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Hannah Kristine Heitz April 4, 2017

Stories of Trauma: The Relationship between Narrative Elaboration and PTSD

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Abstract

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Post-Traumatic Stress Disorder (PTSD) develops as a result of a specific traumatic event and the disorder can have devastating consequences on mental wellbeing and social functioning. PTSD is highly related to memory; symptoms include intrusive flashback memories of the traumatic event, as well difficulty voluntarily recalling the specific traumatic event. Little is known about how traumatic memories are expressed over time and how that expression relates to PTSD, which could provide insight into PTSD development. The current study aims to investigate the relationship between narrative elaboration and symptoms of PTSD. Narratives from 68 participants were collected as a part of the Grady Trauma Project after participants were recruited at the Grady Emergency Department. Narratives were collected at two time points: first, within hours of the trauma and again a year later. Additional measures of baseline trauma experience were collected at the time of trauma and PTSD symptom measures were collected at 1-month and 12-month follow-ups. Narratives were coded for factual and interpretive elaboration in order to assess two types of detail within the narratives over time. Overall, we found that both factual and interpretive elaboration increased over time. Factual elaboration was significantly higher than interpretive elaboration over time. Further, increases in factual elaboration were significantly positively correlated with PTSD symptoms at 12-months. This result could reflect increased intrusive, highly detailed memories characteristic of PTSD. The result does not support the theory that PTSD memories are fragmentary and incoherent and suggests that traumatic memories that result in PTSD may be expressed with increased factual detail over time.

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Table of Contents

Post-Traumatic Stress Disorder (PTSD) is a unique mental disorder that is shaped by how traumatic events are remembered, yet there is little research on how memories of trauma are expressed over time (Rubin, Berntsen & Bohni, 2008). While the clinical diagnosis requires the experience of a traumatic event, how the individual understands and makes sense of that event is another layer of the objective event that needs to be better understood. In particular, how one remembers and narrates the traumatic event is essential to understanding and treating PTSD. Current literature typically evaluates memories that have occurred in the past, which misses the critical initial encoding and immediate reaction to the event. Improved understanding of how initial expression of a traumatic experience relates to later expression and PTSD development provides a useful, untapped tool to increase understanding of PTSD, identify those at increased risk, and develop useful interventions. The major objective of the current study is to examine narratives of trauma as expressed both at the time of experience and again a year later, and to assess how narrative elaboration at both time points relates to PTSD symptomology. In order to place this study in context, I will first review the current understanding of PTSD and the disagreements in the field on how the disorder relates to memory. Given the importance of narratives to wellbeing, I will utilize narratives of trauma to explore the relationship between narrative features, specifically interpretive and factual elaboration, and PTSD symptomology over time.

Post-Traumatic Stress Disorder (PTSD)

PTSD is a mental illness that develops as a result of the experience of a traumatic event. The *Diagnostic and Statistical Manual of Mental Disorders* (DSM-V) defines a trauma as exposure to an event that includes the threat of serious injury or death. The criterion includes direct exposure, witnessing the event occur to others, learning that a loved one experienced a

trauma, or experiencing chronic, repeated exposure to traumatic events. Symptoms include intrusive thoughts, negative affect, and increased arousal (American Psychiatric Association, 2013). The diagnosis of PTSD was only added to the DSM in the third edition, DSM-III, in 1980; it was developed with veterans in mind, but subsequent research indicates that the disorder can develop from any type of trauma that is perceived as life-threatening (Scott, 1990). The disorder has been found in a wide variety of populations, ranging from disaster relief workers to survivors of motor vehicle accidents (Kearns, Ressler, Zatzick, & Rothbaum, 2012).

While the etiology of PTSD remains unknown, clinical psychologists Chris Brewin and Emily Holmes (2003) postulated that PTSD is an evolutionarily adaptive coping mechanism; remembering a traumatic experience and increased arousal in the presence of perceived threat has been crucial for survival in the past. In modern times, the symptoms of PTSD can be maladaptive and have negative effects on functioning in society. Symptoms of PTSD range in severity, while common symptoms include intrusive thoughts related to the traumatic event, persistent negative emotional state, and difficulty sleeping. For a diagnosis of PTSD, symptoms must persist for at least one month and have a significant negative impact on functioning (American Psychiatric Association, 2013). Individuals with PTSD have rates of psychiatric comorbidity that are six times higher than rates for individuals without PTSD (Kearns et al., 2012); common comorbid psychiatric diagnoses include depression, substance use disorder, agoraphobia, and panic disorder (Nemeroff, Bremner, Foa, Mayberg, North, & Stein, 2006). Additionally, those with PTSD face increased physical health risks. The effects of PTSD are not limited to the individual, and have a significant impact on the individual's ability to function in his or her community (Kearns et al., 2012).

