Recalling a Devastating Tornado:

Child and Mother-Child Recollections, Meaning Making, and Child Traumatic Stress

By

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Abstract

Trauma exposure is thought to prompt meaning making efforts. The creation of a trauma narrative is part of many trauma treatments, partly because narrative creation is believed to promote therapeutic meanings made of the event. Yet, little is known about which aspects of meaning making are related to positive adjustment or maladjustment in children in non-therapeutic settings and at what time points following trauma exposure, as well as the role of caregivers in this process. 49 8 to 12 year olds and their mothers who experienced an EF5 tornado provided independent and joint recollections about their tornado experiences one year post-tornado. Verbatim transcripts were coded for indicators of meaning making and meaning made. Increased detail, coherence, emotion expression, and indications of meaning made provided by children in both the child-alone narratives and the mother-child conversations related to increased PTSS. In conversations, child-generated content was more frequently related to PTSS than mother-generated content, suggesting that children begin to have an active role in the meaning-making process at this age. Results indicate that certain indicators of making meaning and/or of meaning made are related to higher PTSS one year post-trauma in preadolescent children.

Table of Contents

List of Tables

List of Appendices

Recalling a devastating tornado: Child and mother-child recollections, meaning making,

and child traumatic stress

The role of trauma memories in post-trauma adjustment has long been identified as important and has led to the generation of trauma-focused therapies that include creating a trauma narrative. The conceptual model for an evidence-based clinical intervention for trauma-related distress in children, Trauma-Focused Cognitive Behavioral Therapy, (TF-CBT, described in Cohen, Mannarino, & Deblinger, 2006), suggests that post-trauma adjustment is improved by the creation of a detailed, coherent account of trauma that is emotionally expressive and that "integrates thoughts and feelings about the traumatic event into a consistent and meaningful experience" (p. 120, Cohen et al.). However, little research has examined whether this potentially therapeutic meaning-making process occurs in non-therapeutic contexts, what indicators of this process might be, or whether and how indicators of this process relate to post-trauma adjustment.

In adult samples, studies where participants provide verbal or written recollections of their traumatic experiences have evidenced relations between narrative length, coherence, emotion expression, and indications of meaning made and post-trauma adjustment (e.g., Park & Blumberg, 2002); typically positive adjustment. However, the literature suggests a difference between meaning-making and meaning made (with meaning making being an inherently stressful process that leads to the psychological benefits of meaning made (Park, 2010) and meaning made being a state of having understood the event, ascribed significance to it, and having in some was transcended beyond the event (Park, Edmondson, & Blank, 2009)). To further complicate the matter, recent research shows that for some types of events and some people, both meaning making and meaning made are related to increased distress (see Bonanno, 2013 and Greenhoot, Sun, Bunnell, & Lindboe, 2013 for a summary) in adults.

There is even less consensus about the relations between children's provision of detailed, coherent, emotionally expressive, meaning-laden recollections and post-trauma adjustment due to a paucity of research. Furthermore, meaning making in children is likely influenced by the ways caregivers or trusted adults make meaning out of the event (Bauer, Burch, van Abbema, & Ackil, 2007). Thus, it is also important to consider ways caregivers discuss trauma with children to understand meaning making and it's relation with post-trauma adjustment in children.

Despite little research about meaning making in children, cognitive factors have been identified as related to post-trauma distress in children (Fivush, 2009). It has been proposed that exposure to trauma triggers increased cognitive and emotional processing of the event (Bronfman, Campis, & Koocher, 1998), and that this processing mediates the relation between severity of exposure and posttraumatic stress symptoms (PTSS) in children (Vernberg, La Greca, Silverman, & Prinstein, 1996). Studies of trauma memories indicate that traumatic events tend to maintain a place of high centrality in a child's autobiographical memory (Berliner, Ira, Ayanna, & Monica, 2003; Greenhoot & Sun, 2014), and thus content within these memories may have implications for adjustment. Moreover, "it is not just what *happened* that is critical, but what the event *means* for the self (Fivush, 2009, p. 352)."

Disaster Exposure and Children

High intensity exposure to trauma and loss experiences during and after natural disasters causes short-term posttraumatic stress reactions in most children (Anthony et al., 2005; Lubit, Rovine, DeFrancisci, & Eth, 2003). These reactions, which include re-experiencing phenomena, psychic numbing, and hyperarousal, typically subside over the course of a year. Reactions rarely persist at clinically significant levels for more than 30% of disaster-exposed children at one year post-disaster (Bonanno, Brewin, Kaniasty, & La Greca, 2010). Those with persistent

posttraumatic stress reactions, however, experience functional impairment in multiple domains. Some factors are related to the nature of the disaster and include the intensity, duration, and type of disaster, such as proximity to the disaster, personal harm or threat of harm, or loss of loved ones (Vernberg & Varela, 2001). Other factors pertain to qualities of the post-disaster environment, including ongoing adversity and parental distress (Vernberg & Varela). Child-related factors include prior trauma exposure, age, and gender. Cognitive factors are also thought to affect adjustment; notably event-related cognitions (La Greca, Silverman, & Wasserstein, 1998; Vernberg & Varela), or the ways children make sense of the trauma (Sales, Parker, Fivush, & Bahrick, 2005). A better understanding of cognitive indicators of meaning making and meaning made in disaster-exposed youth may improve the understanding of persistent PTSS.

Joplin Tornado

The multi-vortex tornado that struck Joplin, Missouri on May 22, 2011, was rated an EF5, the highest severity category on the Enhanced Fujita Scale. It was the deadliest tornado in the United States in over 60 years, and the seventh deadliest in the United States (Time, 2011). The intensity of the storm was unexpected, visibility was impaired, and a lack of basements due to the mine shafts beneath the city left most residents without adequate shelter. Buildings within the six-by-two mile path carved by the tornado were flattened, and the death toll was over 160, including 13 children. At the time of the storm, approximately 50,000 citizens lived within city limits. Close to 7,500 homes were destroyed, 17,000 people were displaced, 1,200 individuals were injured, and almost 500 families remained in Federal Emergency Management Agency (FEMA) trailers one year later. At the time of data collection, the psychological and physical effects of the storm continued to be evident in many parts of the community (V. Mieseler, personal communication, March 16, 2012), and a new child psychological services center, Will's

3

Place, was opened to meet the increased mental health needs of children. Many public memorial events were held and were well-attended, and the city's mantras became "Rebuild Joplin," "Don't let one disaster lead to another," and "There's a chance to build back bigger and better."

Aim 1: Narrative Qualities in Child Recollections and PTSS

The first aim of this study was to examine how specific aspects of a child's recollections of the tornado were related to PTSS. Aspects of the ways children talk about trauma may mirror their ongoing or "on-the-spot" efforts to make meaning of and cope with the trauma (e.g., Cohen, Mannarino, Berliner, & Deblinger, 2000; Fivush, Sales, & Bohanek, 2008). They may also be more stable reflections of meaning made about the event. Thus, the relations between aspects of children's recollections and PTSS may help delineate which aspects of recollections signal meaning making versus meaning made. Research on the relation between qualities of child trauma narratives and post-disaster adjustment, presented in the remainder of this section, is emerging but does not yet present a consistent understanding of the phenomenon.

Detail. A study of three- and four-year-old children interviewed a few months following Hurricane Andrew found a quadratic relation between exposure and narrative length: children who were moderately exposed provided the most details, and children with minimal and severe exposure provided fewer details (Bahrick, Parker, Fivush, & Levitt, 1998). Regarding the relation between detail and PTSS, a study using the same sample found that when controlling for exposure, children who provided more details had less PTSS than children who provided fewer details (Sales et al., 2005). Yet, six years later, children in all exposure levels provided the same amount of details (Fivush, McDermott Sales, Goldberg, Bahrick, & Parker, 2004), potentially indicating that children were more likely to provide detailed accounts of the trauma after they had made meaning of the event.

Research has focused on how much detail is given rather which details are recollected. However, whether or not children mention central events that occurred during the traumatic event in their narrative might also relate to PTSS. Children with high levels of exposure might chose to discuss more benign events, such as events related to the post-disaster environment, instead of discussing events more central to the trauma. This could either be due to avoidance of anxiety provoking aspects of their memory for the event (Mossige, Jensen, Gulbrandsen, Reichlt, & Tjersland, 2005) or to difficulty encoding aspects of the most threatening parts of the storm due to peri-traumatic dissociative responses (van der Kolk & Fisler, 1995). Either way, children with increased PTSS may avoid discussion of central events.

Coherence. Memories for trauma have been found to be more coherent that memories for non-traumatic events in child samples (Sales et al., 2003), potentially indicating the increased cognitive processing elicited by trauma exposure. Some work has accumulated on the relation between coherence, evidence that the narrative is presented in chronological order within the context of one's life and contains causal or explanatory language (see Greenhoot et al., 2013 and Sales, Fivush, & Peterson, 2003), and post-trauma adjustment. In a sample of 8- to 16-year-old children receiving treatment for their trauma histories, children who self-rated their memories for the event as highly coherent were less distressed than children whose coherence ratings were low (Berliner et al., 2003). Similarly, in a study of children ages 2 to 13 years who had experienced a medical emergency within the past year, children who were less distressed had more coherent narratives than children who were more distressed (Peterson & Biggs, 1998). In samples of trauma-exposed children, coherence has thus far been shown to relate to positive adjustment.

Emotion Expression. Research indicates that emotion terms are more prevalent in children's memories for highly stressful events compared to memories for positive events (e.g.,

Fivush, Hazzard, Sales, Sarfati, & Brown, 2003), again highlighting the increased processing prompted by trauma exposure. Yet, research on use of emotion terms in children's recollections for trauma and adjustment is mixed. A study of child hurricane survivors indicated that more severely affected children tended to include less emotion expression, particularly until a significant amount of time had passed (Sales et al., 2005). The authors' conclusion was that when trauma is extreme, it could take years for children to process their emotional reactions and thus integrate them into their recollections. However, links to well-being were not explored in this study, and recent research has shown contradictory findings.

A high frequency of emotion terms in trauma narratives is related to increased distress in children following disaster (Legerski, Greenhoot, Vernberg, LaGreca, & Silverman, 2013; Sales & Fivush, 2005), even over time. This suggests that contrary to findings in adult populations, expressing emotions may not speed recovery in children. Children may lack the cognitive and emotional regulation skills needed to understand emotions in ways that help them make sense or meaning out of the event (Brenner & Salovey, 1997). Thus, frequency of emotion terms in children could be a reflection of internal emotional distress or even of re-experiencing negative emotions related to the event. Another explanation is that the presence of emotionally-laden content in narratives created by children could reflect efforts toward meaning making (Fivush & Baker-Ward, 2005) as opposed to meaning made, and thus be associated with increased PTSS.

Regardless, emotion terms being related to increased PTSS seems contrary to Criterion C of PTSD. To meet Criterion C, the victim must evidence "avoidance of stimuli associated with the trauma and psychic numbing" as indicated by phenomena such as "restricted range of affect" and "efforts to avoid thoughts and feelings related to the trauma of PTSD," (DSM-IV-TR, 2004, pp. 468). An explanation for these seemingly contradictory findings may be that when prompted

to provide recollections, children with increased PTSS provide responses that include increased emotion terms despite a preferred avoidance of such topics. More research on when and for whom emotion expression is helpful or indicative of positive or negative adjustment is needed.

Meaning. Studies pertaining to the presence of explicit references toward meaning made in childhood recollections of trauma are scarce, as are studies evaluating whether the aforementioned narrative qualities are indicative of current meaning making efforts (potentially stressful) or of meaning made (potential therapeutic outcome of the stressful meaning making process). Only one study on this topic was found, and showed that 8 to 16-year-olds rated memories for trauma to be more meaningful and more impactful to their lives than positive memories (Berliner et al., 2003).

This absence of research could be because developmental research has shown that even adolescents rarely provide abstract references toward meaning made in trauma recollections (McLean & Pratt, 2006). Studies regarding the presence of references toward meaning made, such as lessons learned and insights gained, have shown that younger adolescents mention concrete lessons they learned from the event, whereas older adolescents mention more abstract insights gained (McLean & Pratt). Because the meaning making process likely becomes more sophisticated throughout the lifespan, a developmentally sensitive way to capture how children express meaning made could be to evaluate concrete references toward life changes the event caused and whether these changes were perceived as good or bad.

Aim 2: Narrative Qualities in Joint Mother-Child Recollections and PTSS

The second aim of this study was to examine whether qualities of mother-child conversations about the tornado were related to PTSS. Children might be reluctant or struggle to discuss trauma without caregiver guidance, who presumably has more advanced narrative and

emotion-regulation skills. Research indicates that parents and children frequently discuss past events and that these conversations shape children's memories of and reactions to experiences (Fivush, 2009). However, most research has focused on non-traumatic events. Additionally, no studies have analyzed qualities from both child recollections and mother-child conversations about trauma and their relation with post-trauma adjustment within the same sample.

Narrative skills, including the ability to discuss traumatic events in adaptive ways (Bauer et al., 2007), have been proposed to develop via relational processes during preschool and early childhood (e.g. Fivush, Haden, & Reese, 1996). The context of mother-child conversations purportedly provides a safe environment for children to discuss negative emotions (Laible, 2004) and stressful aspects of trauma. For example, when talking with parents about trauma, children might be prompted to provide more detail, coherence, emotion expression, or references toward meaning made. Additionally, the presence of child-generated narrative qualities might be differentially related to PTSS depending on whether they are present in an individual recollection or a parent-child conversation about trauma.

Detail. Several studies have addressed aspects of mother-child conversations about stressful events and show that elaborativeness increases with the perceived stressfulness of the event. Ackil, van Abbema, and Bauer (2003) found that mother-child discussions about a deadly tornado were significantly longer and contained more detail than discussions about positive events. Other studies have shown that maternal elaborativeness about traumatic events is related to increased content provided by children at later timepoints (Bauer et al., 2007). What is unknown is whether engaging in longer conversations promotes positive adjustment over time.

Coherence. Aspects of maternal conversations about stressful events that include causal or explanatory language, a proposed aspect of narrative coherence, have been shown to predict

positive adjustment during discussions of stressful events but not during discussions of acutely traumatic events (e.g., Sales & Fivush, 2005). The authors concluded that this finding could indicate that it makes less sense for mothers to use causal and explanatory language when discussing an unpredictable event that was difficult to prepare for. Results from another study indicated that mother-child conversations about a devastating tornado were rated as more coherent than discussions about positive events, suggesting that the creation of a coherent account of the trauma is modeled for children during mother-child conversations about trauma (Ackil et al., 2003). However, there is a need for a better understanding of the role of coherence in mother-child conversations about trauma in predicting post-trauma adjustment.

