

Mother Recollections of a Tornado

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Abstract

The goals of the present study were to explore how meaning-related features of mothers' individual recollections of a devastating tornado and its aftermath related to mothers' perceived stress approximately one year later, and to elucidate ways in which mothers altered their recollection qualities when talking about the tornado with their children present. Participants included 41 mothers (ages 25 to 57) with 50 children (ages 8 to 12) who experienced a tornado. Multiple measures of meaning-related recollection qualities, including meaning making, coherence, emotional expressiveness, elaborativeness, and language sophistication were coded from verbatim transcripts of individual interviews and mother-child conversations about the tornado. Meaning-related recollection qualities were largely unrelated to mothers' levels of perceived stress, with the exception of positive and negative emotion-related terms. When talking about the tornado with their children present rather than individually, mothers used less sophisticated language, more positive emotion terms, were more coherent, and made more references to positive meaning making, suggesting efforts to match children's developmental levels and to encourage a positive interpretation of the tornado. Implications for future study of meaning making in adults and children are discussed.

Keywords: trauma, disaster, meaning making, autobiographical memory, parenting

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Mother Recollections of a Tornado

We often attempt to create meaning after negative events. This is sometimes a perplexing task, as many such events may seem inherently senseless and uncontrollable. Yet, based on decades of theory about meaning making (e.g. Frankl, 1962; Thompson & Janigian, 1988; Janoff-Bulman, & Frantz, 1997), some researchers have suggested that rebuilding an ordered, purposeful sense of the world through meaning making is essential to healthy adjustment after stressful events (Gillies & Neimeyer, 2006). A growing body of literature suggests that construction of coherent and interpretive recollections about negative experiences is linked to positive psychological adjustment in adulthood (Park, 2010). However, some research suggests that qualities of recollections that have elsewhere been linked to better post-trauma adjustment may be related to worse psychological adjustment for some individuals (Greenhoot & McLean, 2013). As this body of research develops, it is necessary to form a firmer conception of meaning making as a construct and to operationalize definitions (Waters, Shallcross, & Fivush, 2013), and to examine the specific qualities of recollections that are relevant to psychological adjustment. An additional area of study is the development of recollection qualities during childhood (Fivush & Nelson, 2006), including meaning making. However, the processes by which parents facilitate this development are not well understood. The current study seeks to examine the qualities of recollections provided by mothers who experienced a tornado, both in their relation to mothers' psychological adjustment as well as how these qualities differ in individual recollections versus parent-child conversations.

Recollection Qualities

Qualities of individuals' recollections of negative events have been studied extensively. Those from a cognitive perspective often emphasize the structure and linguistic features of

recollections (e.g. Fivush, Sales, & Bohanek, 2008). The study of autobiographical recollections highlights the role of language in creating a structured, evaluative framework for understanding events (Greenhoot & McLean, 2013). Recollections that are coherent (organized, thematic, and situated in time and place) and include *lexical markers* (cognitive processing and emotion words, pronouns, etc.) are thought to represent efforts to understand how the event is relevant, interesting, and important to their own lives (Greenhoot & McLean, 2013; Waters et al., 2013). However, coherence and lexical markers alone do not necessarily explain the type of interpretations individuals make about past events. Thus, another important component to understanding recollection of past events is interpretation. Interpretative statements, or direct references to meaning, may include insights gained, lessons learned, and personal impacts. These types of statements illustrate how individuals come to understand events in relation to the world and themselves.

These various recollection qualities have been incorporated into the study of meaning making, or the process by which individuals attempt to make sense of their experiences. Meaning making is conceptualized as a process in which one attempts to resolve the discrepancy between the situational meaning of a stressful event and one's overall cognitive framework, or *global meaning* (Park & Folkman, 1997). Many researchers have asked participants to provide written or oral recollections of the event, which are then analyzed for recollection qualities hypothesized to be related to meaning making. These include the recollection qualities described above: coherence, use of lexical markers such as cognition and emotion words, and direct references to meaning (e.g. McLean & Pratt, 2006; Greenhoot, Sun, Bunnell, & Lindboe, 2013, Hambrick, 2015, Waters et al, 2013; Lilgendahl, McLean, & Mansfield, 2013). These recollections, sometimes called autobiographical narratives, allow researchers to explore the

ways in which individuals reminisce about past events, and how different features of these recollections relate to measures of psychological adjustment (Greenhoot & McLean, 2013).

Meaning making is a multifaceted construct that can be observed in both the structure and content of autobiographical narratives. Waters and colleagues (2013) explored meaning making in college students' written recollections of negative events, and found that different ways of understanding meaning making provided unique and important information about how individuals understood events. Results indicated that coherence, cognitive processing words, narrative theme, and self-reported posttraumatic growth represented distinct aspects of a multifaceted construct. Greenhoot and colleagues (2013) also analyzed written accounts of past traumatic experiences for various indicators of meaning making, including self-reported qualities of the traumatic memory; lexical markers in written recollections such as sensory, cognitive, and emotion terms; and narrative meaning making qualities including coherence and direct references to meaning. They found that lexical markers and narrative meaning making qualities were consistently correlated, but that because these correlations were in the small range, they captured distinct and non-overlapping components of meaning making. These findings from Waters and colleagues and Greenhoot and colleagues suggest that it is important to consider many different recollection qualities to obtain a holistic understanding of how individuals make sense of past negative experiences.

Although it appears to be important to include a variety of recollection qualities to capture the various aspects of meaning making, some features found in individuals' autobiographical recollections may be more closely related to the psychological impact of traumatic events than others (Fig. 1). Greenhoot and colleagues (2013) found that direct references to meaning accounted for more variance in psychological symptoms compared to

lexical markers, lending support to the idea that direct references to meaning are more central to the overall construct of meaning making. Other researchers have found that in trauma recollections, content-related features such as positive and negative emotion words and pronoun use were more related to PTSD symptoms than were structural features such as disorganization and fragmentation (Jaeger, Lindblom, Parker-Guilbert, & Zoellner, 2014). Therefore, some evidence in the literature suggests that there may be variation in how strongly different recollection qualities relate to psychological adjustment.

Recollection Qualities and Psychological Adjustment

Many empirical research studies have found that recollection qualities related to meaning making are linked to higher psychological well-being. Expressive writing, or the process of writing coherent and emotionally expressive accounts of upsetting experiences, has received considerable support in the literature for its beneficial effects on emotional, social, and physical well-being (e.g. Pennebaker & Chung, 2007; Smyth, 1998; Frattaroli, 2006). Processing, including insights and perspective shifts, has been shown to predict reduction in depressive symptoms over the course of treatment (Hayes, Beevers, Feldman, Laurenceau, & Perlman., 2005). Self-reflection, coherence, and positive resolution have been linked to social-cognitive maturity, positive self-transformation, and well-being (Bauer & McAdams, 2004; Pals, 2006). The link between meaning making and positive adjustment has been supported in literature reviews (e.g. Park, 2010), and meta-analysis (Helgeson, Reynolds, & Tomich, 2006).

However, meaning making has also been linked to concurrent as well as future psychological distress. Cleiren (1993) found that bereaved adults who frequently wondered about why the loss occurred and what it meant were more distressed at each of two time points after the loss (4 and 14 months). Among mothers of children undergoing a life-threatening

medical procedure, attempts to integrate appraised and global meaning around the time of the surgery were related to increased distress at that time point and also predicted distress 3 months later (DuHamel et al., 2004). Another group of researchers found that women who were still searching for the meaning of a stressful event that occurred 5 years earlier had poorer mental functioning, less positive affect, and more negative affect (Tomich & Helgeson, 2002). Use of internal states language, or lexical markers that refer to individuals' thoughts, feelings, or perceptions related to an event, has been linked to greater posttraumatic stress symptoms (Greenhoot et al., 2013). Some researchers suggest that internal states language, although related to concurrent distress, ultimately leads to psychological adjustment (Kennedy-Moore & Watson, 2001), but others have found that greater use of internal states language predicts later posttraumatic stress symptoms (Legerski, Greenhoot, Vernberg, La Greca, & Silverman, 2014).