Numerous individuals experience traumatic events, but not everyone goes on to develop PTSD. Research suggests that between 37-92% of all individuals experience at least one traumatic event during his or her lifetime. Approximately 6.8% of Americans currently have PTSD, and certain populations, such as combat veterans of Iraq and Afghanistan, have a prevalence rate as high as 13.8% (Kearns et al., 2012). While some individuals can make sense of negative events and experience few negative psychological effects, individuals with PTSD go on to experience negative changes in mood and cognition, such as decreased interest in pleasurable activities and increased irritability (Brewin & Holmes, 2003; American Psychiatric Association, 2013). What differentiates those who experience trauma with limited effects from those who go on to develop debilitating PTSD? There are few clear answers, but those answers could have powerful implications for the prevention and treatment of PTSD (Bonanno & Mancini, 2012).

PTSD is considered a chronic condition for 40% of individuals, but there are numerous treatment options available (Kearns et al., 2012). Common treatments for PTSD include pharmacological interventions, Cognitive-Behavioral Therapy (CBT), and prolonged exposure therapy. While numerous studies suggest that disclosure and processing of trauma in a therapeutic setting is beneficial in the treatment of PTSD, there is not consensus in the field (Kearns et al., 2012). There has been support for disclosure based on the inhibition-confrontation model of disclosure, which suggests that sharing a stressful experience releases cognitive tension and strain, resulting in improved cognition and mood (Brouwers, Sorrentino, Roney & Hanna, 2004). Unfortunately, this model may not apply to all types of traumas, populations, and unique situations. Further, although the Substance Abuse and Mental Health Services Administration (SAMHSA) supports prolonged exposure, a meta-analysis by Benish, Imel, and Wampold (2008)

showed that prolonged exposure is not necessarily superior to other empirically supported therapeutic interventions, such as CBT. Given the effects of the disorder, prevalence, and limited treatment abilities, more research is needed to better understand the development of the disorder in order to design potential interventions and improve treatment options.

One critical problem is that research on PTSD is often limited by the natural course of the disorder; it takes a minimum of one month of symptoms to receive a diagnosis. As a result, most studies utilizing clinical populations do not include data prior to a diagnosis, which means that valuable insight into the development of the disorder is lost. For example, few studies are able to intervene within hours following a traumatic incident, and most early interventions occur days or weeks after the traumatic event (Kearns et al., 2012). This gap in research makes it difficult to understand the trajectory of how traumatic experiences impact the individual, particularly the immediate effects of trauma.

PTSD and Memory

Memories associated with PTSD are contradictory; purposeful recall of coherent narratives of the experience is often difficult, yet the disorder is characterized by intrusive, flashback-like memories of the event. We do not yet know whether the way those events are remembered leads to PTSD, or if having PTSD leads to a particular way of remembering (Brewin, 2001). Memories are often based in sensation rather than thought, and are uniquely untethered in time with traumatic events often recalled as if the memories are occurring in the present (Ehlers, Hackmann & Michael, 2004). Compared to everyday memories, flashback memories are unique because they are automatically retrieved, highly detailed, and time is often distorted (Hellawell & Brewin, 2004). Stress generally enhances focus on details, which may help explain why certain vivid memories are re-experienced following a trauma and often relate

to the sensory system. While stress might explain the memory enhancement associated with the richness of intrusive memories, stress does not explain the inability to voluntarily recall and adequately describe traumatic memories (Ehlers, Hackmann & Michael, 2004).

Although PTSD is clearly linked with memory, it is unclear exactly how the disorder and memory are linked. The outstanding question in the field of traumatic memory research is: are traumatic memories functionally different than non-traumatic memories (Sotgiu & Mormont, 2008)? Currently, there are three perspectives on the relationship between PTSD and trauma memory—all of which have robust empirical support (Rubin, Boals & Berntsen, 2008; Sotgiu & Mormont, 2008).

The first theory proposes that memories of trauma are generally less well remembered than non-traumatic memories, often referred to as the *traumatic memory argument*. Van der Kolk and colleagues, as well as numerous clinicians, support this perspective, citing that traumatic memories are expressed in an incoherent, fragmented, involuntary manner. A study by Tromp, Koss, Figueredo, and Tharan (1995) investigated differences between memories of highly emotional events compared to memories of traumatic events in a non-clinical sample of women. The researchers found that traumatic memories were less detailed, less coherent, and were generally less well remembered when compared to emotional memories. In addition, neuroscience research has found evidence for this theory; the findings of neuroimaging studies note that brain regions associated with normal brain functioning, such as the hippocampus, are affected during periods of high stress, which might alter traumatic memories (Sotgiu & Mormont, 2008).

The second theory, the *trauma superiority argument,* posits that trauma memories are enhanced compared to non-trauma memories (Porter & Birt, 2001). A certain level of stress

enhances the ability to focus on details, which may help explain why certain vivid memories are re-experienced following a trauma and often relate to the sensory system (Ehlers, Hackmann & Michael, 2004). Porter and Birt (2001) asked 306 undergraduate students to describe their most traumatic and most positive memories, in addition to collecting information on perceived impact of the events. When comparing the two narratives, traumatic memories included more emotional information, as well as more elaborate, vivid detail. Importantly, participants who reported the highest amount of perceived impact and traumatic stress also reported thinking about and discussing the event more often than other participants.