Emotion Expression. Emotion terms are common in mother-child conversations about negative events (Laible, 2004), and emotion terms are more consistently found in conversations about frustrating and scary events than in conversations about positive events (Fivush, Berlin, Sales, Mennuti-Washburn, & Cassidy, 2003). Maternal use of emotion terms during conversations about a deadly tornado was related to increased child use of emotion terms at six-month follow-up (Bauer et al., 2005). However, the relation between maternal or child use of emotion terms during conversations about trauma and child PTSS is unknown. The inclusion of emotion terms in mother-child conversations about fearful or sad events has generally been shown to promote child "emotional self-concept," or the ability to discuss emotions with others in ways that promote coping with negative emotion (Fivush, Berlin et al.). Thus, the presence of emotion terms in conversations may be related to or even promote positive adjustment.

Meaning. It is not expected that children will make frequent references to meaning made in individual recollections. However, mothers may make these references and thus influence their child's adjustment by helping their children comprehend and transcend the event. No

research has examined the presence of maternal or child references toward meaning made during conversations about trauma and how they relate to children's post-trauma adjustment.

Summary of Aims and Hypotheses

The first study aim was to examine how qualities of individual child recollections of the Joplin tornado were related to child-reported PTSS. Although children likely struggle compared to adults in their ability to create trauma recollections, it was expected that the frequency and/or degree of qualities in the child narratives would vary, and that this variability would be related to severity of exposure and PTSS. It was also expected that higher levels of emotion expression and negative meaning made would positively relate to PTSS, whereas increased detail, coherence, and references toward meaning would negatively relate to PTSS. This was based on the assumption that increased emotion expression and negative meaning made would be an indication of meaning making and/or a reflection of ongoing distress, whereas increased detail, coherence, and references toward positive meaning made would reflect meaning made.

Because it is likely that mothers influence the development of the meaning making process in their children, the second aim was to examine how maternal prompting during conversations about trauma and child responses to this prompting were related to PTSS. It was expected that in general, all child narrative qualities would appear more frequently or to a greater degree in the mother-child conversations than in the individual child recollections. It was also expected that the frequency and degree of the qualities in the mother-child conversations would relate to PTSS differently than those same qualities in the child-alone narratives.

Due to the potentially supportive environment in which a mother-child conversation occurs, it was hypothesized that child-generated detail and emotion expression would positively relate to PTSS due to the child feeling safe to explore unresolved emotions. Conversely,

10

maternally-generated detail and emotion expression were expected to correlate negatively with PTSS. This prediction was based on the assumption that the maternal patterns of discussing the trauma captured in the conversations would be reflections of the ways mothers have discussed the trauma with their children over time, and that these ways of discussing the trauma would have increased the child's mastery over trauma-related thoughts and feelings. Coherence was expected to positively relate to PTSS given previous findings that it might be difficult to provide a coherent story about something that was unpredictable and that providing causal and explanatory language around unpredictable events might not make sense. Finally, references toward meaning made, whether generated by the mother or the child, were expected to be negatively correlated with PTSS unless the meanings made were negative.

Method

Participants

Forty-nine typically developing 8 to 12 year olds (M = 9.42, SD = 1.39) and their mothers who lived in Joplin, Missouri, and experienced the EF5 tornado on May 11, 2011 (49 children, 41 mothers) participated. Three dyads were excluded from analysis and not included in the previous statistics: one child was not living in Joplin during the tornado, one child had verbal deficits, and one child reportedly had Autism-related verbal deficits. Seventy-eight percent of participants were white/non-Hispanic, 7.8% Hispanic, 3.9% Black and 7.8% other/biracial. Yearly household income ranged from 0 - $20,000 to greater than $100,000 with a median yearly household income of the sample of $30,000 - $40,000. In 2011, Joplin residents were 87.7% white/non-Hispanic, 3.1% Hispanic, 3.1% Black, and 6.1% other/biracial and the median household income in Joplin was approximately $38,000 (City-Data, 2014). Of the 3,531 students between ages 8 to 12 enrolled in public or private schools in Joplin at the time of data collection,

1.3% of children participated. Data collection was completed between 14 and 18 months post-tornado. Twenty-four percent of children had received some type of mental health intervention due to tornado-related distress.

Recruitment

Three human subjects institutional review boards approved this project: the University of Kansas, the Missouri Department of Mental Health, and a mental health agency in Joplin. Several local service organizations allowed research team members to recruit on-location, including YMCAs[©], religious organizations, and Boys and Girls Clubs of America[©]. Recruitment also ensued via the project's website, Facebook[®] page, Twitter[®] account, TV news stories, and by schools disseminating flyers and posting web announcements.

Procedures

Mothers and children met with researchers at the family's place of residence or local service sites. Following receipt of parental consent (Appendix A) and verbal child assent, the mother and child separately completed a task of verbal comprehension and a set of measures pertaining to psychosocial adjustment (Appendix B). See Table 1 for a complete set of measures and order of administration. Not all measures administered were used in current analyses. When applicable, questionnaires were read aloud to participants.

Next, researchers interviewed the mother and child individually about their experiences during and after the tornado using the standard protocol from the Narrative Task (Project Share Procedural Instructions; Appendix C). These individual interviews either followed or preceded a mother-child conversation about the tornado (counterbalanced order), which also used a standard protocol to prompt the dyads to discuss challenging and positive experiences (Appendix C). After issuing instructions to the dyads to discuss challenging aspects of the tornado, the

researcher left the room for five minutes. The researcher then came back and prompted the dyad to spend five minutes discussing tornado-related positive things that happened to their family.

Following interviews, the dyads completed measures regarding the subjective and objective severity of the child's exposure to the tornado (Appendix D) so that tornado-specific questions would not interfere with spontaneous recall during interviews (see Bauer et al., 2007, for a study with similar methodology). Then, families participated in debriefing (Appendix C) and were given gift certificates ($20 for the mother, $10 for the child) for participating.

Research on participant reactions to projects that collect narratives from trauma survivors, although scarce, does not indicate long-term procedure-related distress (Legerski & Bunnell, 2010). Rather, results show that many participants report participation-related benefits. Interview formats have been identified as preferable to survey formats (Legerski & Bunnell, 2010) in trauma samples, favoring the methods of the current study. Nonetheless, researchers screened for study-related distress in all participants post-participation. A referral sheet with contact information for local mental health organizations was also provided (Appendix E), along with an explanation regarding how to recognize symptoms of study-related distress in children.

Measures

Tornado-Related Traumatic Experiences (TORTE; Vernberg & Jacobs, 2005). The TORTE was modeled after the Hurricane-Related Traumatic Experiences (HURTE) questionnaire (Vernberg et al., 1996) that was created to measure exposure to traumatic events during and after Hurricane Andrew. The TORTE was used to assess child-reported objective exposure to life-threatening experiences and disruptive life experiences during and after the tornado. Items in the original scale related to subjective distress during the storm were omitted from the scale for this project. The 23-item scale used in this study was intended to be a measure

13

of objective severity (scale is provided in Appendix D).

UCLA Reaction Index for Children-Self Report Version, Diagnostic and Statistical Manual – IV Revision (RI, DSM-IV Revision; Pynoos & Steinberg, 2002). The UCLA RI, DSM-IV Revision was designed for children ages 7 to 18 and was used to assess child-reported symptoms of posttraumatic stress. The symptom scale of the RI contains 22-items with five answer options spanning from 0 (none) to 4 (most of the time). Children were asked to answer questions on the RI symptom scale based on how they had felt due to their tornado experiences in the past month. The RI symptom scale can be used to determine whether a child meets symptom criteria for PTSD and to create an overall score of PTSS severity. Convergent validity for the RI has been cited at .70 when compared to the PTSD Module for the Schedule for Affective Disorders and Schizophrenia for School-Age Children (as cited in Steinberg, Brymer, Decker, & Pynoos, 2004), and internal consistency is approximately .90 (Steinberg et al., 2004). The PTSS severity score had a Chronbach's α of .81 in this study.

Narrative Tasks. The child was questioned with a standard protocol of four open-ended prompts that were designed to elicit tornado-related memories and related thoughts and feelings in this study. Prompt 1 was "tell me some things that happened to you or your family because of the tornado," Prompt 2 was "What were some challenging or difficult things that happened to you or your family because of the tornado," Prompt 3 was "What were some positive or good things that happened to you or your family because of the tornado," and Prompt 4 was "How have things been different for your or your family since the tornado." Mother-child dyads were only asked to respond to two prompts during the conversations: "What were some challenging or difficult things that happened to you or your family because of the tornado" and "What were some positive or good things that happened to you or your family because of the tornado."

Children were asked more questions in the individual interview given the assumption that children would need more orientation to the task to provide a story about their experiences.

Riddles (subscale of the Kaufman Brief Intelligence Scale, Second Edition; KBIT-2; Kaufman & Kaufman, 1997). The Riddles subtest was administered to screen for verbal reasoning abilities and as a way to exclude participants with verbal reasoning abilities falling within the potentially intellectually disabled range (< 70). The Riddles subtest contains 48 items that measure "verbal comprehension, reasoning, and vocabulary knowledge" (p. 4). This subtest can be administered to participants ages 4 through 90, and contains basal and ceiling cut-offs to decrease administration time. Participants are not required to be able to read to complete this subtest, and must answer verbally. Internal consistencies for children ages 8 to 12 are acceptable and range from .84 to .89.

Participation-Related Distress. A mood rating was created for use in this project to assess for changes in mood due to participation. The scale consisted of three questions assessing levels of happiness, upset, and sadness on a scale from 1 (not at all) to 5 (extremely; Appendix C). Participants completed the mood rating prior to and following participation. At the end of the study, participants were also asked to rate how much they regretted participation and how much they benefitted from participation (scale from 1 (not at all) to 5 (extremely)).

Narrative and Conversation Coding

Narratives and conversations were transcribed verbatim prior to coding. Transcripts were then checked for accuracy and coded for the following dimensions: Detail, Coherence, Emotion Expression, and Meaning. Tables 2 and 3 indicate narrative qualities comprising each dimension; Appendix F contains the coding protocol. A master coder coded each transcript, and 20% of transcripts were coded by a reliability coder. Once acceptable inter-rater reliability was achieved

(interclass correlations of above .70, percent agreement of 90% or greater), only codes from the master coder were used. All narrative dimensions except Coherence and Resolution were coded using content from the entire narrative and were coded separately for child- and mother-generated content. Coherence was coded per prompt given that each new prompt naturally called for a change in the coherence of each narrative or conversation. Coherence was also unable to be coded separately for child- and mother-generated content given the reliance of the coherence codes on a continuous story line. Resolution, one of the meaning codes, was only coded using prompts that asked participants to discuss positive or neutral aspects of the tornado because coding for Resolution following a prompt to discuss positive aspects of the tornado was redundant with task demands.

Detail. Two types of analyses were used to determine the level of detail in the transcripts (Tables 2 & 3). The first was an analysis of whether the narratives specifically referred to events that took place during the tornado (Central Event). For the child narratives, inter-rater reliability of whether or not the child mentioned the Central Event was 95%, and inter-rater reliability for the mother-child conversations was 90%. The second analysis of detail involved calculating word counts of the narratives and conversations (Word Count). Word counts that separated child- and mother-generated content from the conversations were also obtained.

Central Event example, child (coded "1" or "yes"): *"...when I was outside...I saw something swirling in the street..."*

Central Event example, mother-child conversation (both mother and child coded "1" or "yes"):

Parent: *Do you remember what we did when it hit?*
Child: *Uh, Yeah.*
Parent: *What'd we do?*
Child: *Well, first of all, we saw that TV and it was black and it had a hole, and you said*

come back down the hallway….

Coherence. The coherence of the transcripts was coded using a scheme developed by Baker-Ward and colleagues (2007; Tables 2 & 3). Three dimensions of coherence were coded on a scale of 0 (complete absence of the dimension) to 3 (fully coherent use of the dimension) per prompt: Context (places event in time and place), Chronology (contains temporal organization), and Theme (use of explanations to create a logical story with links to autobiographical memory). Separate codes for child- and mother-generated content were not obtained. Interclass correlations used to determine inter-rater reliability for the child narratives were .94 for Context, .95 for Chronology and .93 for Theme, and for the mother-child conversations were .94 for Context, .91 for Chronology and .85 for Theme.

Chronology and Theme example, child (both 3-point responses):

Interviewer: *Can you tell me just some things that happened to you and your family because of the tornado?*
Child: *Well, um, first, my sister lived on…closer, inward toward the tornado and she lived in an apartment, and she was coming home from work by the mall and she walked out of the building and heard the sirens, came back in, told her boss 'cause the police and the, uh, mall [police] weren't doing anything about it and…she said everyone get down, there's sirens are going off and the police….the officers in the building were a bit upset about that. And, uh, my sister got in her vehicle, drove over and uh, came up in the house and said "I'm taking you over back to my apartment" and my parents said, uh, "no you're not taking him [me] over, the sirens are going off. And so she stayed here and I'm kinda glad that she listened to my parents and, 'cause her…she was the middle apartment on the bottom floor and her apartment [is] now the end apartment 'cause, so the whole entire other side of the apartment complex was gone.*

Context example, mother-child (3-point response): "Child: *And then all after that, we went in [name's] room and he let us play with his guitar.*"

Emotion Expression. The Linguistic Inquiry and Word Count (LIWC) program was used to analyze the text of the transcripts for the presence of emotion terms (positive/neutral and negative; Tables 2 & 3). The LIWC has been shown to reliability detect emotionality in a variety

of populations (e.g., Tausczik & Pennebaker, 2010). The overall frequency of positive and negative emotion terms per transcript was identified, as well as the frequency of child versus mother-child generated emotion terms in the conversations.

