and child reports of tornado exposure were also influenced by perceived versus actual threat. Child self-report of tornado exposure was significantly related to RI score, whereas parent report of tornado exposure was not. Children's reports of distress may have been a function of how threatening they believed the tornadoes to have been, rather than to how damaging they actually were. When a tornado has been spotted anywhere in Oklahoma, regular television programming is interrupted for extended periods of time to broadcast information about the tornado, which may be a safe distance away from the viewer. Whereas parents may have an accurate understanding of the danger, children may not, and their fears may be exacerbated by television coverage. Furthermore, children's perception of threat may be increased by the hours of threatening or inclement weather that often lead up to the formation of tornadoes. Although parents who are native to Oklahoma or surrounding states are likely to be accustomed to threatening storms, children may see them as more novel and frightening. Thus, the child's perception of tornado threat may be more directly related to distress than is actual or parent-reported exposure. This result is consistent with Lonigan et al. (1994), who found that children's reports of negative emotions after a hurricane were more strongly associated with severe posttraumatic distress than were any exposure factors.

Other factors may account for the discrepancies between parent and child report of exposure. Perhaps children perceive the loss of personal property or disruption to daily routine as more severe or traumatizing than parents do. Parents may focus more on actual damage estimates and rebuilding, placing less emphasis on the loss of individual items. Perhaps the lack of equivalence between the parent- and child-report questionnaires precludes any comparison of exposure scores derived from the two

distinct measures. In their respective questionnaires, parents and children were each asked to respond to items believed to be most salient to their group, which resulted in little overlap in items between the two measures. The different forms used to measure tornado exposure may explain the lack of correspondence between parent and child exposure scores.

Discrepancies between parent- and child-report are consistent with the literature. Parents have been found to deny that their child is experiencing distress (Burke et al., 1982) or to report significantly less distress for their child than their child self-reported (Sullivan et al., 1993). Vernberg and his colleagues (1996) found that some children do not share their distress with their parents so as not to upset them. Natural disasters impact entire families, so a parent's own distress level may influence judgments of his or her child's distress level. McFarlane (1987) found that parents who experienced high levels of distress were more likely to have children who experienced high levels of distress, but this conclusion was based on parent and teacher reports. Parents may have difficulty admitting the extent of their child's distress or may feel responsible for ameliorating it. An individual's report of the internal state of another individual is subject to bias and misinterpretation, thus providing further support for the use of self-reports. The correspondence between child report of fear and RI score for the present study implies that children are able to provide consistent and important information about their emotional states that is not available by any other assessment method. Despite the warning of Shannon et al. (1994) that some children might exaggerate their responses, child self-report remains a valuable assessment tool.

A goal of this study was to test the hypothesis that scores of posttraumatic distress symptoms would be subject to seasonal influence, with an increase in scores predicted for

the majority of children during tornado season assessment compared to non-tornado season assessment. This hypothesis was not supported by the data. According to their self-reports, 5.7% (10.7% at Time 2) children experienced no symptoms of PTSD, 40.3% (35.7% at Time 2) experienced mild PTSD symptoms, 27% (25% at Time 2) experienced moderate PTSD symptoms, 25% (28.6% at Time 2) experienced severe PTSD symptoms, and 2% (0% at Time 2) experienced a very severe level of PTSD symptoms.

Furthermore, it was predicted that children identified at Time 1 as having moderate to severe posttraumatic distress symptoms would have greater increases in posttraumatic distress scores compared to children who were identified at Time 1 as having no or mild symptoms of posttraumatic distress. Again, this hypothesis was not supported. Overall, there was no significant difference or change in RI scores from Time 1 to Time 2.

This lack of change in RI scores may itself be an indicator of sensitivity to tornado season. Children's posttraumatic distress typically declines over time (Vogel & Vernberg, 1993), which was not evident in the current study. The stability of scores over the assessment interval suggests that children maintained their level of distress, perhaps because they were aware of the potential danger of a tornado recurrence. The best predictor of posttraumatic distress at follow-up was the degree of posttraumatic distress at the first assessment. This clearly adds to the evidence that children's posttraumatic distress reactions to disasters are not merely transitory events (La Greca et al., 1998). The trauma resulting from a natural disaster is not limited to the impact of the physical event, but may continue for an extended period of time (Green, 1982) and for victims of seasonal disasters, may include additional traumas and adjustments.

To fully test the seasonal influence hypothesis, additional administrations of the RI are required. If, at a third assessment outside of tornado season, RI scores decreased, as

would be expected with the passage of time, one might speculate that the stability of scores at the second assessment was due to seasonal influence. Another tornado season assessment would provide data to support or refute this hypothesis. The hypothesis would be supported if scores were steady or increased during this fourth assessment. Additional assessments will not be conducted with the current sample, as the low return rate for the follow-up assessment predicts an inability to obtain an adequate sample for additional follow-up study.

There is a great deal of variability in PTSD symptoms in the literature. For example, seven months after a hurricane, Prinstein et al. (1996) found that 24% of third through fifth grade children experienced no symptoms, 34% reported mild symptoms, 23% reported moderate symptoms, and 18% reported severe to very severe symptoms. Twenty-one months after the same hurricane, Shaw and colleagues (1996) found that 70% of children ages 7 to 13 years demonstrated moderate to very severe PTSD symptomatology, while 30% endorsed no or mild symptoms. Both studies used the RI to assess PTSD symptoms. Although the PTSD levels found in these studies and the current study are somewhat discrepant, together they provide compelling evidence of the enduring distress that many children suffer after a disaster.

It was hypothesized that children with more severe posttraumatic distress would employ a greater number of coping strategies, which was the case for this sample. Children categorized as experiencing moderate to very severe distress endorsed significantly more coping strategies than children categorized as experiencing no or mild posttraumatic distress at both assessments. Analyses conducted to examine the frequency of use of various coping strategies indicated that children used distraction, cognitive restructuring, and wishful thinking most often at Time 1 and Time 2. Blaming others and



self-criticism were reportedly used least often at both times. These results are consistent with the findings of Jeney-Gammon and colleagues (1993) in their study of third through fifth grade children 5 months after a hurricane. Other research with the Kidcope has yielded similar results across a variety of situations. Spirito and colleagues (1988; 1991) found that children aged 9 to 11 years tended to use cognitive restructuring, problem solving, emotional regulation, and wishful thinking most frequently with family- and school-related problems. For a group of pediatric patients, wishful thinking and distraction were most frequently used, while self-criticism and blaming others were least frequently used.

Despite the consistency in most and least frequently used strategies, there was a significant amount of variability in coping strategies endorsed from Time 1 to Time 2. Distraction, blaming others, wishful thinking, and social support were the only coping strategies that demonstrated a relationship from the first assessment to follow-up. Although cognitive restructuring was among the most frequently and self-criticism among the least frequently used at both assessments, different children endorsed them at each assessment. Kidcope test-retest reliability correlations dropped from .75 to .56 after an interval of 3 days to .43 to .15 after an interval of 10 days (Spirito et al., 1988), so the variability in the current study is not unexpected.

Of the coping strategies examined here, distraction, problem solving, emotional regulation, and wishful thinking demonstrated a significant relationship with posttraumatic distress as measured by the RI, with children reporting greater distress also reporting greater use of these strategies at Time 1. Other researchers have found similar results. Jeney-Gammon and colleagues (1993) found that distraction, emotional regulation, and wishful thinking demonstrated positive relationships with overall level of

depressive symptoms. Spirito and colleagues (1989) found that adolescents who were distressed or had attempted suicide endorsed wishful thinking more frequently than did nondistressed adolescents. Children with moderate to severe levels of PTSD symptoms reported a greater usage of distraction than children with mild or no of PTSD symptoms (Prinstein et al., 1996). In the current study, the use of distraction as a coping strategy explained a significant portion of the variance in posttraumatic distress scores at Time 1, suggesting that children who avoided thinking about the tornadoes were more likely to suffer from posttraumatic distress.

At Time 2, only the use of distraction and the use of social support were predictive of posttraumatic distress. Findings with regard to social support have been mixed. In the current study, children whose RI scores remained constant from Time 1 to Time 2 endorsed greater use of social support, while children whose RI scores increased five points or more reported less use of social support from Time 1 to Time 2. A supportive environment in which to process feelings about the trauma may be beneficial to traumatized individuals; social support may have prevented posttraumatic distress symptoms from worsening for those who used it. This has received support from other studies of children's post-disaster coping. After a hurricane, social support demonstrated a negative relationship with depressive symptoms (Jeney-Gammon et al., 1993), and higher levels of social support were related to lower PTSD symptomatology in children exposed to a hurricane (Vernberg et al., 1996). However, social support may also serve as a means of avoidance, to deleterious effect. Polusny et al. (1999) found that greater use of social support predicted posttraumatic stress symptoms for children after a tornado.