Peace and Porter (2004) conducted one of the few longitudinal studies of traumatic memories. The study included 52 participants who had experienced a traumatic event within the past year who then experienced symptoms of traumatic stress. The participants described the traumatic event, as well as their most positive emotional experience that had taken place within the past two years. The participants recalled both events again at a follow-up interview three months later. The results showed that trauma memories maintained the same level of detail at both time points, whereas quality of positive memories decreased. In a follow up study of the same participants, the trend endured in the three- and five-year follow up interview (Peace & Porter, 2007).

The third theory posits that trauma memories are remembered in the same way as non-trauma memories. Bohanek, Fivush, & Walker (2005) collected narratives of intensely positive and intensely negative events from a sample of female undergraduate students. In further analysis of the narratives, the researchers determined which narratives met the criteria to be considered traumatic and compared those narratives to the remaining intensely negative narratives. The results showed few differences in structure, significance, and vividness between

narratives of intensely negative memories and traumatic memories. Additional support for this theory comes from a study by Gray and Lombardo (2001). The researchers compared a total of 58 undergraduate students, 29 of which met the criterion for PTSD and 29 served as healthy controls. Each participant wrote three narratives describing a traumatic experience, a positive experience, and a negative experience. After controlling for cognitive ability and writing skill, researchers found that there were no significant differences in description of trauma memories between those with PTSD and those without PTSD.

Few studies have evaluated personal narratives of trauma, and the results are inconsistent (Amir, Stafford, Freshman, & Foa, 1998; Foa, Molnar, & Cashman, 1995; Halligan, Michael, Clark & Ehlers, 2003; Hellawell & Brewin, 2004; Tromp et al., 1995). Moreover, the majority of studies that have done so have emphasized objective qualities, such as word count, rather than analyzing content and structure (Sermpezis & Winter, 2009). A limited number of studies have evaluated narratives of traumatic events before participants have received a diagnosis. Evaluation of narratives before a diagnosis is made could provide insight into what differentiates the traumatic memory narratives of those who go on to have PTSD versus those who are relatively unaffected by the event (Sotgiu & Mormont, 2008). An additional issue in the literature is that different studies assess different aspects of trauma narratives. A better articulation of how narratives of trauma are related to psychological well-being may help point to specific aspects of narrative that are critical in PTSD.

Narratives and Wellbeing

A narrative tells an individual story, incorporating the individual's culture, identity, and emotions in order to connect experiences and the self across a lifetime (Bauer, McAdams & Pals, 2008). Narrative identity is formed by how an individual tells his or her own personal story and

what events are included in that story (Adler et al., 2016). Narratives provide a means to observe how an individual remembers an event and have important implications for both mental and physical wellbeing (Bauer, McAdams, & Pals, 2008). The events and how they are described in the narrative provide a wealth of information about the individual, including sense of purpose and coherence. Sense of purpose is shown in how an individual views meaning in his or her own life. Coherence is critical for a narrative to function as a bridge between the past, present, and future self. The majority of research on trauma and PTSD relies on structured questionnaires or interviews, rather than open-ended narratives. Open-ended narratives allow the individual to fully express their experience without the constraint of limited response options, such as Likert scales, utilized in many survey report measures. Narratives provide a rich source of data for analysis and have proven useful in understanding memory, trauma, and PTSD. Narratives, when compared with the other domains of personality, such as dispositional traits and characteristic adaptations, provide unique, valuable insight into wellbeing and numerous other individual outcomes (Adler et al., 2016).

Narratives of Trauma and Wellbeing

Narrative identity relies upon significant episodic memories, which are often highly emotional, self-defining turning points (Adler et al., 2016). Traumatic events are included among the highly emotional events that punctuate an individual's personal life narrative. While there are many controversies in the field of trauma research, the importance of how individuals express and reflect on trauma and its relationship to wellbeing is well supported in the literature (Crespo & Fernández-Lansac, 2016). Level of detail, or elaboration, has emerged as a critical factor in trauma narratives.

Research on detail and elaboration in narratives of trauma reflects the conflicting opinions in the field; studies have found evidence that supports all three perspectives. The *trauma superiority theory* suggests that traumatic memories associated with PTSD are more vividly detailed narratives (Ehlers, Hackmann, & Michael, 2004). Hellawell & Brewin (2004) collected trauma narratives from 62 individuals diagnosed with PTSD. Following narrative collection, participants identified which sections of his or her narrative were written during flashback memory periods and which sections were written during periods of normative memory. The flashback portions of the narratives had significantly more descriptors and contained more negative affective language, which supports increased elaboration in narratives of trauma.

According to the *trauma memory argument*, there should be limited elaboration within narratives of trauma due to increased difficulty in recollecting traumatic memories. Halligan et al. (2003) conducted a longitudinal study assessing cognitive processing, memory disorganization, and appraisals of individuals with traumatic assault experiences. Narratives, collected orally and transcribed, were coded for numerous variables, including "clauses indicating understanding of what was happening" (Halligan et al., 2003, p. 422). The study found that levels of cognitive processing in traumatic memories were related to PTSD symptomology, which included a lack of self-referent processing.