Negative Emotion example, child (1-point Negative Emotion): *"Some of us are still a little worried. And that's all I have to say right now."*

Positive Emotion example, mother-child (scored only for child; 1-point Positive Emotion): "Mother: *How did that make you feel being able to contribute?* Child: *Happy.*"

Meaning. A coding scheme developed by Greenhoot and colleagues (2013) adapted from McLean and Pratt (2006) was used to code several dimensions of positive and negative meaning made. Dimensions included Resolutions, Instrumental Change (references to concrete changes due to event), Personal Impact (references to relational or psychological impact of event), and Lessons Learned/Insights Gained (Tables 2 & 3). The coding scheme for meaning was intended to be able to capture basic (Instrumental Change) and sophisticated (Lessons Learned/Insights Gained) indicators of meaning made (McLean & Pratt, 2006). The entire transcripts were used to code for all meaning dimensions except for Resolution (Resolution was only coded using data from neutral or negative prompts), and all meaning codes were coded separately for child- and mother-generated content in the conversations. Only unique references toward meaning were coded, not repetitions. Interclass correlations between two raters were .96 for Resolution, .96 for Lessons/Insights, .97 for Positive Instrumental Change, .94 for Negative Instrumental Change, .82 for Positive Impact, and .97 for Negative Impact for the child narratives, and .96 for Resolution, .96 for Lessons, .89 for Positive Instrumental Change, .98 for Negative Instrumental Change, .79 for Positive Impact, and .87 for Negative Impact for the conversations.

Positive Instrumental Change example, child (2-points Instrumental Change

Positive):*"We have more land as you can see, and uh, our house is bigger than before."*

Negative Personal Impact example, child (1-point Personal Impact Negative):*"My friend died. His name was [child's name]."*

Resolution example, child (2-point response):

Interviewer: *Tell me about some things that happened to you and your family because of the tornado.*
Child: *...my dad was losing business when, before the tornado hit, and we were about to shut down, and close. When the tornado came through, everyone was buying appliances because everyone's house had broken [down]. So, thanks to the tornado, we, it saved our business.*

Lessons/Insights example, mother-child (scored only for mother; 3-point response):

Parent: *Yeah, I think we've became a lot stronger, do you? Do you think you're a stronger person? Yes, no?*
Child: *Yeah.*
Parent: *Yeah? Went through a lot of stuff didn't think we could handle, huh? We made it.*
Child: *Mm-hm. Yeah.*
Parent: *Made some new friends, right?*
Child: *Mm, not really.*
Parent: *New neighbors. No? New neighbors?*
Child: *All of our new neighbors are moving.*

Results

Children endorsed a high level of trauma exposure. Table 4 contains frequencies from current data as well as data from a sample of approximately 600 elementary school children who lived in areas that experienced severe property damage during Hurricane Andrew (Vernberg et al., 1996). Exposure severity appears similar between samples. Child reported levels of PTSS in this study indicate that 90% of children met Criterion A for PTSD. Whether or not the child met Criterion A was determined by whether they responded "yes" to at least one question on Part A of the UCLA PTSD Reaction Index, because Part A assessed for whether or not the child responded to the event with helplessness or horror (e.g., "were you scared you might die," "did you feel like you could not stop what was happening to you"). Sixteen percent of children met

full PTSD symptom criteria (Met PTSD Criteria) and that many reported significant PTSS (M = 23.56, SD = 12.08, range = 5 to 52). Bivariate Pearson and Spearman correlations were conducted between Exposure and PTSS. Results in Table 5 indicate that the TORTE score positively correlated with PTSS Severity and that the correlation with Met PTSD Criteria approached significance. Results for subscales of the PTSD Reaction Index, including whether the child met Criterion B, C, or D were examined and when significant correlations were observed, increased PTSS symptoms was related to increased exposure. Only the total scores from the UCLA Reaction Index were used in subsequent analyses due to the individual subscales providing information similar to that of the total scale scores.

Descriptive statistics were used to evaluate the distribution of qualities in child narratives (Table 6). Resolutions, Lessons/Insights, and Personal Impact were present in the child narratives less frequently or to a lesser degree than coherence, emotion terms, and instrumental change; however, the presence or degree of all qualities varied throughout the sample. Between groups t-tests were conducted to determine if child qualities occurred more frequently or to a greater degree in the child narratives that followed the mother-child conversation than in those that preceded the conversation. No significant differences were identified (p values ranged from .07 – .95). Within-subjects t-tests were conducted to determine if there were differences in frequency and degree of child qualities in child narratives and in child-generated content in mother-child conversations. Table 7 shows that Positive and Negative Emotion and Lessons were more frequently present in child-generated content in conversations than narratives. Unexpectedly, negative instrumental change was less frequently present in child-generated content conversations than in narratives (Table 7).

Correlations between age, verbal ability, and PTSS were conducted to test whether these

variables explained the relationship between narrative qualities and PTSS. None of these variables evidenced statistically significant correlations with Met PTSD Criteria or PTSS Severity (*r* values ranged from -.21 to .09). Age and verbal ability were not included in subsequent analyses.

Aim 1: Child Narratives and PTSS

Data analysis for Aim 1 began with determining if narrative qualities within each dimension were multicollinear. Then, correlations between narrative qualities and PTSS Severity and Met PTSD Criteria were conducted. Next, regression analyses were conducted between narrative qualities and PTSS while controlling for Exposure. Overall, when narrative qualities were related to PTSS the presence of the qualities was related to more severe PTSS. This typically remained true when controlling for severity of exposure, although some relations were no longer significant once controlling for exposure. Results per dimension are presented below.

Detail. Central Event (whether the child mentioned events that occurred during the tornado) and Word Count were positively correlated (r=.45, p<.01). Central Event was not correlated with Met PTSD Criteria or PTSS Severity, but Word Count was correlated with Met PTSD Criteria (r=.45, p<.01). Word Count remained a significant predictor of Met PTSD Criteria when controlling for Exposure (Table 7); children meeting PTSD criteria said more about their tornado experiences than those without PTSD when controlling for severity.

Coherence. Coherence (Context, Chronology, and Theme) was measured per prompt. Context, Chronology and Theme *per* prompt were positively correlated (no correlations above .85). Context, Chronology and Theme *between* prompts were rarely correlated, but when significant correlations were present they were positive (*r* values ranged from -.10 to .50). Positive correlations between Context, Chronology, and Theme from Prompt 2 ("Tell me some

challenging or difficult things that happened to you because of the tornado") and PTSS were consistently observed: Theme from Prompt 2 correlated with PTSS Severity (r=.34, p<.01), Context from Prompt 2 correlated with Meet Criteria (r=.32, p<.05), Chronology from Prompt 2 correlated with Met PTSD Criteria (r=.28, p<.05), and Theme from Prompt 2 correlated with Met PTSD Criteria (r=.37, p<.01). Chronology from Prompt 3 correlated with Met PTSD Criteria (r=.31, p<.01) and Context from Prompt 4 correlated with Met PTSD Criteria (r=.36, p<.01). Only Coherence domains from Prompt 2 were used in subsequent analyses given the frequency and consistency of correlations between Coherence and PTSS in this prompt. Word Count from Prompt 2 was correlated with Coherence domains from Prompt 2 (r values ranged from .64 to .78, p<.01), so Prompt 2 Word Count and Exposure were used as covariates. Tables 8 and 9 indicate that Coherence remained predictive of PTSS when controlling for Word Count and Exposure. Children meeting PTSD criteria included more context and theme than those without PTSD when controlling for exposure. Also, children with higher levels of PTSS included more theme than children with lower levels.

Emotion Expression. Frequency of Positive and Negative Emotion terms were positively correlated (r=.56, p<.01) but were maintained as separate variables due to disparate relations found between positive versus negative emotion expression and child PTSS in previous research. The correlation between Positive Emotion and Met PTSD Criteria approached significance (r=.28, p<.10). Negative Emotion correlated with PTSS severity (r=.31, p<.05) and Met PTSD Criteria (r=.43, p<.01). Word Count correlated with Positive Emotion (r=.78, p<.01) and Negative Emotion (r=.74, p<.01) and so was included with Exposure as a covariate. Emotion terms did not significantly relate to PTSS when controlling for Word Count and Exposure (Tables 8 & 9). So, contrary to findings between detail and coherence and PTSS, emotion

22

variables were no longer related to PTSS Severity or Met PTSD Criteria once controlling for Exposure and Word Count.

Meaning. Meaning dimensions (e.g., Positive Instrumental Change, Positive Impact) were not multicollinear and were maintained as separate variables. Resolution correlated with Met PTSD Criteria (r=.30, p<.05), Positive Instrumental Change trended toward correlating with PTSS Severity (r=.27, p<.10) and correlated with Met PTSD Criteria (r=.36, p<.01), and Negative Instrumental Change correlated with PTSS Severity (r=.28, p<.05) and Met PTSD Criteria (r=.44, p<.01). Word Count correlated with Resolution (r=.48, p<.01), Positive Instrumental Change (r=.66, p<.01), and Negative Instrumental Change (r=.42, p<.01), so Word Count and Exposure were used as controls. Several Meaning variables approached significant correlations with PTSS when controlling for Word Count and Exposure (Tables 8 & 9). Yet, similar to Emotion results, meaning variables did not significantly account for variance in PTSS Severity or Met PTSD Criteria once controlling for Exposure and Word Count.

Provided below are sample narratives from Prompts 1 ("Tell me some things that happened to you and your family because of the tornado") and 2 ("Tell me some challenging or difficult things that happened to you and your family because of the tornado") of two children's narratives. The first child met PTSD symptom criteria, and the second child only met Criterion A for PTSD (exposed to a life-threatening event and responded with helplessness or horror). The first child's narrative begins by describing difficult aspects of the central event in detail while providing a high degree of chronology. Additionally, the child mentions getting "sick" (scored as a negative emotion term), and how she "doesn't like talking about [the tornado]":

Child #1 Sample Individual Narrative, Prompts 1 and 2 (Met PTSD Criteria):

Interviewer: *Tell me some of the things that happened to you and your family because of the tornado.*

Child: *Well my sister just got sick…well, we got sick because it hit….*
well we threw up, she threw up, me and her and stuff. And well, that's all I've
got to say, sorry.
Interviewer: *It's ok. Is there anything else you want to tell me about?*
Child: *No.*
Interviewer: *Describe some challenging things that happened to you and your family*
because of the tornado.
Child: *We don't like talking about it? Um, we were running and running and*
running and we went to the basement and we couldn't see nothing and it was
grey clouds and stuff and we couldn't see and stuff and it was really windy
windy windy and well, we, my grandma called my mom at first and said, well
you guys need to get to the ba—, and then my mom picked me up and started
to run, then finally her and my mom and aunt was at [person's house] and
then mom grabbed me and started to run with me and stuff….

The second child's narrative is different than the first child's in a few ways. The second

child begins by discussing a positive thing that happened because of the tornado. Even though

this child also discusses some challenging things that happened and provides some chronology to

the narrative, when specifically asked to discuss challenges the child did not add more

information. Additionally, the second child does not use negative emotion terms:

Child # 2 Sample Individual Narrative, Prompts 1 and 2 (Met only Criterion A for PTSD;

low PTSS):

Interviewer: *Tell me, what were some things that happened to you because of the*
tornado?
Child: *That we didn't go to school for a couple of days.*
Interviewer: *You didn't go to school for a couple of days.*
Child: *And I was happy about that.*
Interviewer: *Mmm.*
Child: *After the tornado was over we went to the city to see what it was like, when it was*
tore down and stuff. Then after that then there was another tornado, there's three of them,
so we went to the church because…we couldn't go to our house or a shelter so we had to
go to that church to be safe.
Interviewer: *Mmhm.*
Child: *like in the middle of it, cause there's this hallway, that, um, cause the place…the*
church was huge and it was brick.
Interviewer: *Mmhm.*
Child: *And that's it!*
Interviewer: *Well, tell me about some challenging or difficult things, some hard things*
that happened to you because of the tornado.

Child: *Mmm…nothing.*
Interviewer: *Nothing was challenging or difficult?*
Child: *No, still the same.*

Aim 2: Mother-Child Conversations and PTSS

Data analysis for Aim 2 also began with conducting correlations between narrative qualities in each dimension to determine if any qualities were multicollinear, with the addition of determining whether there was multicollinearity between mother- and child-generated qualities per dimension. Then, correlations between narrative qualities and PTSS Severity and Met PTSD Criteria were conducted. Next, regression analyses were conducted between narrative qualities and PTSS while controlling for Exposure (and Word Count when indicated). Many positive correlations between narrative qualities and PTSS variables were observed in conversations, similar to child narratives. In general, child-generated qualities were related to PTSS more frequently than mother-generated qualities. Results per dimension are provided below.

Detail. Child- and mother-generated Central Event were highly correlated ($r=.918$, p<.01) and thus a combined score was used. Child and mother-generated Word Count were moderately correlated ($r=.35$, p<.05) but were not combined due to lack of multicollinearity. Central Event correlated with PTSS symptom severity ($r=.41$, p<.01) and Met PTSD Criteria ($r=.35$, p<.05). Child Word Count correlated with Met PTSD Criteria ($r=.37$, p<.01) but Mother Word Count was unrelated to PTSS. Central Event and Word Count remained related to PTSS when controlling for Exposure (Tables 10 & 11). Central Event remained related to PTSS severity once controlling for Exposure, and Child Word Count was related to both Met PTSD Criteria *and* PTSS Severity once controlling for exposure, different than findings from child narratives. Mother-generated word count was unrelated to PTSS variables but Central Event, as a combined Child/Mother-Child variable, was related to PTSS severity.

Coherence. Coherence was measured per prompt, and child- and mother-generated content were unable to be coded separately. Context, Chronology, and Theme were positively correlated *per* prompt but were not judged to be multicollinear due to all zero-order correlations between dimensions being below .85. Context, Chronology and Theme were again only intermittently correlated *between* prompts, but all statistically significant correlations were positive (*r* values ranged from -.11 to .50). For the mother child-conversations, Prompt 1 was "Tell me some challenging or difficult things that happened to you or your family because of the tornado," meaning that Prompt 2 in the child narratives and Prompt 1 in the conversations were equivalent. For Prompt 1, Theme correlated with PTSS Severity (*r*=.31, p<.05). No correlations between Coherence and Prompt 2 ("Tell me some positive or good things…") were observed, unlike findings from child narratives. Word Count from Prompt 1 of the conversations correlated with Theme from Prompt 1 of the conversations (*r*=.40, p<.01). Theme from Prompt 1 was no longer a significant predictor of PTSS when controlling for Word Count and Exposure in the regression model (Table 10).

Emotion Expression. Negative and Positive Emotion were again maintained as separate variables due to differential findings between use of negative and positive emotions terms and psychosocial outcomes in research. Child- and mother-generated Negative and Positive Emotion were also used as separate variables due to inconsistent correlations between Child-and Mother-generated Emotion terms. Mother use of emotion terms was not related to PTSS. Child-generated Negative Emotion correlated with PTSS Severity (*r*=.30, p<.05), child-generated Positive Emotion correlated with Met PTSD Criteria (*r*=.30, p<.05) and child-generated Negative Emotion correlated with Met PTSD Criteria (*r*=.33, p<.05). Word Count positively correlated with child-generated Positive Emotion (*r*=.82, p<.01) and child-generated Negative emotion

26

(r=.51, p<.01). Similar to child findings, child-generated Emotion variables were no longer related to PTSS when controlling for Word Count and Exposure. Mother-generated variables were unrelated to PTSS variables.