Several studies from the 2013 Special Issue of *Memory* also present results showing elements of meaning making to be related to negative mental health outcomes, largely contrary to the authors' expectations. Greenhoot and colleagues (2013) found that increased resolution in young adults' recollections about childhood abuse was associated with greater PTSD and depression symptomatology. Waters and colleagues (2013) found that higher levels of recollection qualities including coherence, lexical markers (i.e. cognitive mechanisms), and narrative theme were linked to more PTSD symptoms. Meaning making has also been linked to depressive symptoms. In a study of trauma recollections provided by low socioeconomic status African American adolescent girls, more reflective insight, higher use of cognitive processing and positive emotion language, and longer length of narrative was linked with higher depressive symptoms (Sales, Merrill, & Fivush, 2013). Results from these studies suggest that attempts to make sense of and interpret negative events may be more prevalent among individuals who are

struggling psychologically. Further, recollection qualities relating to meaning making may be more related to psychological distress in certain contexts, such as when a long time has passed since the stressful event (Bonanno, 2013).

Research on the relation between meaning making in recollections of traumatic experiences and psychological adjustment has most often focused on symptoms of post-traumatic stress disorder (PTSD) and depression. However, mood and anxiety disorders, including PTSD, share considerable symptom overlap and are highly comorbid, suggesting the need to consider dimensional and transdiagnostic features (Krueger, Watson, & Barlow, 2005; Gros, Price, Madruger, & Frueh, 2012) such as perceived stress. For the current study, *perceived stress* refers to a subjective sense that one's life is uncontrollable and overwhelming (Cohen & Williamson, 1988). This may be experienced as a subjective feeling of nervousness, difficulty in meeting life's demands, and fatigue. In addition, although prolonged PTSD or depression is relatively rare among survivors of natural disaster, perceived stress is likely to occur in a larger segment of the population. Natural disasters cause significant stress because of the traumatic nature of the event itself, but also cause continued stress for most people because of the disruption to daily life and the lengthy process of reconstruction (i.e. destruction to home and property, community displacement, loss of loved ones, injury to self and others, etc.). Perceived stress has been identified as a consequence of exposure to traumatic events among middle-aged adults (Thompson, Norris, & Hanacek, 1993). However, most research on trauma recollections and post-disaster adjustment have focused narrowly on PTSD symptoms. Because perceived stress is a more common long-term response to trauma than PTSD or other clinical disorders, it is important to consider the factors that relate to elevated perceived stress in disaster survivors. These factors may include how individuals recall and describe such events.

Development of Recollection Styles

Although much of the research on the interpretation of traumatic events has been conducted with adults, it is emerging as an area of interest for research with children and adolescents as well. Research suggests that children's trauma recollections show some qualities that appear to represent evidence of meaning making, and that the way children recall, understand, and make meaning out of traumatic events may influence connections between trauma exposure and symptoms of PTSD in children. Hambrick (2015) analyzed the trauma recollections provided by forty-nine 8 to 12 year old children enrolled in the present study for recollection features indicating efforts toward meaning making, and found that higher levels of elaborativeness, coherence, emotion-related words, and interpretive statements related to high levels of concurrent post-traumatic stress symptoms (PTSS). Further, meaning making efforts found in children's own utterances were more related to their own PTSS than were their mothers' efforts toward meaning making in conversations about the event, which suggests that pre-adolescent children may have an independent role in creating meaning in their lives.

However, many components of meaning making, such as recognizing consequences of the event, seeing how one has been changed as a person, and extrapolating lessons learned from the specific event to future events require relatively sophisticated cognitive skills that may be beyond the abilities of many children, particularly younger children. Fivush and colleagues (2008) found that children and their parents both evidenced more indication of efforts toward meaning making in recollections about stressful events compared to recollections about positive events, but that children's and mothers' independent indicators of meaning making were unrelated. The authors proposed that children might not yet possess the skills required to

regulate their negative emotions when talking about stressful experiences, and still depend on adults to aid in the development of recollection meaning making.

Children's meaning making may be shaped by the ways caregivers make meaning of the event in conversation with their children, such that parents serve as models for the formation of the skill of meaning making (Bauer, Burch, van Abbema, & Ackil, 2007). That is, if children hear their parents talk about the resolution and positive outcomes of a disaster, they may eventually learn to internalize these interpretations. Parents' expressions of meaning making may give comfort and confidence to children whose worldview has been shaken by disaster. Conversely, parents who talk extensively about negative consequences of the disaster and their own distressing memories and emotions may contribute to more distressing interpretations of the event for their children. Therefore, analysis of how parents recollect stressful events may provide insight into the styles of interpretations to which children are exposed.

In addition to observing and repeating adults' behavior, children may also develop meaning making through active co-construction of coherent, emotionally laden, and meaningful recollections with their parents. There is a substantial body of literature showing that autobiographical memory, or how we remember events that happen to ourselves in the past, is developed in childhood through adult-guided reminiscing (see Fivush, Haden, & Reese, 2006 for a review). For preschool-aged children, memory of events is improved when parents elaborate more during parent-child conversation about past events (Peterson, Sales, Rees, & Fivush, 2007). By discussing past events with their children, parents not only help children to recall past events, but also foster an understanding of how events impact themselves and others over time (Fivush & Nelson, 2006). Parents accomplish this by using internal states language, or words that reference their cognition and emotion states, and by prompting children to consider their own

internal states in reference to past events. Research suggests that mothers who use cognitive and emotion words in co-constructed recollections have young children who are more likely to later use cognitive and emotion words in their independent recollections (Reese, Haden, & Fivush, 1993; Bauer, Stark, Lukowski, Rademacher, Van Abbema, & Ackil, 2005; Rudek & Haden, 2005; Fivush & Nelson, 2006). Understanding how parents' recollections qualities relate to children's recollection qualities helps to inform the developmental process by which children make meaning of trauma, and thus developmental factors related to children's post-disaster adjustment.

Parents help their children develop these important cognitive skills. However, the process by which parents shape children's recollections is not well understood. Guided reminiscing is likely an effortful process that requires talking about past events differently when with one's child than when reminiscing alone or with other adults. Particularly for traumatic events, parents may experience strongly negative emotions that must be suppressed, regulated, or otherwise controlled in order to help children develop a healthy, age-appropriate understanding of the event in relation to their own lives. Excessive focus on the parent's own experience of the traumatic event may prevent children from reflecting on what the event meant to them, and miss the opportunity to develop the child's autobiographical recollection skills. Research shows that individual differences in the way parents talk about past events with their children, or reminiscing styles, influences children's development (Fivush, Haden, & Reese, 2006). However, additional research is needed to understand how guided reminiscing differs from the way parents talk about events on their own. This question may be answered by exploring within-individual differences in recollection qualities in parent-child conversation versus individual interviews. An understanding of the differences between guided reminiscing and individual

recollection may help inform clinical work with families exposed to trauma, in terms of helping parents know how to alter their language when talking about the event with their children to best foster the child's post-trauma adjustment.