Findings have also shown that narratives of trauma that are less detailed and more simplistic are predictive of PTSD development. Amir et al. (1998) evaluated the narratives of twelve female survivors of sexual assault at two time points: two weeks after the assault and again twelve weeks after the assault. Using a computer program to analyze articulation,

researchers found that narratives of trauma that were longer and more articulate two weeks after the traumatic event led to decreased symptomology of PTSD at twelve-week follow up.

These findings indicate that a key aspect of narratives that is important to understanding the relationship between trauma and PTSD is level of detail, or elaboration (Crespo & Fernández-Lansac, 2016). However, elaboration and detail have not been clearly defined in the literature. In this study, we make a theoretical distinction between factual elaboration and interpretative elaboration (see Graci, Watts & Fivush, 2016, for a full theoretical and empirical investigation of this difference). Factual elaboration refers to details that help create a clear picture of the experience, such as the color of a car or the name of the street, and represent the sensory details that characterize the flashback memories common in PTSD. Interpretive elaboration includes the descriptions related to the individual's thoughts, feelings, or judgments related to the experience. This type of elaboration parallels the avoidance symptoms of PTSD, which are often associated with decreased reflection and integration of the trauma experience into the self. Interpretive elaboration within a narrative includes descriptions of how an individual is cognitively processing the memory or event described. In considering features of narratives related to coping, elaborating and evaluating the self is crucial for healthy, effective coping. Additionally, there is evidence that features of narratives, particularly self-evaluation, change over time (Tuval-Mashiach, Freedman, Bargai, Boker, Hadar, & Shalev, 2004). In a study by D'Andrea, Chiu, Casas, & Deldin (2012), researchers evaluated the narratives of forty undergraduate students one week after 9/11 and again five months later. The narratives were coded for a variety of characteristics, and linguistic features, such as cognition words and pronoun usage, showed incremental validity in prediction of chronic symptoms of PTSD. The study also found that increased use of cognitive mechanisms at time one was associated with

increased chronic PTSD symptoms. While the importance of elaboration is clear, it is unknown how elaboration at the time of the traumatic experience and change in elaboration over time relate to PTSD symptoms.

The Present Study

The link between narrative memory expression and perceived impact of trauma is an important area for further exploration in order to better understand PTSD. While most prior research acknowledges the importance of initial encoding and change in narratives of trauma, few studies have evaluated narratives collected within hours of the traumatic event. The majority of studies have collected narratives after PTSD has been diagnosed, only a few collect narratives within the first few weeks of a traumatic experience, and few include longitudinal data to assess how the narratives may change over time in relation to PTSD. PTSD is unique in that the disorder has a specific time stamp of initiation—the experience of trauma. Yet the processes that lead to development of PTSD remain unclear and the immediate processing of trauma is largely unexplored. Elaboration and detail have emerged as key components in trauma memories as they may relate to PTSD. Thus the major objective of the current study is to assess the elaboration and detail in narratives of trauma collected within hours of the event, and to assess the narratives again 12 months later. This will allow critical insights into predictors of PTSD development. Additionally, the present study will further elucidate the mixed findings on the relationship between elaboration in narratives of trauma and PTSD.

Predictions

Given the mixed findings on the relationship between factual elaboration, interpretive elaboration, and symptoms of PTSD, and the paucity of studies evaluating narratives collected immediately following trauma, this is an exploratory investigation.

Method

Participants

Participants were recruited upon entering a hospital Emergency Department (ED) located in an urban area of a large Southeastern city as part of a larger study on biomarkers of PTSD. The participants had all experienced a traumatic incident that prompted the ED visit within the previous thirteen hours. All participants were English-speaking, between the ages of 18 and 65, provided contact information to coordinate follow-up visits, and reported a trauma as designated by DSM-IV-TR in order to be included in the larger study. The DSM-IV was used rather than the DSM-V given the recruitment time period. Individuals with a history of hospitalization for mental health reasons, suicide attempts within the previous three months, current suicidal ideation, current intoxication, or otherwise altered mental state during the initial ED visit were excluded from the study. Sixty-eight of the participants from the larger study on biomarkers of PTSD were recruited for the present study. These 68 participants included everyone who had both completed a recording of their trauma narrative in the ED and attended at least one follow-up visit. Of those 68 individuals, 40 (58.8%) identified as men and 28 (41.2%) identified as women. All participants in the current study were from the sample of the larger study and were between the ages of 19 and 61. Forty-six (67.6%) participants identified as Black or African American, 15 (22.1%) as White or Caucasian, one (1.5%) as Asian, four (6.0%) as multiracial, and one did not provide racial/ethnic identification. The variety of trauma categories included motor vehicle crashes (58.2%), physical assaults (9.0%), home accidents (e.g., ceiling collapse; 9.0%), pedestrian accidents (9.0%), motorcycle accidents (6.0%), and sexual assaults (4.4%). Participant data were collected from approximately one hour to 13 hours (M = 258.38 minutes, SD = 144.21, Median = 225.50 minutes) following the traumatic incident. Participants

provided written informed consent for all components of the study, and the Institutional Review Board approved the study procedures.