Meaning. Correlations between Child- and mother-generated Lessons/Insights (r=.93, p<.01) were multicollinear and collapsed into one variable; however, this variable was unrelated to child PTSS. Child-generated Negative Personal Impact correlated with Met PTSD Criteria (r=.39, p<.01). Child Word Count and child-generated Negative Personal Impact were correlated (r=.40, p<.01), and when Child Word Count was included as a predictor in regression analyses, child-generated Negative Personal Impact no longer related to Met PTSD Criteria (Table 11). As with the many other narrative variables, mother-generated impact statements were not significantly related to children's symptoms. Also, similar to results from child narratives, no meaning variables remained related to PTSS once controlling for Exposure and Word Count.

No participants exhibited significant levels of participation-related distress nor required being connected with local crisis services. Participant-reported levels of happiness ($t = 1.54$; p = .13), nervousness ($t = 1.54$; p = .13), or upset ($t = -.10$; p = .92) did not change from pre- to post-participation, and perceived benefit of participation was significantly greater than regret of participation ($t = 8.27$; p < .001).

Provided are excerpts from Prompt 1 ("Talk about some challenging or difficult things that happened to you or your family because of the tornado") of the mother-child conversations from the same children whose narratives were provided in Aim 1 results. The first conversation is detailed, discusses the central event using a high degree of coherence, contains many child-generated negative emotion terms, and provides some resolution at the end:

Child #1 Sample Conversation, Prompt 1 (Met PTSD Criteria):

Interviewer: *For the next five minutes can you talk to each other (we're going to leave the room) about what were some of the challenging things that have happened since the tornado.*
Child: *I don't know what to talk about, mom.*
Parent: *Me neither.*
Child: *What do we do? What do we do?*
Parent: *How do you feel about the tornado?*
Child: *I just hate- I hate it when it happens, and why I, I wanna ask what made it hit down here.*
Parent: *I don't know baby. I don't know what to do.*
Child: *Um, I don't know what to say.*
Parent: *I don't know really what to talk about either.*
Child: *One thing that makes me upset is when the tornado or when the alarms go off, um that's one thing that makes us panic, right?*
Parent: *Yeah that scared me too.*
Child: *And the ba- [well me and name]. That makes me feel sick to my stomach and stuff. And makes me still worry about the cat too. And um, now what do we do? Well um, well, well.*
Parent: *Do you wanna say about the tornado- what happened?*
Child: *Well we were at home, and momma [and me and momma] called and say we need to get down to the basement.*
Parent: *Mmhm.*
Child: *Well, and the phone went off. That's one thing that made you panic, and me. So we started to run to the basement. And we couldn't see nothing. All we seen was the basement. It was all grey, we couldn't see nothing. And well we were panicking and [name] got sick and threw up.*
Parent: *I remember that, she still gets sick when it comes to the weather.*
Child: *Me too. And well, we all start to panic and I got on that Friday night- on that Sunday night, um, we all stayed and that I didn't wanna leave so we had to go find shelter to go live at. It was pretty fun, I thought it was pretty cool, we go-, I saw picture of Barrack Obama, well I liked it we got to go get on the computers and stuff.*
Parent: *We're done, right?*

The second conversation differs from the first in that it is short, low on coherence, does

not contain a child reference to the central event, does not contain child-generated emotion

terms, and does not include indications of meaning made (e.g., a resolution):

Child #2 Sample Conversation, Prompt 1 (Met Criterion A for PTSD only, low PTSS):

Parent: *What were some of the challenges from the tornado?*
Child: *I don't know.*
Parent: *Okay. Do you remember after the tornado? How did it affect us and our family?*
Child: *Not at all.*
Parent: *But is there anyone in our family that it affected? Do you remember?*
Child: *No.*

Parent: *Did anybody lose their houses?*
Child: *I don't know.*
Parent: *There wasn't anybody who lost their house?*
Child: *I don't know.*
Parent: *Well who just got a new house?*
Child: *Ooh Jennifer.*
Parent: *Jennifer did. Do you remember what happened that day?*
Child: *No.*
Parent: *You don't? Is there anything you want to talk about the tornado? Do you remember going down to the basement with [name] and mommy and [name]?*
Child: *No.*
Parent: *You don't? I remember what was difficult is was when we couldn't drink, when we had to drink bottled water, we couldn't cook anything out of the sink and we had to get all those cases of water to cook our food.*
Child: *I don't remember that.*
Parent: *You don't remember that? Nana brought us six cases of water because the water was bad. I remember it being hard to get to work, right after the tornado. There wasn't anything difficult you can think of?*
Child: *No….*

Discussion

Many evidence-based treatments for trauma contain a narrative component to support the healing process. Yet, there is currently little understanding of what children typically say about their traumatic experiences in nonclinical settings, or what aspects of their narratives indicate about their concurrent adjustment. Literature drawn from adult samples suggests that increased detail, coherence, emotion expression, and references toward meaning made in trauma recollections typically relate to positive adjustment (e.g., Park & Blumberg, 2002). However, recent research indicates that this might not always be the case (e.g., Greenhoot et al., 2013; Bonanno, 2013). Even more ambiguity exists regarding the relation between indicators of the meaning making process and post-trauma adjustment in children. As such, the goal of this study was to inform the understanding of the relations between qualities of child narratives and mother-child conversations about trauma and concurrent symptoms of PTSS.

Ninety percent of children in this sample met Criterion A for PTSD, meaning that they

experienced a sense of helplessness or horror during the life-threatening tornado. Sixteen percent of children met full symptom criteria for PTSD. Severity of exposure was significantly related to whether children met PTSD criteria. Therefore, observed relations between narrative qualities and PTSS are likely meaningful contributions to the understanding of factors contributing to the relation between exposure and PTSS.

Aim 1: Child Narratives and PTSS

The first study aim was to evaluate the relation between qualities of child narratives and PTSS. It was hypothesized that increased emotion expression and negative meaning made would positively relate to PTSS and that increased detail, coherence, and references toward positive meaning made would negatively relate to PTSS. Indicators of each narrative quality were present and varied in child recollections. Thus, the proposed narrative qualities were all evaluated for their relation with PTSS while controlling for exposure. Overall, findings indicated that detailed, emotionally expressive, coherent, and meaning-laden accounts of the tornado were related to higher levels of PTSS, regardless of whether meanings were positive or negative.

Detail. Child word count positively related with whether the child met PTSD symptom criteria. This relation is surprising given previous studies' findings of negative relations between word count and adjustment (e.g., Bahrick et al., 1998). It is possible that children who provided more detail struggle to inhibit tornado-related information and that the increased information provided is a reflection of high levels of tornado-related distress. However, because word count remained related to PTSS when controlling for exposure, it is also possible that these children might still be processing their experience, suggesting that this lengthier narrative is a reflection of their ongoing meaning making instead of a reflection of meaning made (Park, 2010).

Whether or not the child discussed central events did not predict PTSS. This finding is

not completely understood given the fact that it was predicted that children who provided central events about the tornado may be less avoidant of thinking about and discussing more stressful aspects of the storm (e.g., Mossige et al., 2005). One hypothesis for why the expected finding was not observed is because the children were not directly asked to discuss central events. Another is that some children with significant PTSS avoided discussing the most difficult aspects of their experience, while others could not help but disclose these details given the salience of these details in their tornado memories (e.g., Greenhoot & Sun, 2014).

Coherence. Similar to Detail results, contrary to study predictions, and contrary to most previous findings with adults (e.g. Park & Blumberg, 2002), increased coherence was positively related to PTSS. Most literature, particularly in adult samples, suggests that coherence in trauma memories is disrupted for those with significant PTSS (Ehlers, Hackmann, & Michael, 2004). Thus, it is even more interesting that the positive relation between coherence and PTSS was stronger when children discussed challenging or negative aspects of their experience with the tornado than when they discussed positive aspects of the tornado.

Increased theme, or causal and explanatory language, was the dimension of Coherence most strongly related to PTSS within children's discussions of negative aspects of the tornado. This increased theme could again be a reflection of current levels of distress (Brenner & Salovey, 1997) or of a currently unresolved meaning making process (e.g., Park, 2010) that will eventually promote positive outcomes. It is also possible that children who evidenced increased coherence struggle to stop rehearsing or re-experiencing the most distressing aspects of the tornado (Legerski et al., 2013). This re-experiencing may further increase their distress given the fact that it can be difficult to explain trauma in a way that promotes a sense of safety. So, although children may not enjoy discussing negative aspects of trauma and avoid it when

31

possible, when prompted to discuss trauma, they may share negative aspects in detail.

Emotion Expression. Consistent with study predictions and most previous data (e.g., Legerski et al., 2013), increased use of emotion terms, especially negative emotion terms, positively correlated with PTSS. However, emotion terms were unrelated to PTSS when controlling for exposure. In this sample, increased use of emotion terms appeared to be more of a function of level of exposure and ongoing distress (e.g., Brenner & Salovey, 1997) than ongoing meaning making efforts. Moreover, increased emotion expression in trauma narratives may be a natural phenomenon that occurs due to level of exposure rather than an indication of efforts toward increased processing of the event.

Meaning. References toward meaning made, although relatively infrequent in child narratives, were generally positively related to PTSS. These relations, however, were no longer significant when controlling for exposure: both positive and negative instrumental change trended toward predicting PTSS severity, and resolution and negative instrumental change trended toward predicting met PTSD criteria. Similar to emotion expression, increased references toward meaning may be somewhat natural or "normal" within children highly exposed to trauma and may not provide additional information regarding psychological adaptation. However, given the small sample and the infrequency of children's references toward meaning, results should be interpreted with caution.

Yet, it is important to consider the fact that even positive references toward meaning, including resolutions, were associated with increased distress. This finding has also been observed in adult samples (e.g., Greenhoot et al., 2013), and hypothesized to occur due to participants feeling uncomfortable while recalling a stressful event and providing resolutions in an attempt to make sense of the event in the moment to regulate negative emotions (e.g.,

Greenhoot et al., 2013). If this is the case, then the qualities used to measure meaning made in this study might actually be capturing meaning making rather than meaning made. Another hypothesis is that increased references toward meaning made might relate to increased distress for the same reason increased coherence might: because continued efforts to ascribe meaning to an unpredictable and devastating event may decrease the child's sense of safety and control. Finally, given the focus in Joplin on rebuilding and becoming a stronger city despite the devastation, some children may have provided resolutions that they have heard others provide but that they had not yet internalized.

In summary, it was surprising that every significant relation between PTSS and narrative qualities was positive. The finding is partly surprising because children have been shown to improve by participating in treatments that contain the creation of trauma narratives and because meeting criteria for PTSD by necessity means that the child has a preference for avoiding event-related emotions and cognitions. Current findings suggest that although distressed children may prefer to avoid discussing the event and associated emotions, in non-therapeutic settings, these children may disclose more information and more emotional content when prompted to talk about what happened than children who are less distressed.

This idea is highlighted by the narrative of the child who met PTSD symptom criteria whose narrative was excerpted in the results section. She said: "We don't really like to talk about it? … " and then proceed to provide a lengthy narrative that was highly coherent about the central event. The child who did not meet PTSD symptom criteria whose narrative was short, did not contain discussion of the central event and did not contain negative emotion terms also helps highlight this point. An important lesson to take from these data might be that just because the child *can* talk about their trauma in detailed, coherent, emotionally expressive ways that provide

indications of having made meaning of the event does not mean that they are not distressed, and vice-versa.

Aim 2: Mother-Child Conversations and PTSS

The second aim was to evaluate qualities of mother-child conversations and whether children produce the measured qualities more frequently while in conversation with their mothers, as well as the relation between both mother- and child-generated qualities and PTSS. Regarding child production of narrative qualities, consistent with study predictions, children generated more of several of the narrative qualities when in conversations with their mothers: emotion terms, lessons/insights, and negative instrumental change. Parent modeling and prompting may explain these increases; particularly the increase in child references toward lessons learned/insights gained because expressing insights and lessons is a more difficult developmental task (McLean & Pratt, 2006). It is also possible that children felt more comfortable discussing emotions and negative changes related to the tornado when in the presence of their mother (e.g., Fivush, Berlin et al., 2003). Regarding the relation between mother- and child-generated qualities and PTSS, similar to results from Aim 1, increased detail, emotion expression, coherence, and meaning made were related to higher levels of PTSS. Interestingly, child-generated qualities were more frequently related to PTSS than mother-generated qualities, potentially suggesting that conversations can be quite child-directed at this point in development.

Detail. As in the child narratives, child-generated word count was positively related to PTSS. Notably, neither overall word count nor maternal word count related to PTSS. Contrary to results in child narratives, both child- and mother-generated mention of central events was positively related to PTSS. This was the only maternal narrative quality that related to PTSS

when controlling for exposure. It is possible that some children with increased PTSS felt more comfortable discussing central events in this presence of their mothers (e.g., Laible, 2004) than on their own. It is also possible that mothers were more likely to discuss central events with children who were still distressed; that somehow these mothers sensed that their child had a continued desire or need discuss the details of the event (Ackil et al., 2003). The important take away from this finding is that mothers' prompting may be particularly important in influencing children's adjustment when central aspects of the event are being discussed.

Coherence. Consistent with study predictions, increased coherence (mainly theme) was related to higher PTSS. These results mirrored findings from child narratives. Similar to Central Event findings, this was particularly true when discussing challenging aspects of the tornado. Because coherence was unable to be coded separately for child- and mother-generated content, it remains an open question whether child or mother-generated contributions, or both, were driving this outcome. It is possible that mothers engaged children in more coherent accounts of the event if the child evidenced tornado-related distress or signs of needing increased explanation regarding event details given the Central Event findings. It is also possible that because traumatic events are difficult to predict and make sense of (Sales et al., 2003), increased use of causal and explanatory language when discussing trauma actually prolongs children's distress.

Emotion Expression. Child- but not mother-generated positive and negative emotion terms were related to higher levels of PTSS, but again not when controlling for exposure. This finding was similar to findings from child narratives, except that in the conversations positive *and* negative emotion terms were related to PTSS before controlling for exposure. Thus, again, it appeared as if children's use of emotion terms was less related to a desire to process these emotions with their mothers in an effort to regulate their distress (Labile, 2004) than a function

of current levels of distress attributable to severity of exposure (Brenner & Salovey, 1997).