Aims of the Current Study

The present study had two aims. The first aim was to examine how specific features of mothers' individual recollections of a tornado and its aftermath relate to mothers' perceived stress, with the expectation that ways of talking about the disaster will be related to adjustment. Because meaning making has been shown to be a complex, multifaceted construct (Fivush et al., 2008; Waters, Shallcross, & Fivush, 2013), several recollection qualities were selected as indicators of meaning making. Various features of trauma recollections that have been consistently linked with post-traumatic adjustment, including elaborativeness (i.e. word length and mention of events that happened to the narrator during the tornado), coherence, use of emotion-related terms, and references to meaning were coded from transcripts of mothers' individual interviews. References to meaning were operationalized as interpretive statements, which were selected for coding because they have previously been linked to adjustment in trauma-exposed samples (Greenhoot et al., 2013; Hambrick, 2015). Given the mixed results in the literature on the relationship between meaning making and psychological adjustment after trauma, hypotheses are tentative. However, because a relatively long time had passed since the traumatic event in the current sample and because long-term efforts after meaning making have been linked to poorer adjustment (Bonnano, 2013), it was hypothesized that higher levels of these indicators of meaning making will relate to higher perceived stress levels. Given that these interviews were conducted 14 – 19 months after the tornado, ongoing attempts to process the event may become ruminative and counterproductive. Self-reported severity of exposure to the

tornado was included as a covariate in analyses. In order to examine the nature of the relationship among tornado exposure, stress, and meaning making more thoroughly, selected meaning making indicators were tested for their moderation of the relationship between stress and exposure. References to meaning, coherence, and emotion-related terms were selected for moderation analyses, as these indicators were considered more central to the concept of meaning making than elaborativeness.

The second aim was to examine the extent to which mothers adjust their language during conversations about the disaster with their children. Mothers' four domains of recollection qualities from individual interviews (elaborativeness, coherence, emotion-related terms, and references to meaning) were compared with their recollection qualities from conversational interviews with their children (same four domains) in order to determine the extent to which these qualities differ depending on the context of the interview. In addition to the domains of the main coding scheme, mother-generated content from both individual interviews and conversations was evaluated for reading level as a proxy for the developmental level of the language used in these two situational tasks. It was expected that mothers would adjust their language, potentially to scaffold the development of emotion expression and interpretation of the traumatic event. This would be supported by significant within-group differences of mothers' recollection qualities in individual versus conversational interviews.

Method

Participants

Participants included 44 mothers (ages 25 to 57) who participated with their children in a larger study examining cognitive processes related to children's psychological adjustment. Some mothers enrolled more than one child, yielding 53 mother-child dyads. However, three children

were excluded from analyses due to suspicion of intellectual disability ($N = 1$), severe Autism Spectrum Disorder ($N = 1$), and not actually having experienced the tornado ($N = 1$), yielding 50 mother-child dyads. Data from the mothers of excluded children were included in analyses. Included children were 52% male and ranged in age from 8 to 12 years old ($M_{\text{age}} = 9.96$, $SD = 1.49$). The racial/ethnic composition of the sample was 80% white/non-Hispanic, 8% Hispanic, 4% black and 8% other/biracial. All dyads lived in or nearby Joplin, Missouri and were directly affected by the EF5 tornado that occurred at that location on May 11, 2011. This tornado was devastating for the community, costing over 160 lives and injuring approximately 1,200. Thousands of families lost their homes, and many were still living in Federal Emergency Management Agency (FEMA) trailers one year later (Hambrick, 2015). Thus, while mothers varied in the degree of damage they incurred during the tornado, all families lived in a community highly affected and continuing to recover from a catastrophic natural event.

Recruitment

The study was approved by three separate Institutional Review Boards: that of the University of Kansas, Missouri Department of Health, and the Ozark Center, which is a mental health agency in Joplin. Approval from these entities allowed the research team to recruit participants on-site at local service organizations such as YMCAs and Boy and Girls Clubs. Participants were also recruited by advertising on the project's website and Facebook page, two TV news stories, and through flyers and online announcements at area schools.

Data collection procedures

Trained graduate research assistants conducted research visits with dyads either in the home or in local service agencies depending on the family's preference and needs. Parental consent and child assent were obtained before proceeding. Mothers and children independently

completed a task measuring verbal reasoning ability. Children completed measures assessing symptoms of posttraumatic stress as well as another measure assessing depressive and anxious symptoms. Mothers reported on their children's psychosocial adjustment as well as their own perceived stress.

Mothers and children also participated in individual interviews regarding their independent experiences of the tornado. In addition to the individual interviews, mothers and children completed a semi-structured conversation with one another about the tornado. Following the interviews, both mothers and children completed measures about objective severity of the child's exposure to the tornado. This procedure was done after the interviews so that answering these questions would not affect how they qualitatively discussed the tornado. Interviewers read loud self-report questionnaires to parents and children when necessary (e.g. low English reading level). Not all measures completed by participants were used in the current analyses.

The final step of the protocol involved concluding the visit with a brief check-in regarding participants' emotional states and providing payment in the form of gift cards (\$20 for the mother and \$10 for the child). Because research procedures involved asking participants to think and talk about an unpleasant and frightening event that happened in their lives, there was potential for distress. Emotions before, during, and after protocol were assessed to examine study-related distress in both mothers and children. No participants reported study-related distress that persisted after the conclusion of the visit, and many reported that the study had been a positive experience for them. Mothers were given a list of local mental health service agencies to which they could seek help if needed as well as a sheet explaining how to recognize symptoms of psychological distress in their children.

Measures

The measures below are those used in the current study. Additional measures were administered in the original protocol for the purposes of Erin Hambrick's doctoral dissertation but are not included in the analyses for the current study.

Tornado-Related Traumatic Experiences (TORTE; Vernberg & Jacobs, 2005). The TORTE was modeled after the Hurricane-Related Traumatic Experiences (HURTE) questionnaire (Vernberg, La Greca, Silverman, & Prinstein, 1996) that was developed to measure exposure to traumatic events during and after Hurricane Andrew. The TORTE consists of 23 items intended to assess children's objective severity of exposure to the tornado and disruptive life events caused by the tornado. Both mothers and children reported on the child's tornado exposure. Although mothers reported on their children's exposure rather than their own with the TORTE, it is assumed that this is a reasonable representation of mothers' exposure, as 88% of mothers reported being with their children during the tornado. This information will be used as a covariate in analyses, as the severity of exposure likely relates to strongly to post-tornado adjustment. Items related to subjective distress during the storm were omitted because these items are not used to calculate the three subscales of the TORTE (Part A - During the Tornado, Part B - After the Tornado, and Part C - Since the Tornado) or the overall TORTE score. Further, the intent of this measure was to assess objective indicators of exposure, loss, and disruption without subjective ratings of tornado-related distress. Thus, TORTE totals used in the current study represent a subset of scale items. Internal consistency for the HURTE has been found to be acceptable in a study using the HURTE as one full scale (Cronbach's $\alpha = .76$; Hensley and Varela, 2008). Parent-report TORTE had good reliability ($\alpha = .83$).

Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983). The PSS is a measure of past-month global stress appraisal for adults. It is intended to assess how much one feels life to be uncontrollable and overwhelming (e.g. “In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?” and “In the last month, how often have you felt nervous and “stressed”?). This measure was initially created to measure subjective stress as a link between stressful events and health outcomes, but has since been conceptualized as an indicator of psychological distress in samples exposed to natural disaster (Yamashita, 2011). The PSS has also been linked to depression symptoms on the Beck Depression Inventory (BDI; Hewitt, Flett, & Mosher, 1992). The 14 items about perceived stress in the past month are scored on a 5-item Likert scale including 0 (never), 1 (almost never), 2 (sometimes), 3 (fairly often), and 4 (very often). Total scores may range from 0 to 56, with higher scores indicating more stress. In a study involving a nationally representative sample of 2,387 participants, Cohen and Williamson (1988) found the internal consistency of the PSS to be acceptable ($\alpha = .78$) and the mean score for female participants was 20.2 with a standard deviation of 7.8. In the present sample, Cronbach’s α for the PSS was .88, indicating good reliability, and the mean PSS score was 22.44 with a standard deviation of 7.33. This suggests that participants show an expected level of distribution of perceived stress, and were experiencing slightly higher perceived stress compared to a nationally representative sample.