It was hypothesized that children experiencing greater posttraumatic distress would consider their coping strategies as generally ineffective compared to children with less severe symptoms of distress. The relationship between the coping strategies distraction, problem solving, emotional regulation, and wishful thinking and enduring symptoms of posttraumatic distress, depression, or suicidality suggests that these coping strategies may not be effective for those who employ them. However, at Time 1 in the current investigation, three of the strategies used most often by children with higher levels of PTSD symptoms—problem solving, emotional regulation, and wishful thinking—were rated as being most helpful overall. Social support was rated as helpful independent of RI score. At Time 2, social support and problem solving again received high efficacy ratings, as did distraction. Problem solving, emotional regulation, cognitive restructuring, and social support have been consistently found to be efficacious by children in a variety of situations (Jeney-Gammon et al., 1993; Romero & Sullivan, 1992; Spirito et al., 1988). The high efficacy rating given to wishful thinking in the present study is uncommon, but not without some support in the literature. Jeney-Gammon and colleagues found that their sample of children rated wishful thinking as only slightly less effective than children did in the present study.

Contrary to expectations regarding long-term coping in the current study and short-term coping in the study conducted by Jeney-Gammon and colleagues (1993), coping efficacy was not significantly related to symptom level at either assessment. In the present study, there was no significant difference in efficacy ratings between children classified as experiencing no or mild posttraumatic distress and children categorized as experiencing moderate to very severe distress. Distressed and nondistressed children had similar opinions of the helpfulness of their coping strategies. While one might expect

ineffective coping strategies to maintain distress, for the distressed individuals in the current study, the use of any coping strategies may have prevented their distress from becoming even greater.

Children's attributions after a natural disaster have received little attention from researchers. Existing research on attributions for other types of negative events with child and adult populations provides support for the theoretical link between attributions and distress. In one of the few studies on attributions for a weather-related incident, Dollinger (1986) assessed the attributions made by fifth and sixth grade children after a child was killed by a lightning strike during a soccer game. Dollinger found that the children most upset by the incident were also most likely to have made an attribution for it. Downey et al. (1990) found a significant difference in distress level between parents who did and did not make attributions of blame for the SIDS death of their baby, with parents who were more concerned with attributing blame experiencing more distress. Attributions of responsibility to God or to chance, however, were not significantly associated with distress.

The results of the current study are consistent with other research on attributions and distress. It was hypothesized that a relationship existed between the presence of attributions and posttraumatic stress symptomatology. This hypothesis was supported by the data. Children with higher posttraumatic distress scores made more attributions of responsibility for negative events that resulted from the tornado and were more concerned with making attributions and finding meaning in the negative events than were children with lower distress scores. Attributions of blame directed toward God or no attributions of blame were the only subscales that did not demonstrate a relationship with RI scores. Those who made an attribution to God or who made no attribution may have expended

the current study were at an Oklahoma City amusement park when a tornado struck it in 1998. The May 3 tornadoes began in the southwestern portion of Oklahoma and traveled to the northeast over a period of several hours. The children in the present study live in North Central Oklahoma. It is likely that they had seen extensive television coverage of the tornado destruction prior to the tornadoes reaching their counties. Since May 3, 1999, dozens of tornadoes have been sighted in various regions of Oklahoma, all of which have been shown on television. A number of parents wrote on the TEQ-PR that as a result of their experience with the May 3 tornadoes, their children become very fearful and even physically ill during television reports of severe weather. The extensive television coverage of tornadic activity in Oklahoma may trigger fearful reminders of May 3, elevating or maintaining distress levels, and heightening expectations and hypervigilance.

Romero (1997) assessed posttraumatic distress symptoms during tornado season in a sample of Oklahoma children who had not experienced a tornado. She found that levels of distress, as measured by the RI, were elevated such that the sample resembled some disaster samples, suggesting a strong sensitization effect. Additional research during other parts of the year with "Tornado Alley" populations and with samples outside this region will be necessary to fully understand the effect that expectations of recurrence and hypervigilance might have on posttraumatic distress symptoms.

Exploratory analyses were conducted to determine whether any relationships could be identified between the types of coping strategies employed and the presence of attributions. Several relationships were found, two of which involved the Expectations/Hypervigilance scale on the NDAC. This scale was related to the frequency of problem solving and wishful thinking scales on the Kidcope. Problem solving typically involves recognition of the problem, identification of possible solutions, selection of a solution,

performance, and evaluation of consequences. Effective problem solvers are also able to anticipate and prevent potential problems. It may be that children who used problem solving as a coping strategy after the tornadoes were more likely to anticipate a future tornado, or perhaps as children's anticipation of future tornadoes increased, they were more likely to use problem solving as a coping strategy. Regarding the relationship with wishful thinking, it may be that the more children expected or anticipated a recurrence, the more they wished they could do something to stop it.

The relationship between the Search for Meaning scale on the NDAC and the frequency of emotional regulation scale on the Kidcope was relatively strong. Emotional regulation, as measured by the Kidcope, refers to getting upset or trying to control one's emotions. Perhaps children who were more emotional about the tornadoes had a greater need to make sense out of why they happened. On the other hand, finding meaning in tornado-related incidents may have helped these children to better handle their emotions.

Attributions are typically assessed via a structured interview format. This study marks one of the first attempts to employ the use of a systematic questionnaire format to assess attributions. The lack of psychometric data on the NDAC precludes any firm conclusions; however, the results of analyses with this measure were promising and indicate that further research with this measure is warranted.

Regression analyses were conducted to examine the amount of variance in posttraumatic distress that might be explained by the presence and importance of attributions. Results indicated that expectations and hypervigilance explained 53.3% of the variance in posttraumatic distress at Time 1, indicating that high expectations for tornado recurrence predicted distress. Having made an attribution of responsibility for a tornado-related event accounted for an additional 5.6% of the variance. Other researchers

have also found relationships between making attributions of blame and distress (Bulman & Wortman, 1977; Taylor, 1983). The results of this analysis suggest that individuals who expect a disaster recurrence and are watchful for signs, and who attribute responsibility for things that happened during the disaster are more likely to suffer from posttraumatic distress.

In summary, this study found significant elevations in children's posttraumatic distress levels as long as 2 years after a series of tornadoes devastated Central Oklahoma. Children's self-reports of fear during the tornado and of tornado exposure were significantly related to their distress, whereas parent reports of child fear during and after the tornadoes and of tornado exposure were not. The difference between parent and child reports in relationship to child distress may have been a function of perceived versus actual threat. The lack of change in RI scores from the first to the second assessment may indicate sensitivity to tornado season.

This study also found a relationship between the number of coping strategies children endorsed and their level of posttraumatic distress. Distraction, problem solving, emotional regulation, and wishful thinking were significantly related to posttraumatic distress, with children reporting greater distress also reporting greater use of these strategies at Time 1. At Time 2, only the use of distraction and the use of social support were predictive of posttraumatic distress. Contrary to expectation, there was no relationship between perceived efficacy of coping strategies and posttraumatic distress at either assessment. Children had similar opinions of the effectiveness of their coping strategies regardless of their level of distress.

The current study found a relationship between posttraumatic distress scores and the presence and importance of attributions of responsibility for negative tornado-related

events, leading to speculation that attributions may play a role in the development and maintenance of posttraumatic distress symptoms. There was a particularly strong relationship between distress and expectations for recurrence, suggesting that residents of “Tornado Alley” may, understandably, be more sensitive to the possibility of recurrence. In conclusion, individuals who expect a tornado recurrence, are watchful for signs, and who attribute responsibility for tornado-related events are more likely to suffer from posttraumatic distress.

#### Clinical Implications

Some clinical implications have emerged from the results of the current study. The data demonstrated that children continued to report moderate levels of specific, tornado-related symptoms of distress long after the physical tornado damage had been repaired. This suggests that children experience long-lasting effects in a specific way. Furthermore, the results from this study imply that children may experience more ill effects resulting from disasters than parents recognize. Clearly, it is important for parents to monitor their child’s long-term functioning after a disaster. For more distressed children, broader assessments may be necessary to determine the amount of distress and disruption of functioning they are experiencing. Specific interventions may then be designed and implemented to address these negative effects.