Meaning. Contrary to study predictions, child-generated resolutions were related to higher PTSS. Consistent with study predictions, child-generated negative personal impact was also related to PTSS. Similar to child narratives, neither variable remained related to PTSS when controlling for word count and exposure. Child-generated qualities were again more frequently related to PTSS than mother-generated qualities. While it is not difficult to understand why increased references toward negative changes that occurred due to the event related to increased PTSS, it is difficult to understand why positive resolutions were related to increased distress. Again, the best explanation for this finding may be that resolutions are signs of on-the-spot processing (Greenhoot et al., 2013) or efforts toward meaning making of the event in the moment to decrease distress related to discussing the event rather than indications of meaning made (Park, 2010). This may especially be true given the fact that the relations between meaning variables and PTSS became much weaker when controlling for word count and exposure, similar to findings regarding the relation between PTSS and emotion expression.

It is important to consider the role of the "narrative" of the larger Joplin community when interpreting the meaning results found in this study. The Joplin mantra or narrative was highly focused on creating growth and positive change out of devastation. Thus, even children with high levels of PTSS may have provided these types of sentiments in their narratives despite ongoing struggles with tornado-related thoughts and feelings. Highly distressed children may have provided resolutions more frequently than children with lower levels of PTSD due to engaging in on-the-spot processing.

In sum, qualities of maternal meaning making did not relate to child PTSS as frequently as child qualities. Children in this age group may not be highly reliant upon maternal support to

make meaning out of trauma. Or, children's trauma-related distress rather than mothers' conversational goals may drive the content of mother-child trauma-related discussions. It is important to consider whether or not it is helpful for mothers to take the child's lead when discussing trauma in daily conversations or for them to take a more directive role toward distracting children when they repeatedly mention certain aspects of the trauma. What this study adds to the current understanding about children's trauma recollections and maternal reactions to their recollections is that what children say is relevant, *and* that there is much to learn about how parents might engage their children in conversations that promote wellbeing.

Implications

Natural disasters can affect the current and long-term functioning of children and are related to persistent symptoms of PTSS in up to 30% of disaster-exposed youth (Bonanno et al., 2010). Cognitive factors have been suggested to mediate the relation between disaster exposure and persistent PTSS in children (e.g., Vernberg, 1996), and these cognitive factors are likely shaped by conversations with caregivers about the event (e.g., Fivush, 2009). Many evidence-based trauma-focused therapies include the child, with some assistance from or interaction with the parent, creating a detailed, coherent, emotionally expressive account of the trauma that includes references toward meaning made (Cohen, Mannarino, & Deblinger, 2006). However, results from this study suggest that the utility of narratives in therapy settings should not influence parents' or providers' perceptions of a child's current adaptation. Moreover, if a child is observed to engage in increased discussion and processing of the trauma in daily conversations, this should not necessarily be taken as a sign of recovery. This also means that if a child's preference is to only speak briefly about the trauma in daily conversations, this is not necessarily a sign of avoidance-related maladjustment. However, current results are merely a snapshot of the

child's functioning and do not capture how what the child chooses to share in daily conversations may change over time in relation to their post-trauma functioning.

Study Strengths and Limitations

This study contains some methodological advantages compared to other studies focused on linkages between aspects of trauma recollections and post-trauma adjustment. First, in contrast to research which has included participants with diverse trauma histories, all participants discussed their experience with the same potentially traumatic event. This is an advantage because research has shown that the context of the traumatic event may have implications for the relations between meaning making and/or meaning made and adjustment (e.g., Bonnano, 2013). Second, narratives were transcribed and coded for indicators of meaning making and meaning made instead of having participants reflect upon their perceptions of memory qualities, such as how coherent the memories seem (e.g. Berliner et al., 2003). The benefit is that the current methods are a measure of what children actually say when prompted than of how the child feels about their memories for the event. How children feel and what they share may not be consistent or "match" in the expected manner. Third, this study included independent child narratives and mother-child narratives within the same sample, and this is the first project that can directly compare adult-guided and non-adult-guided recollections in relation to post-trauma adjustment. Finally, data indicate that the sample was severely affected by the tornado, making the sample a cleaner trauma sample than is found in most narrative studies (e.g., Sales et al., 2003).

This study also contained several design limitations. As is the case in most trauma samples, lack of baseline data make it difficult to presume that reported elevations on the PTSS measure were due to tornado exposure alone (even though children were prompted to provide answers to the PTSS measure while reflecting on tornado-related distress). Also, although the

intention was to recruit participants who experienced a range of severity of exposure, sampling bias likely occurred. Due to the sensitive nature of the data collection process, families were informed that their children would be asked to talk about the tornado before they were scheduled for a data collection appointment. At least five families who were informed about study procedures declined due to their child being "over the emotional trauma." Parents who felt as if their child had already made therapeutic meaning of the event likely chose not to participate.

Relatedly, in an effort to allow participants choice in what they discussed with interviewers, participants were asked open-ended questions about their tornado experiences instead of being asked to specifically discuss events that occurred during the storm. Although this allowed for an analysis of which children mentioned central events and which did not, correlations between narrative qualities and PTSS may have differed if all children were prompted to discuss the storm. More highly traumatized children might shut down when asked to discuss central events but have much to say when allowed to choose what they discuss (e.g., Kenardy et al., 2007). Yet, research on cognitive appraisal following trauma suggests that it cannot be assumed which aspects of the event were most traumatic (e.g., Stallard & Smith, 2007), thus supporting this project's methods.

Another methodological limitation is that the child and mother-child prompts were not identical. The procedures were designed this way due to concern that children would struggle to provide a recollection without some scaffolding. Regardless, comparisons between frequencies of narrative qualities in child versus mother-child conversations were difficult to make. Even more differences between the frequency of narrative qualities in conversations versus child-alone narratives may have been observed if mother-child dyads were also given four prompts.

Finally, data are cross-sectional and cannot inform the understanding of the trajectory of the many steps in the meaning making process and how these steps relate to PTSS. Increased meaning making efforts and references toward meaning made found in child narratives and mother-child conversations may be predictive of concurrent distress but then decreased distress over time. An understanding of whether the observed concurrent relationship between meaning making and distress predicts future adaptive or maladaptive adjustment is needed.

Future Directions

There is clearly a need for longitudinal analyses in order to understand the meaning making process and how it may or may not be related to child post-trauma adjustment. Wider age ranges should be included in studies to allow for a better understanding of when and how caregiver influences are important in this process or when and how certain indicators of meaning making relate to positive adjustment versus distress. Replicating this study with larger samples would also allow for an understanding of whether there are curvilinear relations between indicators of meaning making and post-trauma adjustment depending upon exposure or age. For example, it is possible that both severely and mildly exposed children say very little about their experiences, while moderately exposed children share many emotion terms and central details. Similarly, younger children who are highly distressed might provide increased detail, while older children who are highly distressed might say very little.

Other indicators of meaning making or meaning made should also be explored. There may be more accurate ways to measure the meaning making process, such as determining whether the recollections, although detailed and coherent, appear detatched from reality and actually resemble more of a dissociative process than therapeutic meaning making (Kenardy, 2007). There also may be more concrete ways to measure meaning making in children, such as

asking what meaningful activities they have participated in to help them cope with or grieve the trauma. Mother-child conversations could be coded for other variables that could be considered to promote therapeutic meaning made, such as validation of child-generated emotional content, provision of reassurance, or indications of their attention to the child's contributions.

A final point is that there is a need to understand meaning making in samples of children who have experienced other types of trauma. Disasters are public events, and children in the Joplin community were arguably continually re-exposed to or reminded of the trauma each time they saw news reporters in their area, heard people in their community discuss the event, attended memorials, or saw the destruction within their community. These children also likely engaged in multiple conversations about the trauma prior to participating. Understanding whether these community-based factors are protective or risk factors and the implications of these community-based factors for meaning making is needed. Despite limitations, Joplin residents provided a great contribution to the understanding of the meaning making process in children. Hopefully, their contribution will promote increased work regarding what certain indicators of children's cognitive processing of trauma are currently indicating and will indicate in the future about children's adjustment, and thus which aspects of this processing are therapeutic for caregivers to support in their children.

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Table 1

Measures Given to Participants in order of Administration

Measure	Participant
Pre-participation Mood Rating (Adapted from Greenhoot et al., in press)	Mother & Child
KBIT-2 Riddles (Kaufman & Kaufman, 1997)*	Mother & Child*
Demographic Questionnaire*	Mother* & Child*
Rehearsal of Events Scale (Bahrick et al., 1998)	Mother
Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983)	Mother
Behavior Assessment System for Children – Second Edition (BASC-2; Reynolds & Kamphaus, 2004)	Mother & Child
UCLA Reaction Index Symptom Scale (Pynoos & Steinberg, 2002)*	Child*
Individual Narrative Task*	Mother & Child*
Joint Narrative Task*	Mother & Child*
Tornado Related Traumatic Experiences (TORTE; Vernberg & Jacobs, 2005)*	Mother & Child*
UCLA Reaction Index – Part A (Pynoos & Steinberg, 2002)	Child
Post-Participation Mood Rating	Mother & Child

Note. * = used in current study

Table 2

Variables Coded: Child Interviews

Coding Dimension	Unit of Analysis	Codes	Resulting Memory Variables
Detail	Whole Narrative	Central Event (0-1)	No or Yes
		Word Count	Word Count
Coherence	Per Prompt	Chronology (0-3)	Chronology Scores
		Context (0-3)	Context Scores
		Theme (0-3)	Theme Scores
Emotion Expression	Whole Narrative	Emotion Terms Pn or Neg (#)	Frequency of emotion terms, scored by LIWC
Meaning	Prompts 1 & 2	Resolution (0-2)	Resolution Score
	Whole Narrative	Impact Pn or Neg (#)	Frequency Individual Statements
	Whole Narrative	Instrumental Change Pn or Neg (#)	Frequency Individual Statements
	Whole Narrative	Lessons/Insights (0-3)	Lessons/Insights Score

Note. Pn = Positive, Neg = Negative

[a]LIWC = Linguistic Inquiry and Word Count Program.

[b]Coherence was coded per prompt given that each prompt may have encouraged children to share a different part of the story thus an interviewer-driven change in coherence.

[c]Resolution was coded only using Prompts 1 and 2 due to Prompt 3 effectively prompting for a resolution to be provided ("Tell me some positive things that happened to you and your family because of the tornado") and then Prompt 4 following Prompt 3.

Table 3

Variables Coded: Mother-Child Conversations

Coding Dimension	Unit of Analysis	Codes	Memory Variables	Child & Mother Content Coded Separately?
Detail	Whole Narrative	Central Event (0-1)	No or Yes	Yes
		Word Count	Word Count	Yes
Coherence	Per Prompt	Chronology (0-3)	Chronology Scores	No
		Context (0-3)	Context Scores	No
		Theme (0-3)	Theme Scores	No
Emotion Expression	Whole Narrative	Emotion Terms Pn or Neg (#)	Measured by LIWC	Yes
Meaning	Prompt 1	Resolution (0-2)	Resolution Score	Yes
	Whole Narrative	Impact Pn or Neg (#)	Frequency Individual Statements	Yes
				Yes
	Whole Narrative	Instrumental Change Pn or Neg (#)	Frequency Individual Statements	Yes
	Whole Narrative	Lessons/Insights (0-3)	Lessons/Insights Score	

Note. Pn = Positive, Neg = Negative

[a]LIWC = Linguistic Inquiry and Word Count Program

[b]Coherence was coded per prompt given that each prompt may have encouraged children to share a different part of the story thus an interviewer-driven change in coherence.

[c]Resolution was coded only using Prompts 1 and 2 due to Prompt 3 effectively prompting for a resolution to be provided ("Tell me some positive things that happened to you and your family because of the tornado") and then Prompt 4 following Prompt 3.

Table 4

Tornado-Related Traumatic Experiences: Child Report

Type of Experience and Item	% Endorsing Item Joplin Tornado Sample - 2012	% Endorsing Item Hurricane Andrew Sample – 1996
Part A: During the Tornado		
1) … windows or doors break in the place you stayed	36	59
2) … get hurt	10	8
3) … see anyone else get hurt badly	38	18
4) … a pet you liked get hurt or die	22	16
5) … get hit by anything flying or falling	6	15
6) …apart from parent during tornado	8	n/a
Part B: After the Tornado		
7) … home damaged badly or destroyed	48	61
8) … have to go do a new school	36	26
9) … move to a new place	42	27
10) … one of your parents lose his or her job	16	13
11) … hard to see your friends because they moved or you moved	48	44
12) … family have trouble getting enough food or water	28	37
13) … clothes or toys ruined by the tornado	36	55

14) … pet run away or have to be given away	16	9
15) … anyone stolen anything from your home	22	15
16) … have to live away from parents for a week or more	12	21
Part C: Since the Tornado		
17) … all the damage to your house now been fixed	26	n/a
18) … living in the house you lived in before the tornado	52	n/a
19) … living in a house that still has a roof that leaks	0	n/a
20) … have to travel a lot longer to get to your school now	20	n/a
21) … one of your parents now out of a job	8	n/a

Note: Data from Hurricane Andrew sample are from (1996). "Prediction of Posttraumatic Stress symptoms in children following Hurricane Andrew," by Vernberg, E. M., LaGreca, A. M., Silverman, W. K., and Prinstein, M. J., 1996, *Journal of Abnormal Psychology, 105,* p. 241.

Table 5

Correlations: Child TORTE and PTSS

	TORTE Total
	Spearman
Met PTSD Criteria	.245[a]
	Pearson
PTSS Symptom Severity	.341*

Note: [a] = p <.10; * = p <.05; ** = p <.01

Table 6

Descriptives: Qualities in Child Narratives

Quality	*M*	*SD*	Range	Frequency
Central Event	--	--	0 - 1	24
WC	288.88	265.65	34 - 1246	50
Context PR 1	1.06	1.30	0 - 3	34
Context PR 2	.986	.92	0 - 3	26
Context PR 3	.895	.88	0 - 3	28
Context PR 4	.881	.80	0 - 3	26
Chronology PR 1	1.32	1.84	0 - 3	34
Chronology PR 2	1.49	1.72	0 - 3	29
Chronology PR 3	1.43	1.60	0 - 3	30
Chronology PR 4	1.41	1.34	0 - 3	26
Theme PR 1	.839	1.50	0 - 3	46
Theme PR 2	.895	1.24	0 - 3	39
Theme PR 3	.737	1.22	0 - 3	44
Theme PR 4	.820	1.02	0 - 3	36
Pos Emo	4.06	3.66	0 - 14	43
Neg Emo	3.22	3	0 - 11	42
Lessons	.40	.926	0 - 3	9
Resolution	.30	.647	0 - 2	10
Pos IC	3.66	3.63	0 - 15	40

Neg IC	4.16	3.30	0 - 12	42
Pos IM	1.10	1.30	0 - 5	30
Neg IM	1.62	1.81	0 - 8	35

Note: WC = Word Count. PR = Prompt. Pos = Positive. Neg = Negative. Emo = Emotion. IC = Instrumental Change. IM = Impact. Prompt 1 = Tell me some things that happened to you and your family because of the tornado; Prompt 2 = Tell me some challenging things; Prompt 3 = Tell me some positive things; Prompt 4 = How have things been different?