Recollection Task. Mothers and children were separately asked a standard protocol of several open-ended questions developed by Erin Hambrick for the purpose of Project Share about the experience of the tornado (2015). Questions included, 1) “Tell me about some of the things that happened to you or your family because of the disaster,” 2) “Describe some challenging or difficult things that happened to you or your family because of the disaster,” 3)

“What positive things, if any, happened to you or your family as a result of the disaster,” and 4) “Compared to your life before the disaster, how are things different for you and your family now?” At the end, interviewers asked, “Is there anything else you would like to tell us about the disaster?” to give participants a chance to make additional comments. Not all prompts were given each time; if a participant provided information relevant to another prompt during a given response, that next prompt was not administered in order to reduce redundancy. Participants were given an unlimited amount of time to respond to each prompt, and each prompt was delivered after participants had finished responding to the last. Interviews were semi-conversational in that interviewers made occasional comments (e.g. “I see”, “Okay”) indicating their active listening, but did not ask additional questions to guide the participants’ responses. All interviews were audio-recorded. Audio recordings of three mother individual interviews were lost due to technical errors, yielding 41 mother individual interviews available for transcription and coding of positive and negative emotion, word count, central event, and reading level. Six of those interviews were not found until after reliability coders for references to meaning and coherence had left the research team, yielding 35 interviews available for coding and analysis involving the meaning making and coherence variables.

Conversation Task. Mothers and their children participated in conversations regarding the tornado. First, the researcher asked the dyad to discuss together some challenging aspects of the tornado. The researcher then left the room in order to encourage mother and child to talk to one another, rather than to the researcher. After five minutes, the researcher returned, asked the dyad to discuss any positive aspects of the tornado for five more minutes, and left again. All interviews were audio-recorded. Conversations for all 50 mother-child dyads were available for transcription and revision.

Coding

Verbatim transcripts of mother recollections were coded on the following dimensions of meaning making: elaborativeness, coherence, emotion-related terms, and references to meaning. In addition, transcripts were coded for reading level. These dimensions were also coded from transcriptions of mother-generated content in the conversations for the purposes of a previous study (Hambrick, 2015). Recollections were coded as a whole rather than by prompt for both mother individual interviews and conversations. Prior to coding, all interviews were transcribed verbatim and reviewed by a second transcriber to ensure accuracy. Each transcription was coded by a master coder, and subsets of interviews were additionally coded by a reliability coder for each variable (with the exception of variables coded by LIWC, as this computer software program introduces little opportunity for user error). Coders were graduate and undergraduate students who underwent several weeks of training with graduate students and faculty familiar with the coding scheme. For those recollections analyzed by both coders, consensus codes were used in the present analyses.

Elaborativeness. As with the previously coded child individual and mother-child conversational interviews, the level of detail in the mother individual interviews was determined using two mechanisms: 1) word count and 2) analysis of whether mothers referred specifically to things that happened to themselves during the tornado (referred to as central event). In the mother-child joint interview, word count was calculated separately for mothers and children. Inter-rater reliability for central event was 90% in mother-child conversations, and 86% in mother individual interviews.

Coherence. The coherence of mothers' recollections in individual interviews and conversations was assessed using a coding scheme developed by Baker-Ward and colleagues

(2007). This scheme conceptualizes coherence as having three domains: context (places event in time and place), chronology (contains temporal organization), and theme (use of explanations to create a logical story). Each domain was coded on a scale from 0 (complete absence of the dimension) to 3 (full use of the dimension). Due to the nature of the construct, mothers' and children's coherence could not be analyzed separately; thus, conversation coherence codes are holistic. Inter-rater reliability was calculated using intraclass correlation. For mother-child conversations, coefficients were .94 for context, .91 for chronology, and .85 for theme (Hambrick, 2015). For mother individual interviews, coefficients were .85 for context, .80 for chronology, and .89 for theme. Thus, the reliability for each variable in both types of interviews falls in the excellent range ($ICC > .75$; Cicchetti, 1994).

Emotion-related Terms. Conversations and mother individual interviews were coded for positive and negative emotion-related terms using the Linguistic Inquiry and Word Count (LIWC) program. LIWC has been shown to have good reliability in identifying emotionality in a variety of populations (e.g., Tausczik & Pennebaker, 2010). Emotion-related terms in conversations were coded separately for mothers and children. Prior to LIWC analysis, transcripts were prepared by removing any content superfluous to words uttered by the participant (e.g. document header, words said by interviewer, etc.). Results provided by LIWC represent the proportion of emotion words to all words coded by the program.

References to Meaning. This dimension includes three distinct components: Resolution, Personal Impact, and Lessons/Insight. The coding scheme used to abstract these dimensions of references to meaning was developed by McLean and Pratt (2006), and adapted by Greenhoot and colleagues (2013). Resolution refers to the degree to which problems were resolved in the recollection, and are coded on a scale from 0 to 2. Lessons/insight refers to the degree to which

the narrator describes lessons they learned as a result of the event or insights they gained. Insights are seen as more cognitively sophisticated than lessons, and are coded higher. Codes for lessons/insight ranged from 0 to 3. Personal impact refers to the psychological or relation impact of the event on the narrator, and can be either positive or negative. Personal impact was coded as the number of times these instances occurred in the recollection. Intraclass correlation coefficients for mother-child conversations were .96 for Resolutions, .96 for Lessons, .79 for Positive Personal Impact, and .87 for Negative Personal Impact, all of which fall in the “excellent” range for reliability (Cicchetti, 1994). Intraclass correlation coefficients for mother individual interviews were .65 for Lessons/Insights, .62 for Positive Personal Impact, and .74 for Negative Personal Impact, all of which fall in the “good” range for reliability. Inter-rater reliability for Resolution as coded in mother-individual interviews was in the “moderate” range ($\kappa = .45$) when coded on a scale from 0 to 2, but rose to the “good” range ($\kappa = .65$) when coded as a dichotomous variable. Resolutions was therefore treated as a dichotomous variable (either present or absent in the entire recollection, coded as 0 or 1) for all analyses.

Reading level (Flesch-Kincaid Grade Level; Kincaid, Fishburne, Rogers, & Chissom, 1975). Mother-generated content in individual and joint interview transcripts were coded for reading level using Microsoft Word’s Readability Statistics; namely, Flesch-Kincaid Grade Level. This measure provides an indication of how the text compares to the average reading ability of various U.S. grade levels. For example, a score of 7.0 would mean that the text would be comparable to the expected reading level for a U.S. seventh grader. Scores may range from -3.40 (every sentence consists of a single one-word syllable) to 22 (college-level). This measure is commonly used as a standard of readability when crafting consent forms and questionnaires to ensure that participants can reasonably be expected to fully understand what is

being asked of them (e.g. Paasche-Orlow, Taylor, & Brancati, 2003). The Flesch-Kincaid Grade Level has been used as a measure of language complexity/articulation in trauma narratives provided by sexual assault survivors, and was related to anxiety and PTSD symptoms (Amir, Stafford, Freshman, & Foa, 1998).