Procedure

Time 1:

After arriving in the ED, prospective participants were approached by research assessors (79% of assessments conducted by female assessors). Following collection of written informed consent, 68 participants completed an hour-long research assessment. All measures were administered verbally by researchers who recorded participant responses in RedCAP, a HIPAA-compliant web-based electronic survey tool. Additionally, interviews were recorded via digital voice recorder. Participants completed the following measures during the initial ED visit:

Narrative Measures

Participants were asked "Can you tell me briefly what happened to you that brought you into the ER today?" The oral narratives were subsequently transcribed verbatim and checked for accuracy prior to coding.

Questionnaire Measures

Baseline trauma history. During the initial visit to the ED, participants completed the self-report version of the Posttraumatic Diagnostic Scale (PDS-SR; Foa, Cashman, Jaycox, & Perry, 1997). The first portion of the scale includes a checklist of traumatic events, including 12 possible event categories. This portion was used to assess trauma history, and PTSD symptoms related to any previous trauma.

1-Month Follow-Up. Participants returned to the ED one month later for a follow up visit, at which point they completed a measure of PTSD Symptoms (PSS-I; Foa, Riggs, Dancu, & Rothbaum, 1993), described below.

Time 2:

Of the 68 initial participants, a total of 35 participants returned for follow-up twelve months after the initial ED visit and completed the following measures:

Narrative Measures

Participants were asked, “Please briefly describe your trauma from 12 months ago.” Oral narratives were then transcribed verbatim and checked for accuracy before coding.

Questionnaire Measures

PTSD Symptoms. Participants completed the PTSD Stress Symptoms Interview (PSS-I; Foa, Riggs, Dancu, & Rothbaum, 1993), which is a semi-structured interview containing seventeen items addressing a specific traumatic event. Participants were instructed to respond to the interview as it related to the trauma that brought them to the ED twelve months earlier. Individuals reported the number of times they experienced symptoms of PTSD related to the same ED-related event within the past two weeks (sample item, "Have you had upsetting thoughts or images about [the event] that came into your head when you didn't want them to?"; 0 = Not at all; 3 = 5 or more times).

Narrative Coding

As described in the introduction, elaboration is implicated in narrative meaning making, and is particularly relevant for narratives of trauma (Sermpezis & Winter, 2009). Two coding schemes were used to analyze the narratives: factual elaboration and interpretive elaboration. The factual and interpretive elaboration schemes were based on the systems developed by Fivush et al. (2012) and Andrews et al. (2015).

Factual elaboration. Factual elaboration is the measure of factual detail provided within the narrative. Factual elaboration assesses how clearly the context of the event is expressed,

including descriptions of who, what, where, and how the specific event occurred. Each narrative received a score between 0 and 3 based on the level of detail. A score of 0 indicated that a narrative included little to no specific details and a minimal number of action words. A score of 1 represented two or more action words with few details. A score of 2 denoted a narrative that included many action words with few details or a moderate number of action words with a high level of detail. A score of 3 indicated the use of many action words along with rich, complex details of how the event unfolded.

Interpretive elaboration. In contrast to factual elaboration, interpretive elaboration is a measure of the subjective details expressed within the narrative. Subjective details of the event include thoughts, judgments, emotions, reasoning, and beliefs expressed when narrating the event. Narratives received a score between 0 and 3 depending of the level of interpretation expressed. A score of 0 represented the absence of any interpretive detail. A score of 1 indicated that at least two expressions of interpretive detail were present. A score of 2 signified multiple thoughts and feelings were expressed, as well as causal connections linking events and emotions, judgments, and beliefs. A score of 3 indicated substantial interpretive detail, including causal connections, which created a clear description of what the narrator was feeling and thinking as the event unfolded.

Reliability. Two coders trained on a subset of narratives, then worked towards establishing reliability. Once the undergraduate coder established a high degree of reliability on 20% of the narratives (n = 21), the undergraduate coder scored the remainder of the narratives. Reliability for factual elaboration and interpretive elaboration were calculated using Cronbach's alpha statistic. Reliability was strong for both interpretative elaboration ($\alpha = .93$) and factual elaboration ($\alpha = .97$).

Results

In order to better understand the study sample, we first calculated general descriptive information for all variables of interest. In order to explore change over time, we then conducted a paired-sample *t*-test for factual elaboration, interpretive elaboration, and PTSD symptoms. In order to examine relations between narratives and PTSD, we conducted correlations and, where appropriate partial correlations, across all variables of interest. Given the multiple time points included within the study, the number of participants in each analysis is variable and N's are specified in text.

Descriptive Statistics

Figure 1 presents descriptive information on trauma type and gender of participants. Means and standard deviations for all variables of interest are shown in Table 1. Given the limited possible range for interpretive and factual elaboration, there was good variability as seen in the standard deviation. Factual elaboration scores were significantly higher than interpretive elaboration scores at both time points. A paired-samples *t*-test was conducted to compare factual and interpretive elaboration at time 1. Factual elaboration scores were significantly higher at time 1 ($M = 1.22$, $SD = 1.06$) compared to interpretive elaboration scores at time 1 ($M = .34$, $SD = .73$); $t(67) = 7.88$, $p < .001$. A paired-samples *t*-test was conducted to compare factual and interpretive elaboration at time 2. Factual elaboration scores were significantly higher at time 2 ($M = 1.66$, $SD = 1.08$) compared to interpretive elaboration scores at time 2 ($M = .60$, $SD = .98$); $t(34) = 5.51$, $p < .001$. PTSD symptoms were highest at 1-month follow-up, although scores at 12-month follow-up remained higher than baseline scores.