#### Limitations and Strengths

There are several limitations to this study that must be noted. First, the sample size was small in comparison to similar research done with disaster survivors; however, it is assumed to be sufficiently large to provide adequate power. Barcikowski and Robey (1984) developed power tables for various alpha levels for single group repeated measure designs. In longitudinal research, use of an estimated average correlation is sufficient to



use the power tables to determine the sample size needed for various alpha levels (Stevens, 1996). For the current study, two repeated measures were conducted with an alpha level of .05. Using an estimated correlation of .50, to achieve a medium effect size (.35), a sample of 34 is required. To achieve a medium effect with an estimated correlation of .80, a sample of 15 is required. It was estimated that the average correlation between repeated administrations of the RI would be between .50 and .80. Therefore, it was assumed that the current sample of 28 would provide sufficient power for the current, mostly exploratory, analyses.

A second major limitation of this study is the homogeneity of the participants, which limits the generalizability of the findings. Participating families were predominately Caucasian and mothers were the majority of parent respondents. Although parents of children aged 8 to 12 years were targeted for recruitment, very few children between the ages of 10 and 12 years participated, again limiting generalizability of findings. Participating families experienced a relatively low level of tornado exposure, limiting the extent to which the relationship between exposure and distress could be tested, and preventing the testing of some of the proposed hypotheses. The lack of families who experienced major damage or disruption as a result of the tornadoes resulted in a restricted range of tornado exposure, further limiting generalizability. Efforts were made to target school districts in the areas hardest hit by the tornadoes; however, personnel at those schools expressed concern about stirring up painful memories related to the tornado and, therefore, elected not to participate.

The lack of overlapping items between the parent and child versions of the TEQ may have precluded an accurate assessment of tornado exposure. It is possible that had parents and children been asked the same questions, parent-derived exposure scores may

have been more closely related to child-derived exposure scores. Furthermore, while parents were asked to report on the level of their child's fear since the tornadoes, children were not, thus preventing a comparison of responses. Any discussion of differences in parent and child reports is tempered by the differences in the assessment instruments.

The NDAC was developed specifically for this study and is not supported by psychometric data. The coefficient alpha for this measure was lower than the generally accepted level, which reflects the heterogeneity of the NDAC, as it is a multidimensional scale. The NDAC has no additional data supporting reliability and validity; therefore, any results based on the NDAC are provisional. The strong correlations demonstrated between the NDAC and the RI were consistent with the literature and provided some of the more compelling results in this study, indicating that further development of this measure is warranted. Some of the children in this study demonstrated confusion with some of the NDAC items, which suggests that those items may be of questionable validity. Additional study on this measure should include an interview component so that the examiner can verify the child's understanding of the questionnaire items. A larger sample is needed in order to conduct factor analysis and to provide conclusive support for the use of this measure.

The exploratory nature of many of the analyses precludes any firm conclusions. Analyses to detect differences with regard to direction of change in RI score or types of coping strategies endorsed were conducted with often very small subsets of the current sample. The size of the samples made detecting significant differences difficult and made conclusions tentative.

Limitations notwithstanding, significant strengths of this study should also be noted. The current study used standardized procedures for the assessment of several different

dimensions of functioning to facilitate comparison with existing research across disasters and across subgroups of disaster survivors. This study used multiple informants in the assessment of exposure and fear to provide more reliable and complete information than can be gained from a single informant. Children's self-report may have the potential to elicit inaccurate responses, but parent reports are not valid measures of internalizing symptoms. The measures used in the current study were selected for their wide range of coverage and, in the case of the RI and the Kidcope, for their strong psychometric properties.

Despite its small size, the sample provided a wide range of responses in several areas salient to the research questions, including parent and child reports of child fear during the tornadoes. Few studies have compared parent and child report on questions pertaining to tornado exposure and fear responses. While the lack of correspondence between parent and child report may be due to a methodology issue, it is also possible that the results demonstrate a difference in perceived versus actual threat.

Very little long-term data exists in the disaster literature, and that which does seldom extends beyond one year. The current study is one of only a few longitudinal studies designed to examine distress and coping as long as 24 months post-disaster. The data demonstrate that posttraumatic distress symptoms maintain over time, that use of coping strategies varies over time, and that children's use of coping strategies can affect the severity and duration of their posttraumatic distress.

Attributions appear to be related to the presence and severity of posttraumatic distress, but attribution research has primarily focused on social interactions and academic achievement. This study marks one of the few attempts to study attributions with a standard and systematic questionnaire. Other studies relied on a single open-ended

question (Dollinger, 1986), coding previously written accounts for the presence of attributions (Benson, 1988; Joseph et al., 1993; Weiner et al., 1982), and interviewing participants about specific events (Bulman & Wortman, 1977; Dollinger et al., 1981; Taylor, 1983). Despite the unknown psychometric properties of the NDAC, this measure provided a thorough, unbiased, and encouraging look at the relationship between distress and attributions and demonstrated that this area offers great potential for researchers.

#### Areas for Future Research

The exploratory nature of the current study suggests a number of directions for future research. The significant elevations found in children's distress levels indicate that additional longitudinal study is necessary. The study of children's posttraumatic distress reactions requires follow-up extending beyond 2 years to determine how symptoms continue to manifest as the child develops. Greater understanding of the influence of development on the presentation and course of symptoms is needed for the advancement of effective interventions.

Moreover, the relationship found between coping strategies and distress level suggests that additional long-term follow-up of the effects of coping on stress is also needed. The Kidcope has a wealth of research with a variety of populations (Spirito et al., 1988; Spirito et al., 1991; Stark et al., 1988); longitudinal study with this measure will facilitate comparison of the relationship between distress and coping in a variety of populations. Longitudinal data will help illuminate the ways in which coping affects the manifestation of distress, which will aid in treatment of distress.

The current study found a strong relationship between posttraumatic distress and the presence and importance of attributions. The relatively little data available on attributions and posttraumatic distress indicates that this is an area in which more study is

sorely needed, particularly regarding the possible moderating effects of attributions on coping and distress. In the present study, two NDAC scales and two Kidcope scales contributed to a large portion of the variance in RI scores from the first assessment. Additional research with larger samples is needed to determine the validity of these results.

More research on the NDAC is needed before its reliability and validity as a measure of attributions can be supported. Some methodology issues with the NDAC were discovered during the present study. Some children clearly had difficulty understanding some items, particularly if they had not made attributions. To establish psychometric properties for this measure, it may be necessary to assess attributions about situations other than tornadoes, as the population of tornado survivors is relatively small. Assessment of large samples of children will allow factor analysis and provide evidence of the merit of this measure.

Additional research with populations residing both inside and outside the most tornado-prone areas of the country is needed to determine the degree to which levels of posttraumatic distress are elevated in residents of tornado-prone areas as a result of sensitization. Furthermore, additional research conducted both during and outside of tornado season with residents of tornado-prone areas is necessary to further examine the influence of season on levels of distress. The strong relationship found in the current study between distress and expectations and the stability of RI scores over the course of 4 months are indicative of sensitivity to the possibility of recurrence, which is a legitimate threat for residents of a tornado-prone area. Further study in this area will help identify the types of coping strategies and stress reduction that will be most beneficial to this population.

## References

- American Academy of Child and Adolescent Psychiatry (1998). AACAP official action: Practice parameters for the assessment and treatment of children and adolescents with posttraumatic stress disorder. Journal of the American Academy of Child and Adolescent Psychiatry, 37 (suppl): 4S-26S.
- American Psychiatric Association. (1980). Diagnostic and statistic manual of mental disorders (3rd ed.). Washington, DC: Author.
- American Psychiatric Association. (1994). Diagnostic and statistic manual of mental disorders (4th ed.). Washington, DC: Author.
- Anthony, J. L., Lonigan, C. J., & Hecht, S. A. (1999). Dimensionality of posttraumatic stress disorder symptoms in children exposed to disaster: Results from confirmatory factor analyses. Journal of Abnormal Psychology, 108, 326-336.
- Altshuler, J., & Ruble, D. (1989). Developmental changes in children's awareness of strategies for coping with uncontrollable stress. Child Development, 60, 1337-1349.
- Barcikowski, R. R., & Robey, R. S. (1984). Calculating the statistical power of the univariate and the multivariate repeated measures analyses of variance for the single group case under various conditions. The American Statistician, 38, 248-250.
- Benson, M. J. (1988). Attributional measurement techniques: classification and comparison of approaches for measuring causal dimensions. Journal of Social Psychology, 129, 307-323.
- Bulman, R. J. & Wortman, C. B. (1977). Attributions of blame and coping in the "real world": Severe accident victims relate to their lot. Journal of Personality and Social Psychology, 35, 351-363.

Frederick, C. J., Pynoos, R. S., & Nader, K. O. (1992). Child Post-Traumatic StressReaction Index. Unpublished instrument. (Available from Calvin J. Frederick, Ph.D. Psychological Services, 69/B116B, Veterans' Administration Medical Center, 1301 Wilshire Boulevard, Los Angeles, CA 90073).