Table 7

Within-subjects t-tests: Child Generated Qualities in Child Narratives vs. Conversations

Quality	Mean		*t*	df	*p*
	Narrative	Conversation			
Central Event	.48	.42	.685	48	.497
Total WC	289	330	-1.35	48	.185
Pos Emo	4.10	6.20	-2.54	48	.014*
Neg Emo	3.20	4.84	-3.04	48	.004**
Resolution	.30	.32	-.172	48	.864
Lessons	.40	1.02	-4.44	48	.000**
Pos IC	3.67	3.73	-.115	48	.909
Neg IC	4.14	2.24	3.78	48	.000**
Pos IM	1.10	.96	.693	48	.492
Neg IM	1.61	1.67	-.178	48	.859

Note: WC = Word Count. Pos = Positive. Neg = Negative. Emo = emotion. IC = Instrumental Change. IM = Impact. df = degrees of freedom.

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

Table 8

Logistic Regressions – Met PTSD Criteria: Child Narratives

Variable	β	*SE*	Wald	*p*	OR	CI
Exposure	.177	.094	3.512	.061[a]	1.193	.992-1.435
Exposure	.195	.002	4.558	.066[a]	1.22	.987 - 1.50
Total WC	.003	.002	4.558	.033*	1.00	1.00 – 1.00
WC PR 2	-.001	.005	.010	.919	.999	.989 – 1.01
Exposure	.194	.109	3.19	.074[a]	1.21	.981 – 1.50
Context PR 2	1.006	.528	3.63	.057[a]	2.74	.971 – 7.70
WC PR 2	-.002	.007	.079	.748	.779	.984-1.01
Exposure	.185	.113	2.71	.100	1.204	.965-1.50
Theme PR 2	1.52	.688	4.90	.027*	4.61	1.19-17.70
WC	.003	.002	4.29	.038*	1.00	1.00 – 1.00
Exposure	.213	.111	3.70	.054[a]	1.24	.996 – 1.54
Pos Emo	-.494	.638	.600	.439	.610	.175 – 2.13
WC	.003	.002	4.53	.033*	1.00	1.00 – 1.00
Exposure	.194	.105	3.40	.065[a]	1.24	.988 – 1.49
Neg Emo	.120	.591	.041	.839	1.13	.354 – 3.59
WC PR 1 & 2	.000	.002	.033	.855	1.00	.995-1.01

Exposure	.241	.117	4.23	.040*	1.27	1.01-1.61
Resolution	.644	.644	3.38	.066[a]	3.27	.924-11.55
Total WC	.002	.002	2.26	.133	1.01	.999-1.01
Exposure	.195	.107	3.29	.070[a]	1.22	.985-1.49
Positive IC	.157	.121	1.69	.193	1.27	.924-1.48
Total WC	.001	.002	.451	.502	1.00	.997-1.01
Exposure	.173	.113	2.34	.126	1.18	.953-1.48
Negative IC	.346	.191	3.27	.071[a]	1.41	.971-2.05

Note: WC = Word Count. PR = Prompt. Neg = Negative. Pos = Positive. Emo = Emotion. IC = Instrumental Change. OR = Odds ratio. CI = confidence interval. SE = standard error.

[a] = $p<.10$; * = $p <.05$; ** = $p<.01$

Table 9

Linear Regressions – PTSS Severity: Child Narratives

Variable	b	SE	β	t	p
Exposure	.783	.376	.288	2.085	.042*
WC PR 2	-.030	.023	-.204	-1.28	.206
Exposure	.494	.376	.182	1.32	.195
Theme PR 2	5.76	2.18	.426	2.63	.011*
Total WC	.008	.006	.170	1.90	.240
Exposure	.774	.382	.274	1.19	.057[a]
Neg Emo	.089	1.72	.007	.052	.959
Total WC	-.010	.022	-.071	-.480	.634
Exposure	.666	.379	.245	1.76	.086[a]
Pos IC	.880	.495	.265	1.78	.082[a]
Total WC	-.014	.022	-.094	-.615	.542
Exposure	.615	.385	.226	1.59	.117
Neg IC	1.02	.569	.279	1.79	.080[a]

Note: WC = Word Count. PR = Prompt. Neg = Negative. Pos = Positive. Emo = Emotion. IC = Instrumental Change. SE = standard error.

[a] = p<.10; *= p <.05; **=p<.01

Table 10

Logistic Regressions – Met PTSD Criteria: Conversations

Variable	β	*SE*	Wald	*p*	OR	CI
Exposure	.177	.094	3.512	.061[a]	1.193	.992-1.435
Exposure	.164	.098	2.78	.095[a]	1.28	.972-1.43
Central Event Total	2.27	1.14	3.99	.046*	9.66	1.04-89.27
Exposure	.213	.108	3.89	.049*	1.24	1.00-1.53
Child Total WC	.005	.002	4.72	.030*	1.01	1.00-1.01
Child Total WC	.004	.002	2.82	.093[a]	1.00	.999 – 1.01
Exposure	.231	.118	3.85	.050[a]	1.26	1.00 – 1.59
Child Pos Emo	.162	.128	1.60	.206	1.18	.915 – 1.51
Child Total WC	.009	.004	4.32	.038*	1.01	1.00 – 1.02
Exposure	.212	.108	3.83	.050[a]	1.24	1.00 – 1.53
Child Neg Emo	-.141	.129	1.20	.274	.869	.675 – 1.12
Child Total WC	.004	.003	1.99	.157	.004	.999-1.01
Exposure	.195	.124	2.46	.117	1.22	.952-1.55
Child Neg IM	.421	.217	2.41	.120	1.52	.896-2.59

Note: WC = Word Count. PR = Prompt. Neg = Negative. Pos = Positive. Emo = Emotion. IC = Instrumental Change. OR = Odds ratio. CI = confidence interval. SE = standard error.

[a] = p<.10; *= p <.05; **=p<.01

Table 11

Linear Regressions – PTSS Severity: Conversations

Variable	b	SE	β	t	p
Exposure	.783	.376	.288	2.085	.042*
Exposure	.652	.343	.240	1.89	.064[a]
Central Event Total	10.13	3.02	.423	3.35	.002**
PR 1 WC	.734	.734	.270	1.96	.056[a]
Exposure	.004	.007	.074	.483	.631
Theme PR 1	3.83	3.01	.195	1.27	0.21
Child Total WC	.005	.010	.084	.533	.597
Exposure	.742	.366	.273	2.02	.048*
Child Neg Emo	.800	.522	.241	1.533	.132

Note: WC = Word Count. PR = Prompt. Neg = Negative. Pos = Positive. Emo = Emotion. IC = Instrumental Change. SE = standard error.

[a] = p<.10; *= p <.05; **=p<.01

61

Appendix A

Informed Consent Form

Joplin Tornado Mother-Child Interaction Study: Project Share

INTRODUCTION

The Clinical Child Psychology Program and the Developmental Psychology Program at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish for you and your child to participate in the present study. You may refuse to sign this form and not participate in this study. You should be aware that even if you and your child agree to participate, you both are free to withdraw at any time. If you and your child do withdraw from this study, it will not affect you and your child's relationship with this unit, the services it may provide to you and your child, or the University of Kansas.

PURPOSE OF THE STUDY

The purpose of this project is to interview children and their mothers who lived in Joplin, Missouri during the EF5 tornado on May 22, 2011 to obtain their descriptions of stressful life events and circumstances related to the tornado. We hope to investigate how the way these events are interpreted and shared relate to child well-being (e.g., scores on measures of behavioral and emotional adjustment) and child coping behaviors.

PROCEDURES

You and your child will meet individually with a member of the research team to complete online questionnaires. Your child's questionnaire will include measures of their tornado-related experience, their ability to cope with stressful life events and circumstances, and their behavioral and emotional adjustment. Your questionnaire will include similar items, including measures of your tornado-related experience, your child's responses to stressful life events, and your own feelings of stress.

Included with both you and your child's questionnaires will be a short audio recorded interview and a measure of expressive vocabulary. For the short interview, you each will be asked to describe your memories of the tornado, highlighting challenges faced and positive adaptations. The measure of expressive vocabulary will examine you and your child's use of vocabulary and ways that vocabulary use might relate to child well-being. A research team member will be present with you and your child to answer questions you may have while completing these measures (i.e., to help your child with the reading of the material, to assist computer usage, etc.). This section of the study will take approximately 60 minutes. You and your child will also participate in an audio recorded interaction task where you will be asked to engage your child in a brief conversation on tornado-related events while the research team members are in another room, which will take approximately 15 minutes. Including introductions and wrapping up, the procedure should take approximately 1 hour and 30 minutes.

One to three months following the in-person visit, you will be contacted via e-mail to complete an online follow-up survey that will contain the same measures you completed previously. Your child will not be contacted to fill out any additional measures.

To ensure your confidentiality, all information collected from you and your child will be identified only by an ID number. A master list will link you and your child's identifying information with data from online questionnaires and audio recordings, and only the principal investigator and project supervisors will have access to this password protected computer file. All data collected in audio format will be stored in a locked cabinet and only viewed by research team members. Data collected via the online survey will also be password protected.

RISKS

We do not expect these procedures to put you or your child at risk. However, thinking about past experiences can sometimes be unpleasant or uncomfortable, and as a participant you should understand that you might need to anticipate the impact of this discussion on your child. If you or your child feel uncomfortable and want to discontinue the study, you both are free to withdraw at any time.

To minimize any negative effects from participating in this study, the researchers will ask you and your child to participate in a few "good-bye" sessions before you leave. We ask that you meet with a member of the research team so that you can ask any questions that may arise after participating and to help you manage any concerns that you might have regarding the best ways to talk with your child following this study. Your child will also participate in a good-bye session, one with you and one by his/herself and a research team member. Furthermore, we will provide you with information regarding how to contact a mental health professional in the event you or your children experience distress due to participation in this study or if you wish to seek mental health assessment or treatment. You will also be informed if the symptom levels reported by you or your child reach a level of clinical concern, so that you may seek services if desired.

BENEFITS

By participating in this study, you and your child will have the opportunity to communicate your experiences regarding the tornado. Although there are no known direct benefits to participating in this study, some participants may feel that this experience is stimulating and/or rewarding. Furthermore, your participation will contribute to a line of research aimed at helping children and families appropriately cope with natural disasters, and understanding factors that promote child well-being following disasters.

PAYMENT TO PARTICIPANTS

For your willingness to aid us in this project, you and your child will be given gift certificates to local businesses in your area. You will receive $20 in giftcards following the first session and your child will receive $10. Following completion of the online questionnaire, you will receive

another $20 in giftcards in the mail. In order to comply with state and federal accounting regulations, the researcher may ask for your (the mother's) social security number.

INFORMATION TO BE COLLECTED

In the course of your participation in this study, you and your child will be asked to complete online questionnaires, and be audio recorded while engaging in memory and mother-child interaction tasks. All responses will be confidential, and your names will not be associated with your responses.

The information collected from you will be used by Erin Hambrick, MA, Dr. Vernberg, Dr. Greenhoot, and other members of their research team in the Clinical Child Psychology program and the Developmental Psychology Program at the University of Kansas. Some participant responses may be reported in research study reports. Again, your names will not be associated with information disclosed in this manner. The researchers will not share information about you or your child with anyone not specified above unless required by law or unless you give written permission.

REFUSAL TO SIGN CONSENT AND AUTHORIZATION

You are not required to sign this Consent and Authorization form and you may refuse to do so without affecting your right to any services you are receiving or may receive from the University of Kansas or to participate in any programs or events at the University of Kansas. However, if you refuse to sign, you cannot participate in this study.

CANCELLING THIS CONSENT AND AUTHORIZATION

You and your child may withdraw your consent to participate in this study at any time. You and your child also have the right to cancel your permission to use and disclose information collected about you or your child in writing, at any time, by sending your written request to Erin Hambrick, Clinical Child Psychology Program, 2006 Dole Human Development Center, 1000 Sunnyside Avenue, The University of Kansas, Lawrence, KS 66045-7555.

QUESTIONS ABOUT PARTICIPATION

Questions about procedures should be directed to the researchers listed at the end of this consent form.

PARTICIPANT CERTIFICATION:

I have read this Consent and Authorization form. My child and I have had the opportunity to ask questions, and my child and I have received answers to any questions we had regarding the study and the use and disclosure of information about me and my child for the study. I understand that if I have any additional questions about my child and my rights as research participants, I may call (785) 864-7429 or write the Human Subjects Committee Lawrence Campus (HSCL),

University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7563, email hscl@ku.edu.

I agree for my child and me to take part in this study as research participants. I further agree to the uses and disclosures of my child and my information as described above. By my signature I affirm that I have received a copy of this Consent and Authorization form.