Narratives Over Time

Table 2 presents the results of the paired sample *t*-test over time. This table shows that both factual and interpretive elaboration increase within narratives over time, but only factual elaboration increased significantly, whereas there was only a trend for interpretative elaboration. These results prompt further analyses into specifically how the narratives are changing over time.

A paired-samples *t*-test was conducted to compare PTSD symptoms at 1-month (the first time PTSD was assessed for this specific experience) and at 12-months. There was a significant decrease in the PTSD symptom scores from 1-month ($M = 15.75$, $SD = 12.45$) to 12-months ($M = 10.39$, $SD = 12.13$); $t(60) = 4.313$, $p < .001$.

Narratives Over Time and PTSD Symptoms

Given that narratives are changing over time, the correlation table in Table 3 presents the correlations among narrative variables and PTSD symptoms variables. As shown, there is a relationship between inherently related variables; for example, baseline PTSD symptoms are significantly positively correlated with PTSD symptoms at 1-month and 12-months. Interestingly, factual elaboration and interpretive elaboration were significantly correlated at time 1 and both types correlated again at time 2. Interpretive elaboration at time 1 was not significantly correlated with interpretive elaboration at time 2. Additionally, factual elaboration at time 1 was not significantly correlated with factual elaboration at time 2. Refer to table 3 for the direction and magnitude of the relations between variables. This suggests that individual narratives were either high or low in both types of elaboration at a given time, but were not necessarily consistently high or low in elaboration across time. This finding suggests that individuals who show change in elaboration over time might also show changes in PTSD. Thus we calculated a change score as time 2 scores minus time 1 scores so we could observe increases and decreases in elaboration over time.

Table 3 includes correlations between change over time within both types of elaboration and PTSD symptoms at 1-month and 12-months. Notably, change in interpretive elaboration is significantly correlated with PTSD symptoms at 1-month (r = .379, p =.032), although this finding is difficult to interpret since there was no narrative collected at 1-month follow-up. As seen in Figure 3, change in interpretive elaboration was not significantly correlated with PTSD symptoms at 12-months. However, change in factual elaboration was significantly positively correlated with PTSD symptoms at 12-months. This finding is shown in Figure 2, increasing factual elaboration is significantly correlated with PTSD symptoms at 12 months (r = .432, p = .009).

In order to further evaluate the relationship between factual elaboration and PTSD symptoms, we conducted a partial correlation. When we control for PTSD symptoms at 1 month on the relationship between factual elaboration and PTSD symptoms at 12 months, increased factual elaboration still predicts higher PTSD scores (r = .438, p = .014).

Discussion

In this study, we assessed narratives of trauma across time, and evaluated possible changes in factual and interpretive elaboration as they relate to symptoms of PTSD. Overall, we found that both factual and interpretive elaboration increased over time. Factual elaboration was significantly higher than interpretive elaboration over time. When looking at the relationship between elaboration and wellbeing, increased changes in factual elaboration over time is significantly related to higher PTSD symptoms present a year after the trauma.

This is one of the only studies to assess narratives within hours following a traumatic event; we found that both factual and interpretive elaboration increased significantly over time. Given current understandings of PTSD, it seems that immediately after the trauma, the individual

is likely still processing the traumatic experience and might struggle to put that experience into words (Brewin & Holmes, 2003). This interpretation is further supported by the generally low levels of both factual and interpretive elaboration at the first time point. Alternatively, low elaboration at the first time point could be explained by insufficient interview time in the Emergency Department (ED), possible traumatic brain injury or concussion, or other distractions present in the ED. However, that elaboration increased significantly indicates that individuals were able to process and ultimately narrate their experience.

Importantly, we distinguished between two types of elaboration in our coding, factual and interpretive, and found that both increased over time. Much of the research in the field has assessed trauma narratives without distinguishing between interpretive and factual elaboration, and has instead looked at a more general construct of elaboration. Elaboration has been operationalized in a variety of ways, ranging from word count to reading level. The lack of consistency across studies in operationalization of elaboration has likely contributed to the lack of consensus and contradictory findings in the field (Porter & Peace, 2007; Sermpezis & Winter, 2009; Amir et al., 1998). Our distinction between factual and interpretive elaboration, based on previous studies by Fivush et al. (2012) and Andrews et al. (2015), allows for a more detailed approach, and provides insight into how different types of elaboration might matter for PTSD and wellbeing. Indeed, although both factual and elaborative interpretation increased over time, they were differentially related to PTSD symptoms over time.