Results

Descriptive statistics, including means, standard deviations, and ranges, for mothers' recollection qualities in individual interviews and conversations with their children are shown in Table 1. Recollection qualities appeared more frequently and to a greater degree in mother-generated content from individual interviews compared to conversations, likely because interviews were longer. Nonetheless, these recollection qualities show variation across the sample in both recollection tasks.

Because the order in which interviews were conducted was counterbalanced, between-groups t-tests (and Chi-square tests for categorical variables) were used to determine if mothers' recollection qualities occurred more frequently or to a greater degree in the individual recollections that followed the mother-child conversation than in those that preceded the mother-child conversation. No significant differences were identified (p values ranged from .09 to .97). Between-groups comparisons were also conducted to test order effects for mother-generated recollection qualities in conversations. Most mother-generated recollection qualities in conversations were not dependent on the order in which interviews were administered (all other p values ranged from .18 to .89). However, there was an observed difference for central event ($\chi^2 = 6.01, p < .05$), suggesting that mothers who completed the conversation before the individual interview were more likely to mention the central event (i.e. things that happened the day of the

tornado) in conversation with their children compared to mothers who completed the individual interview first.

Aim 1: The first aim of the present study was to examine how specific features of mothers' individual recollections of a tornado and its aftermath relate to mothers' perceived stress. The mean PSS score was 22.44 (SD = 7.33), and ranged from 6 to 37. The mean TORTE score was 5.9 (SD = 4.18), with a range from 0 to 15. The sample size for analyses involving meaning and coherence variables was 35, and the sample size for analyses involving emotion-related terms, word count, central event, and reading level was 41.

Coherence variables (context, chronology, and theme) correlated highly with one another, and were thus combined to create a composite variable based on a theoretical understanding of these being three dimensions of the same construct. Bivariate correlations (Pearson, and Spearman where appropriate) amongst mother individual recollection qualities, PSS score, and TORTE scores are presented in Table 2. Most recollection qualities were moderately intercorrelated (r values ranged from .35 to .69), with the exception of proportions of positive and negative emotion-related terms, which were not significantly correlated with any other meaning variables. Proportion of positive emotion-related terms correlated negatively with PSS score ($r = -.37, p < .05$). No other recollection qualities were correlated with PSS score. PSS score was moderately correlated with TORTE ($r = .44, p < .01$). Closer analysis showed that PSS score correlated more strongly with Parts B ($r = .45, p < .01$) and C ($r = .38, p < .01$) of the TORTE, which measure ongoing tornado-related disruption, compared to Part A ($r = .25, p = .08$), which measures experiences during the tornado. Because of the possibility that differences in word count accounted for relationships among recollection features and PSS, partial correlations were also run among lessons/insights, positive personal impact, negative personal

impact, coherence, and PSS score controlling for word count. Again, no recollection features were significantly correlated with PSS; however, the correlation between positive personal impact and PSS score approached significance ($r = -.31, p = .09$).

Proportion of positive emotion-related terms was tested as a predictor of PSS in linear regression, controlling for TORTE. Greater positive emotion in mothers' individual interviews was associated with less perceived stress, even when controlling for tornado exposure ($t = -2.59, p < .05$). Lessons/insights, positive personal impact, negative personal impact, resolutions, coherence, positive emotion-related terms, and negative emotion-related terms were tested as moderators of the relationship between tornado exposure and perceived stress. Proportion of negative emotion-related terms moderated the relationship between tornado exposure and perceived stress ($t = 2.06, p < .05$). Post-hoc probing showed that, at high levels of exposure, proportion of negative emotion-related terms to total number of coded words in individual recollections is related to perceived stress ($t = 3.56, p \leq .001$), but at low levels of exposure, proportion of negative emotion-related terms is not related to perceived stress ($t = .766, p = .49$). The relationship between PSS score and tornado exposure at high and low negative emotion is shown in Figure 1. No other recollection variables moderated the relationship between tornado exposure and stress.

Aim 2: The second aim of the current study was to examine the extent to which mothers change the way they talk about the disaster in individual interviews versus in conversation with their children. In order to examine the extent to which mothers adjust their language during conversations about the disaster with their children, within-subjects t-tests were conducted to determine differences in recollection qualities in mothers' individual interviews and in mother-generated content in mother-child conversations. Aim 2 has one fewer participant included in

analyses because one mother who provided an individual interview had a child who was excluded from the study and thus did not have data from the conversation task. Thus, the sample size for t-tests involving meaning and coherence variables is 34, and the sample size for t-tests involving emotion-related terms, word count, central event, and reading level is 40.

Means and standard deviations of recollection qualities in these two interview contexts are presented in Table 2. Because mother-child conversations had only two prompts compared to the four prompts delivered to mothers individually, proportions of recollection qualities were compared for whole interviews rather than per prompt. Lessons/insights, positive and negative personal impact, resolutions, coherence, and central event were recoded by dividing by word count to create proportion variables, thus accounting for differences in number of utterances between the two interview contexts. Positive and negative emotion-related terms were not recoded as they already represent proportions of emotion-related terms to all words uttered in the interview. Reading level was not recoded because this variable is not influenced by the number of words present in a body of text.

All variables were assessed for normality and outliers. Variables with a high degree of skewness ($\text{skew} > |1|$) were log transformed. Analyses were run with and without transformed variables to decide whether normal distribution made a notable difference. For all variables, transformation did not make a notable difference in results of analyses, and thus results are presented for t tests run with untransformed data. Statistical outliers were detected for mother individual positive personal impact, negative emotion-related terms, and word count, and for conversational positive personal impact, negative personal impact, and negative emotion-related terms. Outliers were retained for all analyses on the basis that they these values were not errors and did not significantly change the results of analyses when included.

Statistical results for t-tests examining the differences in mother-generated recollection qualities across recollection task are shown in Table 1. Results of t-tests indicated significant differences between mother-generated content in individual interviews versus conversations in all but three areas: proportions of lessons/insights, negative personal impact, and negative emotion-related terms. Mothers said more words in their individual interviews compared to their conversations, and had higher reading levels on average. Mothers mentioned more positive personal impacts, resolutions, and positive emotion-related terms; were more likely to mention at least one central event; and were more coherent in their conversations with children than in their individual interviews when controlling for word count.

Discussion

Theory of meaning making suggests it has an important role in adjustment to negative life events. Models of meaning making assume that meaning making has a reciprocal relationship with psychological adjustment; it is prompted by distress caused by discrepant appraised and global meaning, and in turn has effects on well-being and adjustment (Park & Folman, 1997; Park, 2010). However, these relationships are not well understood, as various research studies have found contradictory results. Further, the development of meaning making is a growing area of research with many unanswered questions, including how parents engage in the process of helping their children to develop meaning making skills. This research sought to supplement this growing body of research by exploring the recollection qualities in mothers' recollections of a devastating tornado, both individually and in conversation with their children.

Meaning making was operationalized as an array of recollection qualities that have previously been linked to meaning making (McLean & Pratt, 2006; Greenhoot et al., 2013; Hambrick, 2015). These include references to meaning, including lessons/insights, positive and

negative personal impact, and resolutions; coherence; proportion of positive and negative emotion-related terms; and elaborativeness, including word count and central event (Figure 1). Results indicate that mothers generally provided coherent, elaborate, and meaning-laden recollections about the tornado. Prior research with similar methodology has found recollections to be shorter and with fewer references to meaning compared to the current study (Greenhoot et al., 2013 and McLean & Pratt, 2006). The elaborative nature of recollections provided by the present sample may be due to older age of mothers in this study compared to participants in the Greenhoot and colleagues and McLean and Pratt studies. Other differences include shorter time since the event, the tornado as a shared rather than individualized trauma, and the method of collecting oral rather than written recollections. Most mothers made at least one reference to a lesson they learned or an insight they gained as a result of the tornado, and most also referred to how the event had psychologically or relationally impacted them. Correlations showed that most recollection qualities were moderately intercorrelated, supporting prior conclusions that meaning making is a multifaceted construct that is best measured using a variety of indicators (Waters et al., 2013). However, proportions of positive and negative emotion-related terms (lexical markers) were not related to other meaning making indicators. This suggests that emotionality may not have been a central component of meaning making for the mothers in this sample, and may be more indicative of present stress levels.