Galante, R., & Foa, D. (1986). An epidemiological study of psychic trauma and treatment effectiveness for children after a natural disaster. Journal of the American Academy of Child Psychiatry, 25, 357-363.

Garrison, C. Z., Bryant, E. S., Addy, C. L., Spurrier, P G., Freedy, J. R., & Kilpatrick, D. G. (1995). Posttraumatic stress disorder in adolescents after Hurricane Andrew. Journal of the American Academy of Child and Adolescent Psychiatry, 34, 1193-1201.

Gong-Guy, E., & Hammen, C. (1980). Causal perceptions of stressful events in depressed and nondepressed outpatients. Journal of Abnormal Psychology, 89, 662-669.

Green, B. L. (1982). Assessing levels of psychological impairment following disaster. Journal of Nervous and Mental Disease, 170, 544-551.

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

Jeney-Gammon, P., Daugherty, T. K., Finch, Jr., A. J., Belter, R. W., & Foster, K. Y. (1993). Children's coping styles and report of depressive symptoms following a natural disaster. Journal of Genetic Psychology, 154, 259-267.

Joseph, S. A., Brewin, C. R., Yule, W., & Williams, R. (1993). Causal attributions and post-traumatic stress in adolescents. Journal of Child Psychology and Psychiatry, 34, 247-253.

Kaniasty, K. & Norris, F. H. (1995). Mobilization and deterioration of social support following natural disasters. Current Directions in Psychological Science, 4, 94-98.

Krug, E. G., Kresnow, M. J., Peddicord, J. P., Dahlberg, L. L., Powell, K. E., Crosby, A. E., Annest, J. L. (1998). Suicide after natural disasters. New England Journal of Medicine, 338, 373-378.

La Greca, A. M., Silverman, W. K., & Wasserstein, S. B. (1998). Children's predisaster functioning as a predictor of posttraumatic stress following a hurricane. Journal of Consulting and Clinical Psychology, 66, 883-892.

Lima, B. R., Chavez, H., Samaniego, N., Pompei, M. S., Pai, S., Santacruz, H., Lozano, J. (1989). Disaster severity and emotional disturbance: Implications for primary mental health care in developing countries. Acta Psychiatrica Scand, 79, 74-82.

Lonigan, C. J., Anthony, J. L., & Shannon, M. P. (1998). Diagnostic efficacy of posttraumatic symptoms in children exposed to disaster. Journal of Clinical Child Psychology, 27, 255-267.

Lonigan, C. J., Shannon, M. P., Finch, A. J., Jr., Daugherty, T. K., & Taylor, C. M. (1991). Children's reactions to a natural disaster: Symptom severity and degree of exposure. Advanced Behavioral Research and Therapy, 13, 135-154.

Lonigan, C. J., Shannon, M. P., Taylor, C. M., Finch, A. J., & Sallee, F. R. (1994). Children exposed to disaster: II. Risk factors for the development of post-traumatic symptomatology. Journal of the American Academy of Child Psychiatry, 33, 94-105.

Mannarino, A. P., Cohen, J. A., & Berman, S. R. (1994). The Children's Attributions and Perceptions Scale: A new measure of sexual abuse-related factors. Journal of Clinical Child Psychology, 23, 204-211.



Prinstein, M. J., La Greca, A. M., Vernberg, E. M., & Silverman, W. K. (1996). Children's coping assistance: How parents, teachers, and friends help children cope after a natural disaster. Journal of Clinical Child Psychology, *25*, 463-475.

Romero, R. T., & Sullivan, M. A. (1991). Parent versus child reports of children's reactions to natural disaster. Paper presented at the meeting of the Oklahoma Psychological Association, Oklahoma City, OK.

Romero, R. T., & Sullivan, M. A. (1992). Post-traumatic symptoms and coping strategies of children one year following a tornado. Poster session presented at the meeting of the Association for the Advancement of Behavior Therapy, Boston, MA.

Rubonis, A. V. & Bickman, L. (1991). A test of the consensus and distinctiveness attribution principles in victims of disaster. Journal of Applied Social Psychology, *21*, 791-809.

Russell, D. (1982). The Causal Dimension Scale: a measure of how individuals perceive causes. Journal of Personality and Social Psychology, *42*, 1137-1145.

Ryan-Wenger, N. M. (1992). A taxonomy of children's coping strategies: A step toward theory development. American Journal of Orthopsychiatry, *62*, 256-263.

Shannon, M. P., Lonigan, C. J., Finch, A. J., & Taylor, C. M. (1994). Children exposed to disaster: I. Epidemiology of post-traumatic symptoms and symptom profiles. Journal of the American Academy of Child Psychiatry, *33*, 80-93.

Shaw, J. A., Applegate, B., & Schorr, C. (1996). Twenty-one-month follow-up study of school-age children exposed to Hurricane Andrew. Journal of the American Academy of Child and Adolescent Psychiatry, *35*, 359-364.

Spirito, A., Overholser, J., & Stark, L. J. (1989). Common problems and coping strategies II: Findings with adolescent suicide attempters. Journal of Abnormal Child Psychology, *17*, 213-221.

Spirito, A., Stark, L. J., Grace, N., & Stamoulis, D. (1991). Common problems and coping strategies reported in childhood and early adolescence. Journal of Youth and Adolescence, *20*, 531-544.

Spirito, A., Stark, L. J., & Williams, C. (1988). Development of a brief coping checklist for use with pediatric populations. Journal of Pediatric Psychology, *13*, 555-574.

Stark, L. J., Spirito, A., & Stamoulis, D. (1988, November). Common problems and coping strategies reported by young children. Poster session presented at the meeting of the Association of Behavior Therapy, New York.

Stark, L. J., Spirito, A., Williams, C. A., & Guevremont, D. C. (1989). Common problems and coping strategies I: Findings with normal adolescents. Journal of Abnormal Child Psychology, *17*, 203-212.

Stevens, J. (1996). Applied multivariate statistics for the social sciences. Mahwah, N.J.: Lawrence Erlbaum Associates.

Sullivan, M. A., Romero, R., & Hutchison, K. (1993). Children's long-term reactions to a tornado. Paper presented at the meeting of the American Psychological Association, Toronto, Ontario.

Taylor, S. E. (1983). Adjustment to threatening events: A theory of cognitive adaptation. American Psychologist, *38*, 1161-1173.

Terr, L. C. (1981). Psychic trauma in children: Observations following the Chowchilla school bus kidnapping. American Journal of Psychiatry, *138*, 14-19.

- Terr, L. C. (1983a). Chowchilla revisited: The effects of psychic trauma four years after a school bus kidnapping. American Journal of Psychiatry, 140, 1543-1550.
- Terr, L. C. (1983b). Life attitudes, dreams, and psychic trauma in a group of "normal" children. Journal of the American Academy of Child Psychiatry, 22, 221-230.
- Terr, L. C. (1983c). Time sense following psychic trauma: A clinical study of ten adults and twenty children. American Journal of Orthopsychiatry, 53, 244-261.
- Terr, L. C. (1991). Childhood traumas: An outline and overview. American Journal of Psychiatry, 148, 10-20.
- Vernberg, E. M., La Greca, A. M., Silverman, W. K., & Prinstein, M. J. (1996). Prediction of posttraumatic stress symptoms in children following Hurricane Andrew. Journal of Abnormal Psychology, 105, 237-248.
- Vogel, J., & Vernberg, E. M. (1993). Children's psychological responses to disaster. Journal of Clinical Child Psychology, 22, 464-484.
- Weiner, B., Graham, S., & Chandler, C. (1982). Pity, anger, and guilt: An attributional analysis. Personality and Social Psychology Bulletin, 8, 226-232.
- Wong, P. T. P. & Weiner, B. (1981). When people ask "why" questions, and the heuristics of attributional search. Journal of Personality and Social Psychology, 40, 650-663.
- Wortman, C. B. (1976). Causal attributions and personal control. In Harvey, J. H., Ickes, W. J., & Kidd, R. F. (Eds.), New Directions in Attribution Research: Volume 1. (pp. 23-52). Hillsdale, NJ: Lawrence Erlbaum Associates.

Table 1

Parents' Perceptions of Tornado Severity

<u>Severity</u>	<u>Parents</u>
Mild	15.6%
Moderate	15.6%
Severe	15.6%
Very severe	26.6%
Catastrophic	26.6%

---

Table 2

Parents' Perceptions of Their Child's Fear During and Since the Tornadoes

<u>Child's Fear</u>	<u>During</u>	<u>Since</u>
Not at all scared	6.7%	15.2%
Somewhat scared	60%	50%
Scared	8.9%	17.4%
Very scared	17.8%	13%
Terrified	6.7%	4.3%

Note: Perception of tornado severity, child's fear during the tornadoes, and child's fear since the tornadoes is based on participants' responses on the TEQ-PR.