More specifically, increased changes in factual elaboration over time is significantly related to higher PTSD symptoms at 12-months, even controlling for PTSD symptoms present at 1-month. That increases in factual elaboration predicted increased PTSD symptoms might suggest that increasing factual elaboration may reflect intrusive symptoms of PTSD, as

suggested by Hellawell and Brewin (2004). Intrusive symptoms include a high level of sensory detail—such as sights, sounds, and smells (Ehlers, Hackmann, & Michael, 2004). The significant association between increased factual elaboration and PTSD symptoms further supports the trauma superiority argument, which suggests that details related to the trauma are remembered as well as, or perhaps better, than non-traumatic events. Unfortunately, we do not have narratives of non-traumatic events from the same participants, which would elucidate how elaboration in their trauma narratives compares to elaboration within their non-trauma narratives. Some researchers, such as Sermpezis & Winter (2009), posit that the increased elaboration exposes the importance of an event within the individual's personal narrative and narrative identity. Thus, if the traumatic event has become a significant, richly elaborated life event, it would likely have a persistent negative effect on wellbeing. This view, and our results, contrast with the idea that trauma memories are fragmentary and incoherent (Sotgiu & Mormont, 2008). Our results suggest that trauma memories that lead to PTSD symptoms include increased factual detail over time. The following narrative series describing a participant's traumatic incident provides an example of increased factual elaboration over time:

> Time 1:
>
> Um, I was in the car. Um, I caught a flat tire. I pulled over to the side of the highway and they went- my brothers and my friend went to go change the tire and a guy came off the side of the highway, hit the car, hit my brother and hit the friend and just…I'm here [...]
>
> Time 2:
>
> Um, well, I was leaving the club, and I got a flat tire on the highway. I pulled over. I call, I guess, Statewide, State Farm, I call a whole bunch of people; 411.

> And they told me it was going to cost me 50 to 60 dollars to change my tires which I didn't have so, I call my friends, and they ended up coming, and I was sitting in the car while they were changing the tire and all I remember was just the glass shattering on me and then I couldn't come up the driver side, so I had to come up the passenger side and I saw my friend in front of the door, laying down. And my other friend, like, 15 feet away from my car so…

As can be seen in these narratives, there is increased descriptive language at time 2, including more detail regarding how the event unfolded, as shown in the explanation of why the individual's friends came to help change the tire. Additionally, there was more specificity in what the accident entailed, including a description of where the individual was during the incident and more detail regarding what happened to his or her friends.

In contrast, even though there was a general increase in interpretive elaboration over time, change in interpretive elaboration was not significantly correlated with PTSD symptoms at 12-months. Interpretive elaboration, which is the use of detailed cognitive language, reflects cognitive processing and personal interpretation of an event. This type of elaboration could reflect multiple different, contrasting cognitive processes: avoidance, rumination, and meaning-making, all of which might have different effects on PTSD.

For example, avoidance of thoughts and feelings related to the trauma is a key feature of PTSD (American Psychiatric Association, 2013). While avoidance is important to consider when evaluating interpretive elaboration, theoretically it would have limited effects on change in interpretive elaboration over time. Avoidance would more likely explain the generally low amount of interpretive elaboration within the narratives across both time points when compared to levels of factual elaboration.

Another possibility is that interpretive elaboration could reveal rumination-like thoughts, which are repetitive, negative thoughts about a specific event without focus on a solution or means to decrease said negative thoughts. The following narrative given at Time 2 portrays the recurrent focus on negative emotion, with repetition of the same emotional expressions numerous times:

> Um, probably the scariest, long I've-the scariest thing I've ever been through.
>
> Um, It was shocking, I've never cried that much, never felt like a punk, then I realized I was in an accident.
>
> Um, It was-honestly it was traumatizing… I mean it's probably the best way to illustrate it; it was traumatizing.
>
> Um, apparently we was sitting on the, uh, far right lane…and we was getting off the exit and somebody slammed in behind us. And uh, people that saw the accident said that the truck rolled, like, 3-4 times, hit two other cars and slammed into the wall. Um, I blacked out in the midst of all that.
>
> Um, then, next thing you know there was paramedics and people rushing- rushing us to the hospital.

As seen in the narrative, the individual does not seem to put the event in a larger context, and instead focuses on the negative emotions associated with the trauma. Rumination, like the cyclical negative thinking shown in the narrative, has a detrimental effect on mental wellbeing (Michael & Snyder, 2005). A 2016 study by Crespo & Fernández-Lansac found rumination within trauma narratives was predictive of PTSD symptoms. Thus, interpretive language

focusing on thoughts or feelings related to the trauma within narratives could potentially increase PTSD symptoms.

Alternatively, when interpretive elaboration is used in a productive way, it can help the individual make sense of an event or experience, connecting that event with thoughts, feelings, and judgements. Important memories are more frequently reactivated, which makes the way in which the memories are cognitively framed and integrated influential on wellbeing (Adler et al., 2016). More specifically for trauma, cognitive processing models of trauma often cite the importance of meaning-making and adequate interpretation of trauma as a component of healthy coping (Halligan et al., 2003). If interpretive elaboration is used in a way that is reflective of healthy coping, then increased interpretive elaboration should have a negative correlation with PTSD symptoms. While there was limited meaning making within the narratives of the current study, the following participant has a sense of resolution and puts the trauma into perspective:

> A car accident on my way to, um, funeralize my niece that had been, uh, involved in a car accident, um, a week prior.
>
> And, um, I was hit, um, t-boned, with me, my daughter and my mom in the car and uh, we was sent to Grady. Uh, my daughter having more physical trauma…Me more mental, I guess, I don't know.
>
> And uh, but we are all-it was an accident, we, we did survive.