Mother-reported severity of tornado exposure was related to perceived stress, suggesting that mothers who experienced more damage and disruption because of the tornado also felt more stressed and less capable of handling life's difficulties approximately one year later. Most hypothesized relationships between recollection qualities and perceived stress were not significant. Also contrary to hypotheses, the results indicated that mothers who reported feeling

more stressed evidenced fewer positive emotion-related terms in their individual interviews recalling the tornado regardless of the severity of their exposure to the tornado. However, these results may not speak to their experiences of the tornado or this recollection task in particular, in that mothers more prone to perceive themselves as stressed may be less inclined toward positive emotions in general. In addition, proportion of negative emotion-related terms moderated the relationship between severity of tornado exposure and perceived stress levels. Higher proportion of negative emotion-related terms was related to greater perceived stress, but only at high levels of tornado exposure. This suggests that negative emotion-related terms may be more strongly related to perceived stress at higher levels of tornado exposure. One explanation for this could be that negative emotion related terms are related to stress when the stress is due to damage and disruption caused by the tornado, as would be the case for individuals more severely exposed to the tornado, but not when stress is due to other life stressors. This is supported by the fact that perceived stress was most strongly related to those aspects of the exposure measure (TORTE) that related to ongoing, or more recent disruption of the tornado (i.e. home damage still has not been fixed, continued displacement, longer travel to work, etc.).

Although mothers in the current study tended to indicate high levels of meaning making in their individual recollections of the tornado, these indicators were largely unrelated to perceived stress. Further, those indicators which were related to perceived stress (positive and negative emotion-related terms) seem to not be central features of meaning making for the participants in this study due to no relation to other indicators of meaning making. Because there was no measured relationship between meaning making and psychological distress, it is possible that these mothers had already resolved any discrepancy between global and situational meaning.

Meaning making, as measured here, may actually have been representing meaning *made*, or the products of the meaning making process.

Results also show that mothers changed the way they talked about the tornado depending on whether they were speaking to the interviewer or with their children. The differences observed in the ways that mothers talked with their children may reflect an attempt on the part of mothers to scaffold children's processing of the event by meeting children where they are developmentally and focusing on positive outcomes and growth. Mothers actively co-constructed recollections that were more coherent, included more references to the events that took place during the tornado, used more positively oriented language, and made more positive yet simplistic references to meaning (i.e. resolutions and positive personal impacts) than when they were interviewed alone. Generally, mothers tended to talk less in conversations than individual interviews, likely due to the give-and-take nature of conversations, as well as time limits placed on conversations that were not placed on individual interviews. In addition, results show that mothers evidenced lower reading grade level in their speech when talking with children than when talking alone. Mothers did not include more or less negative references to meaning or more negative emotion-related terms in either setting. Finally, mothers did not include more sophisticated lessons or insights in their conversations than in their individual interviews, possibly because these were deemed too complex for children to understand. Despite their own struggles with the tornado and its aftermath, it seems that mothers were generally able to put those experiences aside and attempt help the child come to terms with the event in a positive and developmentally appropriate way.

Due to the possibility that the order in which recollection tasks were completed might influence how mothers talk about the tornado, the individual interviews and conversations were

counterbalanced. For the most part, the order in which interviews were conducted had no bearing on the frequency or degree of recollection qualities in mother-generated content in conversations. However, mothers who completed the conversation before the individual interview were more likely to mention the central event (i.e. things that happened the day of the tornado) in conversation with their children compared to mothers who completed the individual interview first. This could be because mothers felt that they had sufficiently addressed issues relating to the tornado itself when discussing it with their children, and felt less compelled to bring up the details of the event a second time. However, other recollection qualities were not affected by the order of administration. Thus, future research should bear in mind that participants may not express details of traumatic events more than once if given multiple recollection tasks.

Strengths and Limitations

This study has some methodological strengths that set it apart from other studies on meaning making. First, rather than asking participants to self-report on their perceived meaning making, meaning making was coded from interviews and conversations. This allowed for a more in-depth exploration of the various features that comprise efforts to understand and make sense of traumatic events. Second, having all participants recall the same disaster provided consistency, and introduced less potential confounds than asking participants to recall various types of potentially traumatic events. Further, severity of the traumatic event is often related to meaning making (Park, 2010), and asking about the same event allowed for the consistent measurement of its severity. Third, this study included many different recollection qualities in the measurement of meaning making, allowing for a unification of different theoretical orientations. Fourth, while most research on the parent-guided development of meaning making

in children has examined how parents talk about events with their children, there is little research on how parents talk differently in this context than they normally would. By comparing recollection qualities across these contexts, this study allows for an exploration of the process by which parents engage in the work of fostering meaning making in their children. Finally, counterbalancing the order of administration of these two different recollection tasks allowed for testing of order effects.

Several limitations should be considered as well. First, effects may be difficult to detect in a small sample such as this. While recruitment involved a variety of different approaches and great care was taken to be sensitive to the characteristics of this community, it was limited in that Joplin, MO is a small city. Further, there is potential for sampling bias. In an effort to conduct this research ethically (Hambrick, O'Connor, & Vernberg, 2015), families were informed prior to participation that they and their children would be asked to talk about the tornado and its impact on their lives. Some families who initially expressed interest in the study declined to participate, explaining that their children had finished the process of recovering from the event. Therefore, families who had already made meaning of the event may have been disinclined to participate. Families who were still in the throes of meaning making may have declined to participate as well, as they may have been apprehensive about providing detailed recollection of an event that still troubled them. It is not possible to examine differences between those who did and did not participate in this study, but should be taken into account when interpreting results.

Another limitation to the current study is the absence of a measure of clinically significant psychological distress. It is possible that the hypotheses regarding the relationships between mothers' individual recollection qualities and psychological adjustment might not have been supported because psychological distress was operationalized as measured generalized life

stress, rather than a pathological level of stress. Perhaps relatively high levels of stress are required to initiate the meaning making process, and that lower-level generalized stress is not substantially related to the cognitive processes of making sense of trauma. This study would also have benefited from inclusion of some measure of positive adaptation, such as positive well-being or resilience. While much of the literature, and indeed psychology in general, tends to be focused on preventing and addressing negative psychological symptoms, there is a growing interest in the positive sequelae of negative events, particularly as they relate to processing of those events (Helgeson et al., 2006; Calhoun, Cann, Tedeschi, & McMillan, 2000; Triplett, Tedeschi, Cann, Calhoun, & Reeve, 2012). It could be that while the recollection qualities measured here were not related to perceived stress, they were related to perceived well-being or post-traumatic growth. Inclusion of measures of adaptation would have allowed us to explore how meaning making, particularly the positive aspects such as positive lessons, insights, and personal impacts, helps individuals not only recover from but also grow after disaster.