Table 3

Degree of PTSD Symptoms as Measured by the Reaction Index

<u>Degree of PTSD Symptoms</u> (Scores = 0-80)	<u>Time 1</u>		<u>Time 2</u>	
	<u>N = 52</u>	<u>%</u>	<u>N = 28</u>	<u>%</u>
No PTSD Symptoms (range 0-11)	3	5.7	3	10.7
Mild PTSD Symptoms (range 12-24)	21	40.3	10	35.7
Moderate PTSD Symptoms (range 25-39)	14	27	7	25
Severe PTSD Symptoms (range 40-59)	13	25	8	28.6
Very Severe PTSD Symptoms (range 60-80)	1	2	0	0

Note: Degree of PTSD symptoms is according to published scoring criteria for the Reaction Index (Frederick, Pynoos, & Nader, 1992).

Table 4

Kidcope Frequency Endorsements with Chi-Square Analyses of Change from Time 1 to Time 2

<u>Strategy</u>	<u>Frequency</u> <u>Endorsed Using This Strategy</u>		<u>Significance of Change</u> <u>Time 1 to Time 2</u>	
	<u>Time 1</u>	<u>Time 2</u>	<u><math>\chi^2</math></u>	<u>p</u>
Distraction	73.1%	82.1%	10.388	.011*
Social Withdrawal	53.8%	46.4%	.144	1.000
Cognitive Restructuring	61.5%	78.6%	.019	1.000
Self-Criticism	17.3%	14.3%	.162	1.000
Blaming Others	9.6%	10.7%	17.949	.008*
Problem Solving	59.6%	71.4%	3.500	.091
Emotional Regulation	55.8%	75.0%	.207	.674
Wishful Thinking	65.4%	85.7%	6.222	.038*
Social Support	50%	60.7%	6.601	.019*
Resignation	28.8%	28.6%	1.718	.311

\*Indicates a significant relationship between use at Time 1 and use at Time 2

Table 5

Efficacy Ratings Given by Children Who Endorsed Use of Kidcope Coping Strategies


---

Time 1: N=52			
<u>Strategy</u>	<u>Not at all</u>	<u>A little</u>	<u>A lot</u>
Distraction (n = 38)	15.8%	26.3%	57.9%
Social Withdrawal (n =28)	25.0%	32.1%	42.9%
Cognitive Restructuring (n = 32)	12.5%	43.75%	43.75%
Self-Criticism (n = 9)	44.4%	11.2%	44.4%
Blaming Others (n = 5)	60.0%	0%	40.0%
Problem Solving (n = 31)	6.4%	35.5%	58.1%
Emotional Regulation (n = 29)	6.9%	24.1%	69.0%
Wishful Thinking (n =34)	8.9%	17.6%	73.5%
Social Support (n = 26)	3.9%	26.9%	69.2%
Resignation (n = 15)	40.0%	26.7%	33.3%

---

Time 2: N=28			
<u>Strategy</u>	<u>Not at all</u>	<u>A little</u>	<u>A lot</u>
Distraction (n =23)	8.7%	47.8%	43.5%
Social Withdrawal (n =13)	38.4%	38.4%	23.2%
Cognitive Restructuring(n =22)	13.6%	59.1%	27.3%
Self-Criticism (n = 4)	0%	25.0%	75.0%
Blaming Others (n = 3)	33.4%	33.3%	33.3%
Problem Solving (n = 20)	20.0%	35.0%	45.0%
Emotional Regulation (n = 21)	4.8%	52.4%	42.8%
Wishful Thinking (n =24)	25.0%	41.7%	33.3%
Social Support (n = 17)	0%	23.5%	76.5%
Resignation (n = 8)	62.5%	0%	37.5%

---

Table 6

Correlations between Reaction Index Scores and Use of Kidcope Coping Strategies


---

Time 1

<u>Strategy</u>	<u>r</u>	<u>p</u>
Distraction	.452*	.001
Social Withdrawal	.234	.094
Cognitive Restructuring	.359	.009
Self-Criticism	.144	.309
Blaming Others	.112	.428
Problem Solving	.531*	.000
Emotional Regulation	.417*	.002
Wishful Thinking	.556*	.000
Social Support	.357	.009
Resignation	.144	.307

---

Time 2

<u>Strategy</u>	<u>r</u>	<u>p</u>
Distraction	.502	.006
Social Withdrawal	.032	.873
Cognitive Restructuring	.230	.239
Self-Criticism	.423	.025
Blaming Others	-.061	.759
Problem Solving	.289	.136
Emotional Regulation	.479	.010
Wishful Thinking	.390	.040
Social Support	.345	.072
Resignation	.193	.324

---

\*Significant after Bonferroni correction ( $p < .005$ )



Table 7

Correlations between Scores on the Reaction Index and Scores on the Natural DisasterAttribution Checklist


---

<u>NDAC Scale with Subscales</u>	<u>r</u>	<u>p</u>
Attributing Responsibility	.533**	.000
Self-blame	.638**	.000
Other-blame	.482**	.000
God-blame	.261	.061
No-blame	-.189	.179
Importance of Attributing Responsibility	.462**	.001
Expectations/Hypervigilance	.736**	.000
Expectations	.633**	.000
Hypervigilance	.715**	.000
Search for Meaning	.688**	.000
Omen Formation	.567**	.000
Total score	.789**	.000

---

\*\*Correlation is significant at the .005 level (Bonferroni corrected; 2-tailed).

Table 8

Relationships between Use of Coping Strategies as Measured by the Kidcope and  
Presence of Attributions as Measured by the NDAC

<u>Kidcope Strategy</u>	<u>NDAC Scale</u>				
	<u>Attributing Responsibility</u>	<u>Importance of Attrib.</u>	<u>Expectations/ Hypervigilance</u>	<u>Search for Meaning</u>	<u>Omen Formation</u>
Distraction	.212	.074	.313	.267	.333
Social Withdrawal	.331	.018	.224	.090	.128
Cognitive Restructuring	.193	.148	.417*	.358	.264
Self-Criticism	.377	-.019	.393*	.144	.448*
Blaming Others	.436*	.166	.131	.080	.090
Problem Solving	.380	.085	.572**	.462*	.404*
Emotional Regulation	.245	.200	.422*	.525**	.259
Wishful Thinking	.296	.186	.469**	.432*	.437*
Social Support	.262	.134	.408*	.315	.343
Resignation	.202	.390*	.229	.157	.175

\*\*Correlation is significant at the .001 level (Bonferroni correction, 2-tailed).

\* Correlation is significant at the .005 level (2-tailed).

Table 9

Summary of Stepwise Regression Analysis for Kidcope Frequency Scores and NDACScale Scores Predicting the Reaction Index Total Score(N = 52)

<u>Variable</u>	<u>Multiple R</u>	<u>R<sup>2</sup></u>	<u>Adjusted R<sup>2</sup></u>	<u>F</u>	<u>Significance of F</u>	<u>B</u>	<u>SeB</u>	<u>Beta</u>
Step 1	.736	.542	.533	59.145	.000			
Expectations/ Hypervigilance						3.416	.444	.736
(Constant)						14.396	2.369	
Step 2	.778	.605	.589	37.602	.000			
Expectations/ Hypervigilance						2.886	.457	.622
Attributing Responsibility						1.245	.443	.277
(Constant)						11.513	2.446	
Step 3	.812	.659	.637	30.895	.000			
Expectations/ Hypervigilance						3.232	.448	.696
Attributing Responsibility						1.548	.431	.344
Self-Criticism						-9.765	3.565	-.260
(Constant)						10.432	2.332	
Step 4	.840	.705	.680	28.129	.000			
Expectations/ Hypervigilance						2.951	.433	.636
Attributing Responsibility						1.452	.406	.323
Self-Criticism						-9.968	3.349	-.265
Distraction						7.315	2.685	.228
(Constant)						6.747	2.574	

Note: Variables not entered into the equation were: child-reported exposure, Importance of Attributing Responsibility, Search for Meaning, Omen Formation, distraction, social withdrawal, cognitive restructuring, blaming others, problem solving, emotional regulation, wishful thinking, social support, and resignation.