_____   _____

Print Participant's Name (Mother)   **Date**

_____   _____

Print Participant's Name (Child)   **Date**

_____   _____

Participant's Signature (Mother)   **Date**

_____   _____

Participant's Signature (Mother) to   **Date**
consent to child's participation

Researcher Contact Information

Erin P. Hambrick, MA   Eric Vernberg, Ph.D., ABPP
Principal Investigator   Faculty Supervisor
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Lawrence, KS 66045   Lawrence, KS 66045
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1415 Jayhawk Blvd.
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Lawrence, KS 66045
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Appendix B

Mother and Child Measures

Date:_____   **Name:**_____

Date of Birth: _____   **Address:** _____

Email Address: _____   **Marital Status:** _____

Other Parent name: _____   **Date of Birth:** _____

Zip Code of Home residence at time of tornado: _____

Zip

What is your ethnic background?
☐   Asian or Asian American
☐   Latino or Hispanic
☐   African American or Black
☐   White, Caucasian, Anglo, European American; not Hispanic
☐   American Indian or Native American
☐   Other (*write in*) _____

Highest level of education (please check and describe):
o High school Grade: _____
o Technical/two year degree: _____
o Bachelor's degree Major: _____
o Master's degree Area of study: _____
o Doctoral degree Area of study: _____
o Other: _____

Occupation: _____

Spouse's/Partner's Occupation (if applicable): _____

Household Income Level Per Year (please check):
o 0 – $20,000
o $20,000 - $30,000
o $30,000 - $40,000
o $40,000 - $50,000
o $50,000 - $70,000
o $70,000 - $100,000
o Greater than $100,000

Please complete the following for your child:

Child Name:_____   **Gender:**_____

66

Date of Birth:_____ **Grade:**_____

Did your child have any mental health experiences _prior to_ the tornado:
☐ Yes ☐ No

If yes,   Reasons_____   Dates_____

_____   _____

Did your child have any mental health experiences _after_ the tornado:
     ☐ Yes ☐ No

If yes,   Reasons_____   Dates_____

_____   _____

Were you and your child together during the tornado?
☐ Yes ☐ No
Explain if needed: _____

Has your child written a trauma narrative as a part of their treatment following the tornado?
☐ Yes ☐ No

Has your child written a trauma narrative at school about the tornado?
☐ Yes ☐ No

How often did your family talk about the tornado in the presence of your child during the first week following the storm?

None	Once that Week	2-6 Times that Week	Once Per Day	Several Times Per day
1	2	3	4	5

How often did your family talk about the tornado in the presence of your child during the most recent week prior to this study?

None	Once that Week	2-6 Times that Week	Once Per Day	Several Times Per day
1	2	3	4	5

How often did your family talk about the tornado in the presence of your child during the period in between (more than one week after storm, more than one week prior to study)?

None	Once a Week	2-6 Times a Week	Once Per Day	Several Times Per day
1	2	3	4	5

Child Questionnaire (Ages 8 – 12)

Name:_____   Age:_____

Sex (Circle): Girl   Boy

Ethnicity: _____

Date:_____ / _____ / _____   School Grade:_____
          Month   Day   Year

Birthday:_____ / _____ / _____
              Month   Day   Year

Parent's Name: _____

Have you completed a Trauma narrative as a part of treatment since the tornado?

Yes   No

Have you written a trauma narrative in school since the tornado?

Yes   No

Appendix C

Project Share Procedural Instructions Group A

R1 = Researcher 1 will work with mother, R2 = Researcher 2 will work with child

R1 & R2: Introductions
- Introduce yourselves and build rapport with the family (5-10 minutes).
- Familiarize the family with the goals of the project: *To learn more about challenges faced by families in Joplin during and after the storm, and to hear their perceptions of this event a year later. The ultimate goal is to understand factors that promote well-being and positive adjustment in children following disasters.*

R1 (mother): Informed Consent
- Review the Informed Consent form with the mother and allow her time to read and sign. (5 minutes)

R2 (child):
- Review the assent form with the child pending Informed Consent from the mother.

R1 & R2: Mood Rating
- Before beginning the survey, obtain a Mood Rating from your participant (3 mins):

- On a scale of 1-5, how **UPSET** do you feel **now**?

Not at all	A little	Some	Quite a Bit	Extremely
1	2	3	4	5

- On a scale of 1-5, how **NERVOUS** do you feel **now**?

Not at all	A little	Some	Quite a Bit	Extremely
1	2	3	4	5

- On a scale of 1-5, how **HAPPY** do you feel **now**?

Not at all	A little	Some	Quite a Bit	Extremely
1	2	3	4	5

R1 & R2: K-Bit
- Administer the K-Bit Riddles task to your participant (15 minutes).

R1 & R2: Surveys
•   Have your participant complete the surveys (10 minutes) If child survey, check their age and make sure you have the correct packet, either the 8-11 packet or the 12 packet.

R1 & R2: Interviews
•   Complete the interview with your participant, using the following instructions (10 mins):
1.   Set up audio recording equipment, and give it a test run.

2.   Spend a few minutes developing more rapport with the participant.

3.   Ask the participant the following open-ended questions (providing prompts when needed): Prompt for elaboration throughout interview with, "Tell me more about that.")

a.   *Tell me about some of the things that happened to you or your family because of the tornado."*
        Follow up with*, "Is there anything else you want to tell me about?"*

b.   *"Describe some challenging or difficult things that happened to you or your family because of the tornado."*
        If necessary, follow up with *"Is there anything else you want to tell me about?"*

c.   *"What positive things, if any, happened to you or your family as a result of the tornado?"*
        If necessary, follow-up with, *"Is there anything else you want to tell me about?"*

d.   *"Compared to your life before the tornado, how are things different for you and your family now?"*

e.   *"Is there anything else you would like to tell us about the tornado?"*

     Allow the participant an unlimited amount of time to respond but prompt the child to stay on task if needed.

RI & R2: Interaction Task

1.   Set up audio recording equipment and complete a test run.

2.   Prepare stopwatch.

3.   Spend a few minutes developing rapport with the participants.

4.   Provide the participants with the following instructions:

"Today you each shared with us some challenging things that happened to you and your family as a result of the tornado. For the next five minutes, we will go out of the room and will ask you to talk together (have a conversation) about what you think were some of the challenging aspects of the tornado and how it affected your family.

5.   Leave the room and set your stopwatch.

6.   After five minutes, return to the room.

7.   Provide the participants with a second set of instructions.

"Now for the next five minutes we would like you to have a conversation about whether there were any positive things for your family that resulted from the tornado. Again, we will leave the room and let you talk about this on your own."

8.   Leave the room and set your stopwatch.

9.   After five minutes, return to the room.

R1 & R2: TORTE Survey
•   Administer the TORTE to your participant (5 minutes; parents can fill it out, ask children orally). Tell children you appreciated what they told you earlier about the tornado, and now want some more specific information.

Still R1 & R2: Debriefing & Mood Rating
•   Have a debriefing with mother and child separately using the form below (10 mins). Read the following to the participant and mark participant's responses on this scale:

•   On a scale of 1-5, how **UPSET** did you feel while completing the measures?

Not at all	A little	Some	Quite a Bit	Extremely
1	2	3	4	5

•   On a scale of 1-5, how **NERVOUS** did you feel while completing the measures?

Not at all	A little	Some	Quite a Bit	Extremely
1	2	3	4	5

•   On a scale of 1-5, how **HAPPY** did you feel while completing the measures?

Not at all	A little	Some	Quite a Bit	Extremely
1	2	3	4	5

2. On that same scale of 1 to 5, how do you feel **now**?

- On a scale of 1-5, how **UPSET** do you feel **now**?

Not at all	A little	Some	Quite a Bit	Extremely
1	2	3	4	5

- On a scale of 1-5, how **NERVOUS** do you feel **now**?

Not at all	A little	Some	Quite a Bit	Extremely
1	2	3	4	5

- On a scale of 1-5, how **HAPPY** do you feel **now**?

Not at all	A little	Some	Quite a Bit	Extremely
1	2	3	4	5

3. How much, if at all, do you feel you benefitted from completing this study on a scale of 1 to 5, with 1 being not at all and 5 being extremely?

Not at all	A little	Some	Quite a Bit	Extremely
1	2	3	4	5

4. How much, if at all, do you regret completing this study on a scale of 1 to 5, with 1 being not at all and 5 being extremely?

Not at all	A little	Some	Quite a Bit	Extremely
1	2	3	4	5

5. If you had known how this study would make you feel, would you have agreed to participate?

                         Yes   No (circle)

        [If no] is this because of the time and effort involved, or other reasons?

        Time or Effort   Other Reasons (circle; if Other, please note any explanation)

Adverse reaction plan:
- If current distress is a 5 for the mother or child (and if it increased from the original mood rating), discuss the referral sources on the referral handout with the family. If there is a threat to

safety or if the family would like to speak with someone immediately, call the Ozark Center Crisis Line **(417) 347-7720, which is 24/7.**
- If the mother indicates that their child has suicidal ideation, assess for risk (intent/past attempts/means) and refer either to the crisis line if needed.

RI: Additional debriefing with mother
- Give the mother the referral list and review symptoms of distress in children and how to recognize them.
- Tell the mother we will call in a few days to check on she and her child to make sure there is not any study related distress.
- Remind the mother of the follow-up, which will consist only of questionnaires and take approximately 20 minutes. She will receive $20 in gift cards in the mail following completion of the online questionnaire.

R1 & R2:
- Thank the family for coming, give the mother a $20 gift card and the child $10. Have them sign receipts and the consent to future contact. Answer any study-related questions, and let them know we will follow up with them in a few days via phone to make sure they are doing OK.

Appendix D

Tornado Related Traumatic Experiences Scale (Child Version)

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

2. Did you get hurt during the tornado?   yes

3. Did you see anyone else get hurt badly during   yes
    the tornado?

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

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

6. Was your mother or father with you during the   yes
    tornado?

**7. Overall, how scared or upset were you   not at all   a little   a lot
    during the tornado?**

What Happened To You after the Tornado

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

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

3. Did you move to a new place because of the   yes
    tornado?

4. Did one of your parents lose his or her job   yes
    because of the tornado?

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

6. Did your family have trouble getting enough   yes
    food and water after the tornado?

7. Were your clothes or toys ruined by the tornado?   yes

8. Did you pet run away or have to be given away because of the tornado?   yes

9. Has anyone stolen anything from your home since the tornado?   yes

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

11. Overall, how upset about things have you been since the tornado?   **not at all   a little   a lot**

What Happened to you Since the Tornado

1. Has almost all the damage to your house from the tornado now been fixed?   yes

2. Are you now living in the house you lived in before the tornado?   yes

3. Are you living in a house that still has a roof that leaks because of the tornado?   yes

4. Do you have to travel a lot longer to get to your school now than you did before the tornado?   yes

5. Is one of your parents now out of a job because of the tornado?   yes

6. How many times have you moved since the tornado?   0   1   2   3+

Appendix E

Mental Health Services Handout

If you or your child are experiencing emotional distress after thinking about and recollecting negative events in our study, or if you are experiencing emotional distress for reasons unrelated to this study, there are counselors who may help you with these feelings.

Please feel free to contact the references below if any concerns arise.
Will's Place, a child treatment center run by the Ozark Center, is an official partner of Project Share - Joplin and has agreed to be a referral source for interested families. Call to contact them: 417.347.7580

Below are other agencies in Joplin, MO that provide mental health services. These services are not affiliated with Project Share – Joplin.

Agency	Address	Telephone	Specialty Area
Applied Psychological Services	2700 N. Range Line Suite 101	417-627-9601	General, all ages
Behavior Management	1531 W. 32nd Street Suite 201	417-782-1910	General, all ages
College Skyline Counseling Center	1230 N. Duquesne Road	417-782-1443	General, all ages
Compass Counseling Services	In home	417-597-4572	Children and Adolescents/Family interventions
Counseling Assoc. of the 4-States	705 S. Illinois Ave Suite 22	417-627-9994	General, all ages
Haven Counseling Center	Christ Church of Oronogo	417-623-0090	Adolescents and adults *some free services for tornado survivors
Healing the Family	508 E. 32nd Street	417-624-8333	General, *have therapy groups for children/adolescents
Healthe Path Associates	608 S. Pearl Ave (August)	417-626-7900	Adults only
Herndon Snider & Assoc.	2650 E. 32nd Street Suite 221	417-623-1381	General, all ages
House of Hope	614 S. Wall Ave	417-483-2863	Christian based adolescent/family interventions
Lafayette House	1809 S. Connor Ave	417-782-1772	Dom. violence, sexual assault, & substance abuse
Liston, Mark	2660 E. 32nd Street Suite 101	417-782-1290	Christian counseling, CISD trained
McGregor, Patti, Psychologist	1105 E. 32nd Street	417-621-5192	General, all ages
Mt. Hope Counseling Center	2810 Mt. Hope Road	417-624-9659	Christian counseling, *free srvs. for tornado survivors
Office of Frisbie &	2914 E. 32nd Street	417-624-	General, all ages

Gerhart	Suite 307	4475	
Options Out-patient Counseling	1515 W. 10th Street Suite E	417-782-7700	General, all ages
Ozark Center	Several locations	417-347-7567	General, substance abuse, in-patient, geriatric
Parker, Angie; MSW, LCSW	In-home	417-437-4329	General, all ages
Preferred Family Healthcare	818 W. 4th Street	417-623-1990	Adolescent substance abuse
Psychological Associates	1840 N. Range Line	417-624-7002	General, all ages
Resolutions Consulting Group	302 S. Florida	417-781-6228	General, all ages
Restoration Counseling Services	1027 S Main, Suite 309	417-627-9601	General, all ages
Southern Light Counseling	702 S. Pearl	417-781-4552	General, all ages
Thompson, Barbara; MSW, LCSW	1105 E. 32nd Street	417-627-9968	General, all ages
Trinity Life Counseling	730 S. Range Line	417-623-7852	Christian counseling
Tri-Star Counseling	712 E. 32nd Street	417-781-2868	Adolescent and adult substance abuse

Crisis Intervention Hotline (417) 347-7720 answered 24/7; Ozark Mental Health Center

Appendix F

Coding Protocol

I. Content: Detail/Elaborativeness.

- **Central Event:** We coded a "Yes" or "1" for Central Event if the child mentioned events that happened *to themselves*, *during the tornado*. We did not score a 1 if the child mentioned the day of the tornado or before or after the tornado without mention of Central Events during the tornado. Use of personal pronouns such as "I" and "we" typically accompanied statements that indicated that the child was discussing events that occurred during the storm.

- **Elaborativeness:** We created a total word count variable to provide a measure of elaborativeness. We also created variables of total word count per prompt. We only used Prompts 1 – 4, because many children did not respond to the final prompt ("Is there anything else you'd like to tell me about the tornado?)

  - Prompt 1: Tell me about some things that happened to you because of the tornado
  - Prompt 2: Tell me some challenging or difficult things that happened to you because of the tornado
  - Prompt 3: Tell me some positive or good things that happened to you because of the tornado
  - Prompt 4: How have things been different for you and your family since the tornado?

II. Coherence.
The coherence of the child narratives was evaluated with a coding scheme developed by Baker-Ward and colleagues (2007) and used in other research on children's memory narratives (e.g., Fivush, Sales, & Bohanek, 2008). Thus, we analyzed three dimensions of coherence on a scale of 0 (complete absence of the dimension) to 3 (fully coherent use of the dimension). We coded all three dimensions of coherence *per prompt*, meaning that there were four sets of coherence codes per child narrative.