This study failed to support a relationship between positive and negative emotion-related terms and other recollection qualities identified as being related to meaning making. This result is somewhat surprising, as emotionality has been consistently linked to meaning making in the literature (Greenhoot et al., 2013; Fivush et al., 2008; Sales et al., 2013). Emotion-related terms were coded using the default dictionary of the Linguistic Inquiry and Word Count program. This dictionary includes many words in the positive and negative emotion categories which are not, strictly speaking, emotion words, but are rather terms related to or often accompanied by emotion (e.g. benefit, agree, glamor, play, fake, danger, and mistake). In addition, LIWC is not able to detect context, irony, sarcasm, and idioms (Tausczik & Pennebaker, 2010). Some researchers (Greenhoot et al., 2013) have used revised versions of this dictionary including only

emotion words, while others have coded emotion words manually rather than using a software program (Sales et al., 2013), which may explain differences observed in the current study.

In terms of the second aim of this study, the design was limited by the fact that prompts differed slightly between individual interviews and mother-child conversations. Individually, mothers were asked to talk about the tornado generally, positive and negative consequences of the tornado, and how their lives had changed. In conversation, mothers and children were only asked to discuss positive and negative consequences of the tornado. This slight inconsistency across tasks may have caused mothers to talk differently, in ways not related to whether or not they were with their children. However, as mothers received more prompts during the individual interview but still evidenced a higher proportion of meaning making when with their children, this may provide additional support for the conclusion that mothers make an effort to help their children understand and make sense of traumatic events more than they do individually.

Finally, this is a cross-sectional design, limiting any inference about how meaning making develops over time after traumatic events. The inclusion of only one time point approximately one and a half years after the tornado may mean that most participants had already finished making meaning of the event. With respect to the second aim, a longitudinal design would have allowed for an examination of how mothers' recollection style predicts children's future recollection styles and adjustment, as has been illustrated in prior research (e.g. Bauer et al., 2005). However, the cross-sectional design of this study does allow for observations of concurrent relations between meaning making and psychological distress, and also provides valuable information about how mothers alter the way they recall traumatic events when alone versus with their children, which were the goals of the present study.

Future Directions and Concluding Remarks

Echoing the calls of many other researchers, there is a great need for longitudinal research (e.g. Bonanno, 2013). Designs with multiple time points will allow us to better understand how meaning making changes over time, as well as how it predicts future positive and negative psychological adjustment. Meaning making may be especially adaptive in the short-term recovery phase after a traumatic event. However, if the search for meaning struggles on, unsuccessful, into the long-term recovery phase, meaning making may tend to look more like rumination, becoming less productive and more distressing (Sales, et al., 2013). Bonanno (2013) suggested that meaning made might be far more important than meaning making, and persistent efforts toward meaning making may actually be counterproductive in certain situations. Future research would benefit from using longitudinal designs to explore how meaning making and its relationship to psychological adjustment change over time.

In addition to an understanding of meaning making versus meaning made, personality characteristics may also provide information as to whether meaning making is healthy or unhealthy for the self. Lilgendahl and colleagues (2013) drew a distinction between healthy meaning making, in which individuals reported self-growth after a negative experience, and unhealthy meaning making, in which individuals came to the conclusion that they were damaged or a bad person because of a negative experience. Interestingly, the authors found that personality characteristics and personal theories of the self differentially predicted healthy and unhealthy meaning making in recollections about trauma. These results give valuable insight into the relevance of personality features and concept of the self in determining whether meaning making is healthy. Future research studies should continue to identify individual characteristics that might account for differences in the relationship between recollection qualities and

psychological adjustment. Another factor that may be important for adjustment is whether lessons, insights, and resolutions are positive or negative. While all lessons, insights, and resolutions in the present study were positive, future studies should take care to note differences in whether participants discuss positive and/or negative interpretations and conclusions about themselves and the event.

Although the methodology inherent to qualitative research, such as coding recollections and recollections, is not always feasible with large sample sizes, this would increase the power to detect smaller effect sizes. This is particularly relevant when numerous recollection qualities are being considered, as having a large number of variables limits power. Future studies should continue to find a balance between optimizing their sample to be able to detect hypothesized relationships, and yet limiting sample size so that recollections can be coded for many qualities and in great detail.

The second aim of the study opens doors to many possible areas of exploration. While mothers generally altered the way they talked about the tornado across recollection tasks, there was likely variability across the sample. It would be very informative to assess between-group differences across those mothers who changed their recollections a lot versus very little. Individual characteristics such as age, education level, ethnicity, and other demographic features may account for the extent to which mothers alter their language. In addition, personality and psychological features such as stress level, verbal language ability, and mother-child attachment may also predict differences in recollection qualities across contexts.

Future research should also consider how the degree to which mothers do or do not change the way they talk about the tornado relates to children's adjustment. It may be that mothers who do not alter their language, continue to focus mainly on their own experiences of

the trauma, or talk about their own emotions to the exclusion of their children's may not provide their children with a space to process the event and come to their own interpretations. In contrast, mothers who show more change between recollection contexts may be more in-tune to their children's developmental level and their needs to make sense of the event. Finally, most research on parent-guided reminiscing has involved mothers as participants, and there is woefully little information about the role that fathers play in the development of children's autobiographical memories and recollection styles, with some exceptions (e.g. Roger, Rinaldi, & Howe, 2012).

Overall, these results suggest that 1) mothers who experienced more disruption and loss after the tornado were more stressed a year and a half later, 2) mothers showed evidence of having made meaning of the tornado but meaning making was largely unrelated to psychological distress except for positive and negative emotion-related terms, and 2) mothers substantially changed the ways they recalled the tornado when alone versus when with their children, providing insight into the ways that parents foster the skill of meaning making for their children. While this study has several limitations, it adds to the literature on meaning making after traumatic events and provides several directions for future research. It is clear that individuals make meaning after negative experiences, and efforts toward meaning making have complex and inconsistent relationships to well-being. Further, meaning making is itself a complex concept, and is best studied using a detailed, yet holistic approach. Finally, this study contributes to greater understanding of the role that parents play in the development of meaning making in children, and how parents engage in the process of helping their children understand stressful events. More information about how parents can foster this developmental process will inform post-trauma intervention with families.

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Table 1.

Recollection qualities in mother individual interviews and conversations

	Individual Interviews					Conversations				
	Mean	SD	Range	N		Mean	SD	Range	N	
Lessons/Insights ^a	1.91	1.10	0 – 3	35		0.98	1.13	0 – 3	34	
Positive Personal Impact ^b	2.91	2.19	0 – 8	35		1.96	1.97	0 – 8	34	
Negative Personal Impact ^b	4.70	4.70	0 – 12	35		1.32	1.52	0 – 8	34	
Resolution ^a	--	--	0 or 1	35		--	--	0 or 1	34	
Coherence ^a	7.21	2.12	2 – 9	35		6.36	1.29	4 – 9	34	
Positive Emotion ^c	2.42	0.84	1.09 – 4.38	41		4.72	2.00	.76 – 9.77	40	
Negative Emotion ^c	1.38	0.54	.25 – 2.59	41		1.76	1.17	0 – 6.32	40	
Word Count ^b	1714.04	1389.34	119 – 6499	41		515.54	286.26	57 – 1232	40	
Central Event ^a	--	--	0 or 1	41		--	--	0 or 1	40	
Reading Level ^a	7.15	2.50	3.8 – 14.6	41		2.13	1.03	.2 – 8.4	40	

Note: Sample size (N) differs across format of task and recollection quality due to availability of audio files.

^aVariable originally coded on a scale.

^bVariable coded as a count of occurrence in the recollection.

^cVariable coded as a proportion of positive or negative emotion words to the total number of words recognized by the Linguistic Inquiry and Word Count (LIWC) Program.

Table 2.