Table 10

Summary of Stepwise Regression Analysis for Kidcope Frequency Scores Predicting the  
Reaction Index Total Score at Follow-up

(N = 28)

<u>Variable</u>	<u>Multiple R</u>	<u>R<sup>2</sup></u>	<u>Adjusted R<sup>2</sup></u>	<u>F</u>	<u>Significance of F</u>	<u>B</u>	<u>SeB</u>	<u>Beta</u>
Step 1	.502	.252	.224	8.778	.006			
Distraction						19.774	6.674	.502
(Constant)						12.400	6.049	
Step 2	.671	.450	.406	10.241	.001			
Distraction						23.054	5.938	.586
Social Support						13.970	4.656	.453
(Constant)						1.224	6.469	

Note: Variables not entered into the equation were: social withdrawal, cognitive restructuring, self-criticism, blaming others, problem solving, emotional regulation, wishful thinking, and resignation.

APPENDIX-A

Demographic Questionnaire

**Demographic Questionnaire**

*Please fill in the blanks below. All responses will be kept confidential.*

1. Your relationship to the child: Mother \_\_\_\_\_ Father \_\_\_\_\_ Other \_\_\_\_\_  
Please describe

2. Your sex: Male \_\_\_\_\_ Female \_\_\_\_\_

3. Your age: \_\_\_\_\_

4. Your race:

White \_\_\_\_\_ African-American \_\_\_\_\_ Hispanic/Latino \_\_\_\_\_

Asian/Pacific Islander \_\_\_\_\_ American Indian \_\_\_\_\_  
Tribe(s)

Biracial \_\_\_\_\_ Other \_\_\_\_\_  
Please describe Please describe

5. Your highest level of education completed (circle year):

1    2    3    4    5    6    7    8 (Grade school)

9    10    11    12 (High school)

13    14    15    16 (College)

17 and over (Graduate School)

6. Your total family income per month (check one):

Less than \$800 \_\_\_\_\_ \$800-\$1,000 \_\_\_\_\_ \$1001-\$1,500 \_\_\_\_\_

\$1,501-\$2,000 \_\_\_\_\_ \$2,001-\$2,500 \_\_\_\_\_ over \$2,500 \_\_\_\_\_

7. Marital Status (check one):

Married \_\_\_\_\_ Divorced \_\_\_\_\_ Separated \_\_\_\_\_ Single \_\_\_\_\_

Widowed \_\_\_\_\_ Living with partner \_\_\_\_\_

8. If married or living with partner, please provide the following information about your spouse/partner:

a. His/her relationship to the child:

Biological parent \_\_\_\_\_ Step-parent \_\_\_\_\_ Adoptive parent \_\_\_\_\_ Other \_\_\_\_\_

b. His/her age \_\_\_\_\_

c. His/her race:

White \_\_\_\_\_ African-American \_\_\_\_\_ Hispanic/Latino \_\_\_\_\_

Asian/Pacific Islander \_\_\_\_\_ American Indian \_\_\_\_\_  
Tribe(s)

Biracial \_\_\_\_\_ Other \_\_\_\_\_  
Please describe Please describe

d. His/her highest level of education completed (circle year):

1    2    3    4    5    6    7    8 (Grade school)

9    10    11    12 (High school)

13    14    15    16 (College)

17 and over (Graduate school)

9. Please provide the following information about the child participating in this study:

a. Age \_\_\_\_\_

b. Sex: Male \_\_\_\_\_ Female \_\_\_\_\_

c. Race (check all that apply):

White \_\_\_\_\_ African-American \_\_\_\_\_ Hispanic/Latino \_\_\_\_\_

Asian/Pacific Islander \_\_\_\_\_ American Indian \_\_\_\_\_  
Tribe(s)

Biracial \_\_\_\_\_ Other \_\_\_\_\_  
Please describe Please describe

d. Grade in school (circle one):

3    4    5    6



APPENDIX-B

Tornado Exposure Questionnaire-Parent Report

### **Tornado Exposure Questionnaire-Parent Report**

Circle the response that best describes your experience and provide additional information if applicable.

1. During the tornado, where was your child?

- a. At home                      b. At school                      c. At friend's or relative's house  
 d. In a storm shelter at a home                      e. At a community storm shelter

Other \_\_\_\_\_  
 Please describe

2. During the tornado, where were you?

- a. At home                      b. At school                      c. At friend's or relative's house  
 d. In a storm shelter at a home                      e. At a community storm shelter

Other \_\_\_\_\_  
 Please describe

3. How much damage occurred at your child's location?

None                      Little                      Moderate                      Major                      Total Destruction

4. How much damage did the tornado cause to your home?

0%    10%    20%    30%    40%    50%    60%    70%    80%    90%    100%

5. How long were you not able to live in your home?

One week or less                      1 week to 1 month                      1-2 months

2-4 months                      4-6 months                      Longer than 6 months

6. What is your current living situation? *Check one*

- \_\_\_\_ Living in same home/no damage  
 \_\_\_\_ Living in same home/damage repaired  
 \_\_\_\_ Living in new house  
 \_\_\_\_ Living in new apartment or mobile home  
 \_\_\_\_ Living with relatives or friends

Other \_\_\_\_\_

7. At any time during the tornado did you think you might die?      Yes                      No

8. Did you get hurt during the tornado?

Yes                      No

If yes, how \_\_\_\_\_

9. Did your child get hurt during the tornado?

Yes                      No

If yes, how \_\_\_\_\_

10. Did your child see anyone else get hurt during the tornado?

Yes                      No

If yes, how \_\_\_\_\_

11. During the tornado, how scared was your child?

Not at all Scared	Somewhat Scared	Scared	Very Scared	Terrified
----------------------	--------------------	--------	----------------	-----------

12. Since the tornado, is your child scared or worried about storms?

Not at all Scared	Somewhat Scared	Scared	Very Scared	Terrified
----------------------	--------------------	--------	----------------	-----------

13. In your opinion, how severe was the tornado?

Mild	Moderate	Severe	Very Severe	Catastrophic
------	----------	--------	-------------	--------------

14. During the tornado, was your child separated from his/her family?

Yes                      No

15. In the days following the tornado, was your child separated from his/her family?

Yes                      No

16. If you answered Yes to #14, how long was your child separated from his/her family?

1-2 weeks	2-4 weeks	1-3 months
3-6 months	6-12 months	More than 12 months

17. Were you or your spouse unemployed or prevented from working for some period of time as a result of the tornado?

Yes                      No

18. If you answered Yes to #15, how long were you or your spouse unemployed or prevented from working after the tornado?

1-2 weeks              2-4 weeks              1-3 months  
3-6 months              6-12 months              More than 12 months

19. Did your family receive assistance after the tornado? *Check all that apply*

Financial (FEMA loan, insurance coverage)

Medical

Donations (Clothing, household items, money)

Clean up assistance

Other \_\_\_\_\_

20. Did your child receive psychological services or counseling after the tornado? *Check all that apply*

Crisis debriefing/counseling within 2 months of the tornado (from the Red Cross, FEMA, NOVA, church, school, etc)

Counseling in small groups provided in school

Counseling in small groups provided by church or community organization

Individual meeting with school counselor

Individual counseling with psychologist/psychiatrist/mental health worker

Other \_\_\_\_\_

Please describe

21. Did anyone else in your family receive psychological services or counseling after the tornado? *Check all that apply*

Crisis debriefing/counseling within 2 months of the tornado (from the Red Cross, FEMA, NOVA, church, school, etc)

Counseling in small groups provided in school

Counseling in small groups provided by church or community organization

Individual meeting with school counselor

Individual counseling with psychologist/psychiatrist/mental health worker

Other \_\_\_\_\_

Please describe

22. Please describe any stressful events that have occurred in your family since the tornado that are not directly related to the tornado:

---

---

---

---

---

23. Please provide any additional information related to your child's experience with the tornado that may have had an impact on him/her:

---

---

---

---

---

---

APPENDIX-C

Tornado Exposure Questionnaire-Child Report

Tornado Exposure Questionnaire-Child Report

*Circle the response that best describes your experience during and after the tornado*

1. During the tornado, where were you? *Circle one*

- a. At home                      b. At school                      c. At friend's or relative's house  
d. In a storm shelter at a home                      e. At a community storm shelter

Other \_\_\_\_\_  
Please describe

2. Did windows or doors break in the place you stayed during the tornado?

Yes                      No

3. Did you get hurt during the tornado?

Yes                      No

4. Did you see anyone else get hurt during the tornado?

Yes                      No

5. How scared were you during the tornado? *Circle one*

Not at all	Somewhat	Very	Terrified
Scared	Scared	Scared	

6. Did a pet you liked get hurt or die during the tornado?

Yes                      No

7. Did you get hit by anything falling or flying during the tornado?

Yes                      No

8. Did you have to go outside during the tornado because the building you were in was badly damaged?

Yes                      No

9. Was your home badly damaged or destroyed by the tornado?

Yes                      No

10. How much damage did the tornado cause to your home? *Circle one*

A little            A medium amount            A lot            Totally destroyed

11. Were your clothes or toys ruined by the tornado?

Yes            No

12. Has it been hard to see your friends since the tornado because they moved or you moved?

Yes            No

13. Did you or your family have trouble getting enough food or water after the tornado?

Yes            No

14. Did you move to a new place after the tornado?

Yes            No

15. Did you have to go to a new school because of the tornado?

Yes            No

16. Did you have to live away from your parents for a week or more because of the tornado?

Yes            No

17. Did one of your parents have to stop working because of the tornado?

Yes            No

18. Did your pet run away or have to be given away because of the tornado?

Yes            No



APPENDIX-D

Frederick Reaction Index

**Frederick Reaction Index**

Below are some statements about how children and adolescents might react to the stress of tornadoes. For each one, place a check mark under the words that describe how much of the time it would be true for you.