- *Context* places the event in time and place. For this project, time was implied to a certain degree because we told participants which life-event to talk about. So, participants might not have felt as compelled to describe exactly when events happened. That said, it could be meaningful when some children do mention time – e.g., "a few days after the tornado" or "the day of the tornado" etc; therefore, we also coded for specific mentions of time as a part of our coding for coherence.

    0   No mention of time or place
    1   General mention of either time (e.g., after the tornado, since the tornado, lately, recently) or place (e.g., at school, at work, at home, in Joplin, we were another town over) – aka, the child mentioned where they were but not specifically enough that you, as an outside observer, could go and find that place
    2. Specific mention of time (e.g., yesterday, last week, last August, the day of the tornado, or any other reference where you could pinpoint the exact day or week given the information present) or place (e.g., in our basement, in our car, in my bedroom, or any other situation where you could located the exact location of the child)
    3   Specific mention of both

78

- *Chronology* refers to the degree to which the narrative is temporally organized. Evaluations (e.g., "at 4:00 we heard the tornado sirens. It was really scary when that happened") or elaborations (e.g., "Then, we all went into my basement; well, I mean, almost all of us; my dad stayed upstairs to watch the news") that were present between the ordering of events that did not obscure the sequencing of events did not affect the chronology score:
    - 0   Provision of no temporal sequencing information (an unordered collection of statements about the event or only one action mentioned in the narrative)
    - 1   A minority of statements were in an identifiable sequence
    - 2   About half of the statements were in an identifiable sequence
    - 3   A majority of the statements were in a comprehensible sequence
- *Theme* assesses the clarity of topic in the narrative. This includes how explanatory or interpretive the narrative is – or, do we know why things happened, what the results were, etc?
    - 0   No apparent topic or substantially off topic (e.g., "I don't know," "I got a new bike this summer")
    - 1   Staying mostly on topic but minimally developed (i.e., few causal connections or elaborations – a score of 1 was given to narratives that had only one statement if the statement was related to the prompt, such as "The tornado smashed a lot of buildings")
    - 2   Substantially developed with elaborations, interpretations or causal links (even if elaboration was present, *substantial development* was required)
    - 3   Substantially developed, with elaborations, interpretations or causal links, AND with links to autobiographical knowledge or self concept OR a resolution (again, even if elaboration was present, substantial development was required)

III. Emotion Content. The Linguistic Inquiry and Word Count (LIWC) program analyzed the text of verbatim transcripts of the child narratives for the presence of emotion terms (positive and negative). The program provided a frequency count of the amount of words per child narrative that either expressed positive/neutral or negative emotion. LIWC has been shown to reliability detect emotionality in a variety of populations (e.g., Tausczik & Pennebaker, 2010).

IV. Meaning. We coded for several dimensions of Meaning, including Resolutions, Instrumental Change, and Personal Impact based off of a coding scheme developed by Greenhoot et al. (2013), and for Lessons Learned/Insights Gained based on a coding scheme developed by McLean and Pratt (2006).

- *Resolution* coding measured the degree to which the main character's problems were resolved in the narrative. Again, in this study, it was implicitly assumed that the tornado was the "problem," and resolution was scored if the child made reference to having resolved how they felt about tornado-related events. Resolution was scored on a 3-point scale. We only coded information within the first two prompts – and only one score encompassing information from both prompts was given. We chose the first two prompts because neither prompt "pulled" for a resolution, so the presence of a resolution within these two prompts was likely a meaningful indicator of how the child was making sense out of the event.
    - 0   No resolution mentioned
    - 1   Vague reference to resolution (e.g., "things are better now.")
    - 2   Specific mention of the way in which the character's problem was resolved (e.g.,

"but, we got a new house and that has helped us feel better about losing our old house.")

- *Instrumental Change.* (0, 1, or more) We coded the narratives for frequency of references toward instrumental change by using the coding scheme used by Greenhoot et al. (2013). Individual statements from the entire narrative were used to code instrumental change. The participant had to make an explicit reference to a change; change could not be inferred by the coder. Instrumental change was coded if the child stated some specific instrumental/practical change (benefit or negative effect) of the event on their life. We did not code Instrumental Change for things that propelled action; instead, we coded *consequences* of the event. Sometimes the child mentioned the same instrumental change twice; in this case, it was only coded once.
    - INST – PN (0, 1, or more): "We got to move into a new house." "People sent us presents."
    - INST – NEG (0, 1, or more): "My house got blown down." "All the houses in Joplin were smashed." "Peoples' animals died."

- *Personal IMPACT-PN or NEG* (0, 1, or more). We coded the narratives for frequency of references toward personal impact by using the coding scheme used by Greenhoot et al. (2013). Individual statements from the entire narrative were used to code personal impact. Personal impact was coded when there were references to the *psychological* or *relational* impact of the event on the narrator, for better (or neutral; PN) or for worse (NEG). We did not code personal impact for things that propelled action in the event itself. Rather, we coded consequences of the event that lasted longer than the event itself (although they didn't have to be permanent). Personal Impact included references to the effect the memory has on the subject (e.g., "thinking about this makes me feel bad.") Again, we did not code references toward the same personal impact twice.
    - PImpact – Neg (0, 1, or more): "We got lazier." "My friend died." "My cat died." "People died." "I lost my faith in God." "This memory makes me feel bad."
    - PImpact – PN (0, 1, or more): "I got some new neighbors." "I get to see my dad more." "I made new friends at my new school." "I like helping people in need now." *Statements that were coded as PImpact – PN were NOT also coded as Lessons or Insights.*

- *Lessons/Insights:* We coded the entire narrative for lessons/insights using a coding scheme created by McLean and Pratt (2006), in which insights gained were considered to be a more sophisticated representation of meaning making than lessons learned. For example:
    0 No lessons or insights reported.
    1 Narratives with a lesson reported. "Lessons were defined as meanings that are behavioral and do not extend the meaning beyond the original recalled event" (p. 717). (e.g., "I learned to watch the weather more closely during tornado season.")
    2 Narratives with vague meaning. "These narratives contain meanings that are slightly more sophisticated than lessons but are not as explicit as insights" (p. 717) (e.g., "We learned how strong our family is")
    3 Narratives with insights, which are defined as "meanings that extend beyond the specific event to explicit transformations in one's understanding of oneself, the world,

or relationships" (p. 717). (e.g., "I realized that God's plan does not always make sense, but that despite the fact that bad things happen, there can be joy in healing.")

Coding Protocol – Mother-Child Conversations

I. Content: Detail/Elaborativeness.

- **Central Event:** We coded a "Yes" or "1" for Central Event if the child mentioned events that happened *to themselves*, *during the tornado* and we did the same for the mother (mother and child each received a unique score). We did not score a 1 if the child or mother mentioned the day of the tornado or before or after the tornado without mention of Central Events during the tornado. Use of personal pronouns such as "I" and "we" typically accompanied statements that indicated that the participant was discussing events that occurred during the storm.
- **Elaborativeness:** We created a total word count variable to provide a measure of elaborativeness. We also created variables of total word count per prompt. Then, we split all of these variables into mother and child word count variables. We only used Prompts 1 – 4, because many children did not respond to the final prompt ("Is there anything else you'd like to tell me about the tornado?)
    - Prompt 1: Tell me about some things that happened to you because of the tornado
    - Prompt 2: Tell me some challenging or difficult things that happened to you because of the tornado
    - Prompt 3: Tell me some positive or good things that happened to you because of the tornado
    - Prompt 4: How have things been different for you and your family since the tornado?

II. Coherence. The coherence of the conversations was evaluated with a coding scheme developed by Baker-Ward and colleagues (2007) and used in other research on children's memory narratives (e.g., Fivush, Sales, & Bohanek, 2008). Thus, we analyzed three dimensions of coherence on a scale of 0 (complete absence of the dimension) to 3 (fully coherent use of the dimension). We coded all three dimensions of coherence *per prompt*, meaning that there were four sets of coherence codes per child narrative. We did *not* code child and mother content separately for coherence given that conversational coherence would be almost impossible to identify using information from only one participant in the dyad.

- *Context* places the event in time and place. For this project, time was implied to a certain degree because we told participants which life-event to talk about. So, participants might not have felt as compelled to describe exactly when events happened. That said, it could be meaningful when some dyads do mention time – e.g., "a few days after the tornado" or "the day of the tornado" etc; therefore, we also coded for specific mentions of time as a part of our coding for coherence.
    - 0   No mention of time or place
    - 1   General mention of either time (e.g., after the tornado, since the tornado, lately, recently) or place (e.g., at school, at work, at home, in Joplin, we were another town over) – aka, the child mentioned where they were but not specifically enough that you, as an outside observer, could go and find that place
    - 2.   Specific mention of time (e.g., yesterday, last week, last August, the day of the

tornado, or any other reference where you could pinpoint the exact day or week given the information present) or place (e.g., in our basement, in our car, in my bedroom, or any other situation where you could located the exact location of the child)

      3 Specific mention of both

- *Chronology* refers to the degree to which the narrative is temporally organized. Evaluations (e.g., "at 4:00 we heard the tornado sirens. It was really scary when that happened") or elaborations (e.g., "Then, we all went into my basement; well, I mean, almost all of us; my dad stayed upstairs to watch the news") that were present between the ordering of events that did not obscure the sequencing of events did not affect the chronology score:

      4 Provision of no temporal sequencing information (an unordered collection of statements about the event or only one action mentioned in the narrative)

      5 A minority of statements were in an identifiable sequence

      6 About half of the statements were in an identifiable sequence

      7 A majority of the statements were in a comprehensible sequence

- *Theme* assesses the clarity of topic in the narrative. This includes how explanatory or interpretive the narrative is – or, do we know why things happened, what the results were, etc?

      1 No apparent topic or substantially off topic (e.g., "I don't know," "I got a new bike this summer")

      4 Staying mostly on topic but minimally developed (i.e., few causal connections or elaborations – a score of 1 was given to narratives that had only one statement if the statement was related to the prompt, such as "The tornado smashed a lot of buildings")

      5 Substantially developed with elaborations, interpretations or causal links (even if elaboration was present, *substantial development* was required)

      6 Substantially developed, with elaborations, interpretations or causal links, AND with links to autobiographical knowledge or self concept OR a resolution (again, even if elaboration was present, substantial development was required)

III. Emotion Content. The Linguistic Inquiry and Word Count (LIWC) program analyzed the text of verbatim transcripts of the child narratives for the presence of emotion terms (positive and negative). The program provided a frequency count of the amount of words per conversation that either expressed positive/neutral or negative emotion. The program also provided a frequency of child-generated emotion and mother-generated emotion per conversation. LIWC has been shown to reliability detect emotionality in a variety of populations (e.g., Tausczik & Pennebaker, 2010).

IV. Meaning. We coded for several dimensions of Meaning, including Resolutions, Instrumental Change, and Personal Impact based off of a coding scheme developed by Greenhoot et al. (2013), and for Lessons Learned/Insights Gained based on a coding scheme developed by McLean and Pratt (2006).

- *Resolution* coding measured the degree to which the main character's problems were resolved in the narrative. Again, in this study, it was implicitly assumed that the tornado was the "problem," and resolution was scored if the child or mother made reference to having resolved how they felt about tornado-related events. Again, the child and mother each received separate resolution scores. Resolution was scored on a 3-point scale. We only coded infor-

mation within the first two prompts – and only one score encompassing information from both prompts was given. We chose the first two prompts because neither prompt "pulled" for a resolution, so the presence of a resolution within these two prompts was likely a meaningful indicator of how the child was making sense out of the event.

    0 No resolution mentioned
    1 Vague reference to resolution (e.g., "things are better now.")
    2 Specific mention of the way in which the character's problem was resolved (e.g., "but, we got a new house and that has helped us feel better about losing our old house.")

- *Instrumental Change.* (0, 1, or more) We coded the narratives for frequency of references toward instrumental change by using the coding scheme used by Greenhoot et al. (2013). Individual statements from the entire narrative were used to code instrumental change. The participant had to make an explicit reference to a change; change could not be inferred by the coder. Instrumental change was coded if the child stated some specific instrumental/practical change (benefit or negative effect) of the event on their life. We did not code Instrumental Change for things that propelled action; instead, we coded *consequences* of the event. Sometimes the child or mother mentioned the same instrumental change twice; in this case, it was only coded once. Mothers and children were given separate instrumental change scores.
  - o INST – PN (0, 1, or more): "We got to move into a new house." "People sent us presents."
  - o INST – NEG (0, 1, or more): "My house got blown down." "All the houses in Joplin were smashed." "Peoples' animals died."

- *Personal IMPACT-PN or NEG* (0, 1, or more). We coded the narratives for frequency of references toward personal impact by using the coding scheme used by Greenhoot et al. (2013). Individual statements from the entire narrative were used to code personal impact. Personal impact was coded when there were references to the *psychological* or *relational* impact of the event on the narrator, for better (or neutral; PN) or for worse (NEG). We did not code personal impact for things that propelled action in the event itself. Rather, we coded consequences of the event that lasted longer than the event itself (although they didn't have to be permanent). Personal Impact included references to the effect the memory has on the subject (e.g., "thinking about this makes me feel bad.") Again, we did not code references toward the same personal impact twice. Mothers and children were given separate instrumental change scores.
  - o PImpact – Neg (0, 1, or more): "We got lazier." "My friend died." "My cat died." "People died." "I lost my faith in God." "This memory makes me feel bad."
  - o PImpact – PN (0, 1, or more): "I got some new neighbors." "I get to see my dad more." "I made new friends at my new school." "I like helping people in need now." *Statements that were coded as PImpact – PN were NOT also coded as Lessons or Insights.*

- *Lessons/Insights:* We coded the entire narrative for lessons/insights using a coding scheme created by McLean and Pratt (2006), in which insights gained were considered to be a more sophisticated representation of meaning making than lessons learned. Mothers and children

were given separate Lessons/Insights scores. For example:

0 No lessons or insights reported.
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2 Narratives with vague meaning. "These narratives contain meanings that are slightly more sophisticated than lessons but are not as explicit as insights" (p. 717) (e.g., "We learned how strong our family is")
3 Narratives with insights, which are defined as "meanings that extend beyond the specific event to explicit transformations in one's understanding of oneself, the world, or relationships" (p. 717). (e.g., "I realized that God's plan does not always make sense, but that despite the fact that bad things happen, there can be joy in healing.")