Correlations among perceived stress, tornado exposure, and individual recollection qualities

	Perceived Stress	Tornado Exposure	Lessons / Insights	Positive Personal Impact	Negative Personal Impact	Resolution	Coherence	Positive Emotion	Negative Emotion	Word Count
Tornado Exposure	.44**	--								
Lessons/Insights	NS	NS	--							
Positive Personal Impact	NS	NS	.44**	--						
Negative Personal Impact	NS	NS	NS	.45**	--					
Resolution	NS	NS	NS	.35*	NS	--				
Coherence	NS	NS	.69**	.45**	.52**	.43**	--			
Positive Emotion	-.37*	NS	NS	NS	NS	NS	NS	--		
Negative Emotion	NS	NS	-.33 ^T	NS	NS	NS	NS	NS	--	
Word Count	NS	NS	.37*	.49*	.40**	.67**	.49**	NS	NS	--
Central Event	NS	NS	.45**	NS	.27 ^T	NS	.48**	NS	NS	.39*

Note: ^T = trend-level, $p < .10$; * = $p < .05$; ** = $p < .01$

Table 3.

Paired t-tests comparing mother-generated recollection qualities in individual interviews versus mother-child conversations

Recollection Quality	Statistic	p-value
References to Meaning		
Lessons/Insights	t = -1.56	.13
Positive Personal Impact	t = -2.32	.03
Negative Personal Impact	t = .95	.35
Resolution	t = -2.45	.02
Coherence	t = -4.50	<.0001
Proportion of Emotion-Related Terms		
Positive Emotion	t = -6.15	<.0001
Negative Emotion	t = -1.91	.06
Elaborativeness		
Word Count	t = 5.09	<.0001
Central Event	t = -2.19	.04
Reading Level	t = 10.48	<.0001

Note. All variables (except word count and reading level) were recoded as proportion to the overall word count in order to take into account differences in number of utterances between individual interviews and conversations. Negative values indicate that the recollection quality was higher in proportion in mother-generated content in conversations than in mother individual interviews.

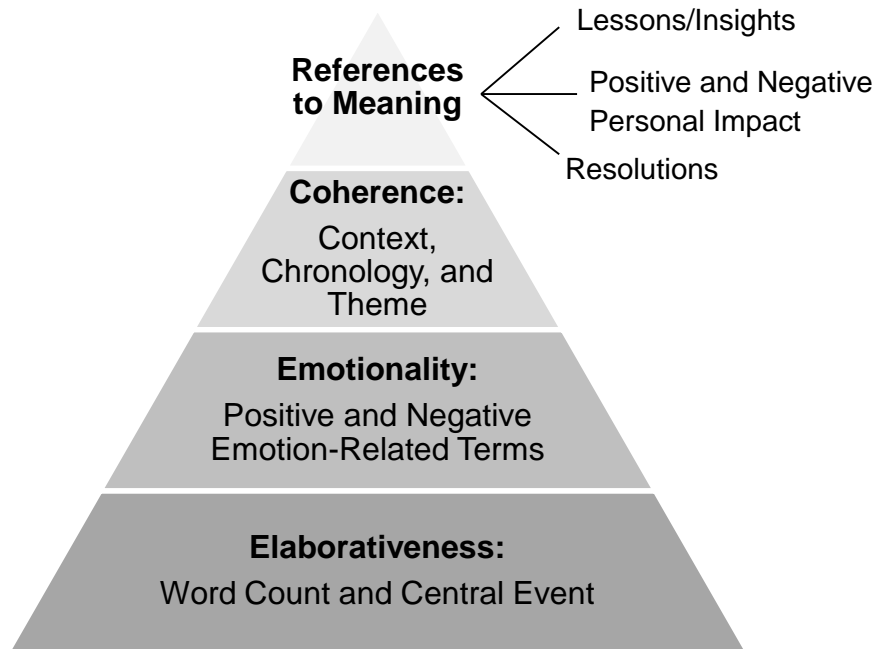


Figure 1. Theoretical organization of the recollection meaning making qualities measured in the current study. Recollection qualities are hierarchically organized, with those that are more sophisticated and more central to the construct of meaning making at the top.

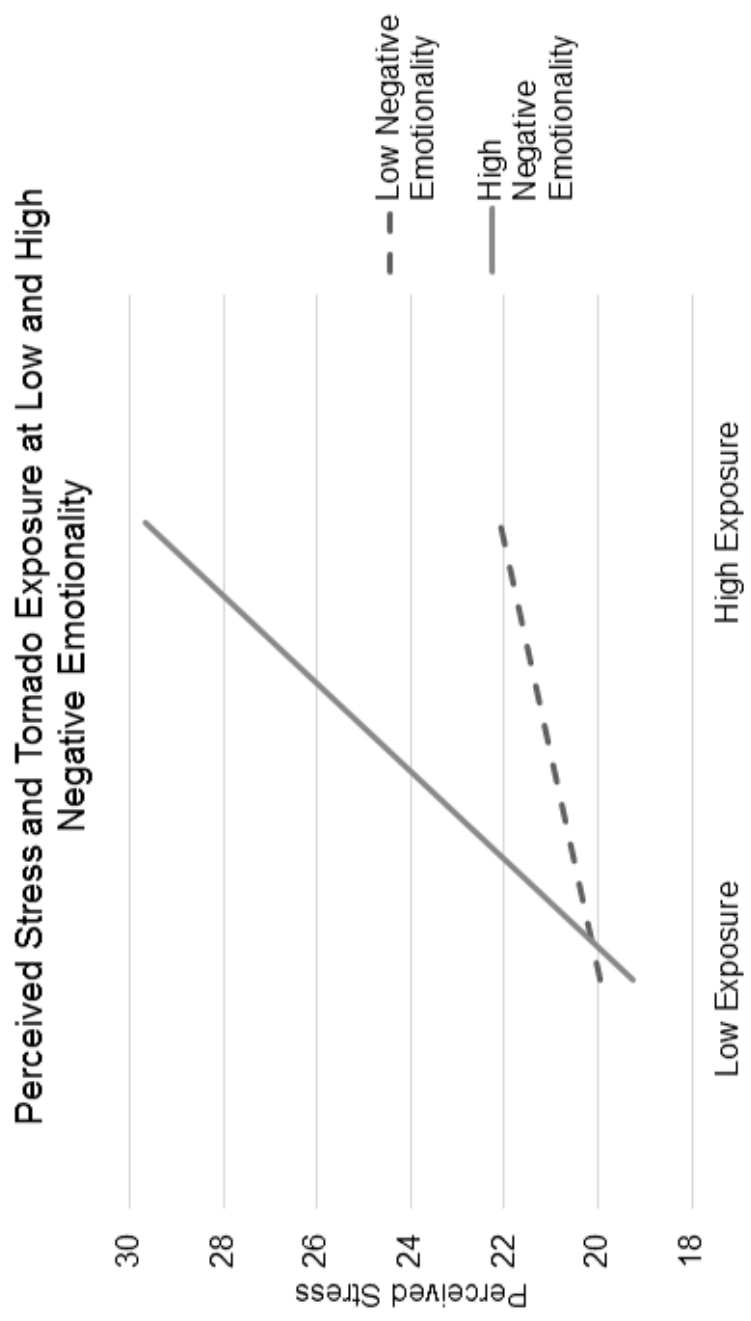


Figure 2. Perceived stress and tornado exposure at low and high negative emotionality. The slope of the relationship between exposure and perceived stress is significantly different from zero for high proportions of negative emotion-related terms ($t = 3.56, p \leq .001$), but not at low proportions of negative emotion-related terms ($t = .766, p = .49$).