	None of the time	Little of the time	Some of the time	Much of the time	Most of the time
1. I feel tornadoes are so bad they would upset most kids.	_____	_____	_____	_____	_____
2. I feel afraid or upset with thoughts about tornadoes.	_____	_____	_____	_____	_____
3. I go over in my mind what happens with tornadoes—keep seeing pictures or hearing sounds.	_____	_____	_____	_____	_____
4. I have bad thoughts about tornadoes even though I don't want to.	_____	_____	_____	_____	_____
5. I have bad dreams about tornadoes.	_____	_____	_____	_____	_____
6. Things sometimes make me think that a tornado might happen again.	_____	_____	_____	_____	_____
7. I feel as good about things I like to do, even though tornadoes exist.	_____	_____	_____	_____	_____
8. I feel more alone inside; other people don't really understand how I'm feeling.	_____	_____	_____	_____	_____
9. I feel so scared or sad sometimes that I don't really want to know how I feel.	_____	_____	_____	_____	_____
10. I feel so scared or sad about tornadoes I can't even talk or cry about it.	_____	_____	_____	_____	_____
11. I'm more jumpy or nervous because of tornadoes (startled at loud noises).	_____	_____	_____	_____	_____

	None of the time	Little of the time	Some of the time	Much of the time	Most of the time
12. I sleep well.	_____	_____	_____	_____	_____
13. I feel bad that I can't do something to stop tornadoes from happening or to help.	_____	_____	_____	_____	_____
14. I remember things well; thoughts or feelings about tornadoes do not make me forget things I learn in school.	_____	_____	_____	_____	_____
15. It's easy to pay attention even though tornadoes exist.	_____	_____	_____	_____	_____
16. I want to stay away from things that make me think about tornadoes.	_____	_____	_____	_____	_____
17. When something makes me think about tornadoes I get tense or upset.	_____	_____	_____	_____	_____
18. Things happen that warn me that a tornado is coming.	_____	_____	_____	_____	_____
19. Because of thinking about tornadoes, I have stomachaches, headaches, or other signs of illness.	_____	_____	_____	_____	_____
20. I do not behave recklessly or take chances.	_____	_____	_____	_____	_____

APPENDIX-E

Kidcope

*Instructions: Below is a list of things that kids and adolescents sometimes do to solve problems and feel better. Think about the worst thing that happened to you because of the tornado. For each statement below, circle "yes" or "no" to show if you have used that way of coping with the problem. Then show how much it helped by circling "none", "little", or "lot".*

	Have you done this?		IF YES, How much did it help?		
	Yes	No	None	Little	Lot
1. I just tried to forget it.	Yes	No	None	Little	Lot
2. I did something like watch TV or played a game to forget it.	Yes	No	None	Little	Lot
3. I stayed by myself.	Yes	No	None	Little	Lot
4. I kept quiet about the problem.	Yes	No	None	Little	Lot
5. I tried to see the good side of things.	Yes	No	None	Little	Lot
6. I blamed myself for causing the problem.	Yes	No	None	Little	Lot
7. I blamed someone else for causing the problem.	Yes	No	None	Little	Lot
8. I tried to fix the problem by thinking of answers.	Yes	No	None	Little	Lot
9. I tried to fix the problem by doing something or talking to someone.	Yes	No	None	Little	Lot
10. I yelled, screamed, or got mad.	Yes	No	None	Little	Lot
11. I tried to calm myself down.	Yes	No	None	Little	Lot
12. I wished the problem never happened.	Yes	No	None	Little	Lot
13. I wished I could make things different.	Yes	No	None	Little	Lot
14. I tried to feel better by spending time with others like family, grownups, or friends.	Yes	No	None	Little	Lot
15. I didn't do anything because the problem couldn't be fixed.	Yes	No	None	Little	Lot

APPENDIX-F

Natural Disaster Attribution Checklist

### Natural Disaster Attribution Checklist

*Read the following question and answer it as best you can. Write your answer in the space below.*

When something like a tornado happens, people often ask, “why?” “Why did the tornado strike my town?” “Why were my friends/family/neighbors hurt?” You’ve probably thought about this yourself. What kinds of answers have you come up with? Why do you think it happened?

---



---



---



---

Even though kids know that what happens during a tornado is really nobody’s fault, they sometimes report *feeling* that things might have been their fault or someone else’s fault anyway. ***Read the questions below and think about how often you have felt that way since the tornado. Place a check mark in the column that best describes how often you have felt that way.***

	Not Much	A Little	A Lot
1. Since the tornado, how much do you feel like something bad that happened during the tornado was your fault?	_____	_____	_____
2. How much do you feel like you should have been able to change things that happened during the tornado?	_____	_____	_____
3. Do you think there is anything you could have done differently before the tornado that would have changed what happened during the tornado?	_____	_____	_____
4. How much do you feel like something bad that happened during the tornado was someone else’s fault?	_____	_____	_____
5. How much do you feel like someone could have done something to change what happened during the tornado?	_____	_____	_____
6. How much do you feel like something bad that happened during the tornado was God’s fault?	_____	_____	_____
7. How much do you feel like God should have protected you and your town from the tornado?	_____	_____	_____

	Not Much	A Little	A Lot
8. How much do you feel like something bad that happened during the tornado happened by accident and wasn't anyone's fault?	_____	_____	_____
9. How much do you feel that you should have been able to avoid the bad things that happened during the tornado?	_____	_____	_____
10. How important was it for you to blame someone for the bad things that happened during the tornado?	_____	_____	_____
11. How important was it for you to figure out if the things that happened during the tornado were anyone's fault?	_____	_____	_____
12. How much time do you spend thinking about whether anyone were to blame for the bad things that happened during the tornado?	_____	_____	_____
13. How much do you expect that a tornado will come very close to your school or town in the next 2 years?	_____	_____	_____
14. How often do you find yourself looking for signs that another tornado might be coming?	_____	_____	_____
15. How often do you think about another tornado hitting your town?	_____	_____	_____
16. Before the tornado, how much did you expect a tornado would hit your town?	_____	_____	_____
17. How often do you find yourself looking for a safe place to go in case another tornado comes?	_____	_____	_____
18. Some kids have said that they find themselves looking for a reason why the tornado happened to them and their town. How much have you thought about why the tornado happened?	_____	_____	_____
19. How important was it for you to find a reason why the tornado happened to your town?	_____	_____	_____
20. How much did you try to make sense of the tornado and the bad things that happened?	_____	_____	_____
21. How often have you asked yourself "Why me?" or "Why my town?"	_____	_____	_____



	Yes	No	Don't Know
22. Have you come up with an answer to "Why me?" or "Why my town?"	_____	_____	_____
23. Did you ever feel like the tornado was somehow meant to happen?	_____	_____	_____
24. Some kids look for signs that should have warned them that the tornado was coming. Have you found signs that you should have seen to warn you that the tornado was coming?	_____	_____	_____
25. Did anything happen in the days before the tornado (not weather related) that made you think something bad was going to happen?	_____	_____	_____
26. Some kids look for ways they could have avoided the tornado or the bad things that happened. Have you looked for ways you could have avoided what happened?	_____	_____	_____
27. Did you think you should have known somehow that the tornado was going to happen before the weather got bad?	_____	_____	_____

APPENDIX G

Informed Consent and Assent Forms

## INFORMED CONSENT STATEMENT

Project Title: Children's Distress, Attributions, and Coping after a Natural Disaster

Investigators: Maureen A. Sullivan, Ph.D., Laura Knight, M.A.

---

- A. Purpose: This study will assess the effects of experiencing a tornado on children. Information on children's coping strategies, distress, and attributions made about tornado-related events will be gathered in the winter and in the spring to determine whether reactions are different during tornado season as compared to non-tornado season.
- B. Procedures: I understand that I will be asked to complete the following measures:
1. Demographic Questionnaire. This questionnaire will ask for demographic information about yourself and your spouse or partner such as age, race, and relationship to child, education level completed, marital status, and income.
  2. Tornado Exposure Questionnaire. This questionnaire will ask for information about your experience during the tornado, including your family's location and whether your child was separated from you, how severe you thought the tornado was, the amount of damage to your home, any injuries suffered by your family, your family's current living situation, whether you were prevented from working because of the tornado, and whether you received assistance after the tornado.

I understand that my child will be asked to complete the following measures:

1. Tornado Exposure Questionnaire (child form). This questionnaire will ask your child about his/her experience during the tornado, how severe he/she thought the tornado was, any injuries sustained or witnessed, loss of property, and disruption in routine as a result of the tornado.
2. Kidcope. This questionnaire will ask your child about the ways he/she coped with tornado-related events and how effective your child thinks those coping strategies have been.
3. Frederick's Reaction Index. This questionnaire will ask your child about feelings and thoughts he/she has had about the tornado. Topics include bad dreams, repetitive thoughts, worries, loneliness, and physical complaints like headaches or stomachaches that may have been present after the tornado.
4. Natural Disaster Attribution Checklist. This questionnaire will ask your child about explanations he/she may have for the occurrence of the tornado or bad things that happened during the tornado. Your child will be asked questions about reasons that he/she may have for tornado-related events.

- C. Duration of Participation. Your participation and your child's participation are completely voluntary and may be ended at any point. It is expected to take approximately 30 minutes to complete the parent questionnaires. The child questionnaires are expected to take 60 minutes to complete and will be administered at your child's school during school hours in January. The follow up to this study will occur in April. Your signature on this form gives consent for you and your child to participate in the January study. In April, you will receive another form asking for your consent to participate in the follow-up study.
- D. Confidentiality. All information about you and your child will be kept confidential and will not be released. Questionnaires will have subject numbers, rather than names on them. All information will be kept in a secure place that is open only to the researchers and their assistants. This information will be saved as long as it is scientifically useful; typically, such information is kept for 5 years after publication of the results. Results from this study may be presented at professional meetings or in publications. You and your child will not be identified individually; we will be looking at the group as a whole.
- E. Benefits of participation. Your family will be entered into a \$50.00 drawing after the parent questionnaires are received and the child questionnaires are collected in January. Your family will be entered into another drawing in April after follow-up questionnaires are collected.
- F. Risks of participation. The risks to you and your child are minimal. It is possible that some children may become upset when asked to think about the tornado. If this happens, we will talk with your child about his/her concerns and let you know about his/her concerns. If your child becomes uncomfortable or upset, your child will be given the opportunity to stop participation at that point with no penalty. You will be offered several names and phone numbers of agencies that work with parents and children.

I have been fully informed about the procedures listed here. I am aware of what my child and I will be asked to do and of the benefits of my participation. I also understand the following statement:

I affirm that I am 18 years of age or older.

I understand that I may contact any of the researchers at the following addresses and phone numbers, should I desire to discuss my or my child's participation in the study and/or request information about the results of the study: Maureen Sullivan, Ph.D., 215 North Murray Hall, Dept. of Psychology, Oklahoma State University, Stillwater, OK 74078-0250, (405) 744-6027. I may also contact Sharon Bacher, Institutional Review Board, 203 Whitehurst, OSU, (405) 744-5700. I have read and fully understand this consent form. I sign it freely and voluntarily. A copy of this form will be given to me.

Please read the following statements and place a check next to the statement that indicates your level of participation.

\_\_\_\_\_ I agree to participate and I give my permission for my child to participate if he/she wishes to.

\_\_\_\_\_ I agree to participate, but I do not give my permission for my child to participate.

\_\_\_\_\_ I do not wish to participate, but I give my permission for my child to participate if he/she wishes to.

\_\_\_\_\_  
Parent's Name (please print)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of Parent

\_\_\_\_\_  
Child's Name (please print)

Dear Student,

The tornadoes that cut across Oklahoma on May 3, 1999 are an example of the kind of damage that tornadoes can cause. We are interested in the effects of tornadoes, and we are requesting your help. We are asking you to participate in our study.

To participate in our study, you will have to fill out four forms. These forms ask questions about your family's experiences during the tornadoes, your feelings about the tornadoes, thoughts you have had about the tornadoes, and ways that you have dealt with your feelings.

Please know that whether or not you participate is completely up to you. We do hope that you will take the time to complete these forms and provide us with this important information. If you any question bothers you, please feel free to leave the answer blank.

If you are willing to complete these forms for us, please check off the blank and sign your name on the line. If you do not want to participate, just put the forms back in the envelope, give us the envelope, and you can return to class. The pencil is yours to keep.

\_\_\_\_\_ I agree to participate in this study.

\_\_\_\_\_  
Please print name

APPENDIX H  
IRB Approval Form

Oklahoma State University  
Institutional Review Board

Protocol Expires: 11/5/01

Date: Monday, November 06, 2000

IRB Application No AS0116

Proposal Title: CHILDREN'S DISTRESS, ATTRIBUTIONS, AND COPING AFTER A NATURAL  
DISASTER

Principal  
Investigator(s):

Laura Knight  
215 N. Murray  
Stillwater, OK 74078

Maureen Sullivan  
215 N Murray  
Stillwater, OK 74078

Reviewed and  
Processed as: Expedited (Spec Pop)

Approval Status Recommended by Reviewer(s): Approved

---

1) The reviewer is concerned that the assent form may be a little difficult for the youngest of the sample to understand. You might think about trying to make it even simpler

Signature:   
\_\_\_\_\_  
Carol Olson, Director of University Research Compliance

Monday, November 06, 2000  
\_\_\_\_\_  
Date

Approvals are valid for one calendar year, after which time a request for continuation must be submitted. Any modifications to the research project approved by the IRB must be submitted for approval with the advisor's signature. The IRB office MUST be notified in writing when a project is complete. Approved projects are subject to monitoring by the IRB. Expedited and exempt projects may be reviewed by the full Institutional Review Board.



2

VITA

Laura A. Knight

Candidate for the Degree of

Master of Science

Thesis: CHILDREN'S DISTRESS, ATTRIBUTIONS, AND COPING AFTER A  
NATURAL DISASTER

Major Field: Psychology

Biographical

Education: Graduated from Otsego High School, Otsego Michigan in May 1989; received Bachelor of Arts degree in Theater from Roger Williams University, Bristol, Rhode Island in May 1989; received Master of Arts degree in Clinical Psychology from Roosevelt University in Chicago, Illinois, in September 1999. Completed the requirements for the Master of Science degree with a major in Clinical Psychology at Oklahoma State University in December, 2001.

Experience: Clinical practica experience through Roosevelt University with the Behavior Alternatives for Families program at Illinois Masonic Medical Center, Chicago, Illinois, September 1998 to July 1999. Clinical practica experience through Oklahoma State University Psychological Services Center, August 1999 to present; employed by Oklahoma State University as an instructor of Introductory Psychology, August 2000 to June 2001; research associate in the Child Behavior Research Lab under Maureen Sullivan, Ph.D in the Department of Psychology, Oklahoma State University, August, 1999 to present.

Professional Affiliations: American Psychological Association and Association for the Advancement of Behavior Therapy.

2

VITA

Laura A. Knight

Candidate for the Degree of

Master of Science

Thesis: CHILDREN'S DISTRESS, ATTRIBUTIONS, AND COPING AFTER A  
NATURAL DISASTER

Major Field: Psychology

Biographical

Education: Graduated from Otsego High School, Otsego Michigan in May 1989; received Bachelor of Arts degree in Theater from Roger Williams University, Bristol, Rhode Island in May 1989; received Master of Arts degree in Clinical Psychology from Roosevelt University in Chicago, Illinois, in September 1999. Completed the requirements for the Master of Science degree with a major in Clinical Psychology at Oklahoma State University in December, 2001.

Experience: Clinical practica experience through Roosevelt University with the Behavior Alternatives for Families program at Illinois Masonic Medical Center, Chicago, Illinois, September 1998 to July 1999. Clinical practica experience through Oklahoma State University Psychological Services Center, August 1999 to present; employed by Oklahoma State University as an instructor of Introductory Psychology, August 2000 to June 2001; research associate in the Child Behavior Research Lab under Maureen Sullivan, Ph.D in the Department of Psychology, Oklahoma State University, August, 1999 to present.

Professional Affiliations: American Psychological Association and Association for the Advancement of Behavior Therapy.