While rumination and meaning-making support two opposing views of the relationship between interpretive elaboration and symptoms of PTSD, both have support and together could explain the insignificant findings of the current study. The lack of significant findings could be the result of the balance of both processes within participants; some individuals within the sample may

have used interpretive elaboration as a means to decrease symptoms, whereas increased interpretive elaboration led to increased PTSD symptoms in other participants.

Thus, the type of interpretive elaboration is of great importance considering that different types of elaboration have unique associations with mental wellbeing and PTSD. Given that some participants in the study sample sought therapy following his or her trauma, the types of interpretive elaboration across narratives may have been very different. Typical therapies, such as CBT, for PTSD often incorporate cognitive restructuring and reframing of the traumatic event, which means that interpretive elaboration within narratives from participants receiving therapy might be guided to incorporate more meaning-making rather than rumination (Kearns et al., 2012).

In the context of the conflicting findings in the field, the results reflect the complexity of the relationship between narrative elaboration and PTSD. The finding that increased factual elaboration over time is correlated with increased PTSD symptoms at 12-months contradicts prior findings (Tromp et al., 1995; Amir et al., 1998), but aligns well into the theoretical understanding of highly detailed intrusive symptoms of PTSD. The lack of significant findings between interpretive elaboration and PTSD symptoms was unexpected, but it speaks to the mixed findings of previous studies. This study highlighted the multifaceted nature of elaboration and its role in PTSD symptom development and has prompted important questions for further research.

In particular, future research should examine different forms of elaboration in more detail. For example, the affect and content of elaboration could have important effects that this study did not capture. Including a measure of affect when evaluating interpretive elaboration could help us better understand our insignificant results. The presence, or lack, of affective

language and how that language shifts throughout the narrative provides a rich source of information. A narrative that shifts from negative affect to positive affect may have different effects on wellbeing when compared to a narrative that shifts from positive to negative affect (Adler et al., 2016). Further, whereas increased factual elaboration over time was associated with increased PTSD symptoms at 12-months, we do not know what specific aspects of factual elaboration increased. Factual elaboration includes a range of descriptions; separately assessing contextual descriptions, such as time of day or street name, versus more self-focused descriptions, such as details of personal injury, could be valuable in interpreting what specific instances of factual elaboration relate most to PTSD symptoms. Identifying more specific trends within factual and interpretive elaboration, in conjunction with a measure of affect within the narratives, could provide more insight into how and why elaboration matters for PTSD symptoms.

An additional limitation is the small sample size. The small sample limits the generalizability of the findings, although participants were recruited from a racially diverse community sample. Despite this limitation, the study had the unique strength of collecting narratives mere hours after the traumatic event, which provides a rare glimpse into the initial narrative processing of the trauma. While the collection of narratives immediately following the traumatic event is a unique strength, we only have narratives collected at the initial ED visit and narratives from the 12-month follow up, which limits our ability to extrapolate on how narratives relate to symptoms at PTSD measured at multiple time points.

Implications and Future Directions

This study adds a unique perspective to the complex, often contradictory field of trauma narratives and PTSD. Narratives collected within hours of a traumatic event afford a rare look

into the initial processing and expression of a traumatic event, providing the opportunity to observe how initial processing might relate to later symptoms of PTSD. Narratives provide a unique perspective into the individual experience of trauma, and looking at changes in narration of the same event over time is a promising area for further research. Building upon the current study, future research evaluating change in narratives over time could reveal important information related to the development of PTSD, especially a study with a large sample size.

Assessing elaboration along multiple dimensions and coding for affect could provide more insight into how elaboration matters, specifically when considering the role of positive or negative affect in interpretive elaboration. In addition, more specificity in coding of factual elaboration would be beneficial. Given the wealth of information within the narratives, employing qualitative analyses on the narratives might provide more in-depth exploration of the individual trajectory as it relates to narrative elaboration and PTSD symptoms.

Additionally, separating narratives by trauma type and conducting analyses separately would be interesting, although it was not feasible within the small sample of the current study. Different types of trauma, such as interpersonal violence and motor vehicle accidents, might produce narratives expressed in unique ways, as suggested by prior research (Chung & Breslau, 2008). Further study of narratives with a focus on gender differences might illuminate narrative characteristics unique to females, who have a higher prevalence of PTSD (Kearns, 2012). Dividing study samples by characteristics such as trauma type and gender might help differentiate unique narrative characteristics or trajectories of PTSD development.

While this study prompts numerous questions, it provides a unique glimpse into the early narrative expression of traumatic events and how changes in elaboration within narratives over time relates to symptoms of PTSD. Further exploration of narratives immediately following

traumatic events can help us better understand the development of PTSD, identify those most at-risk for PTSD development, and develop early interventions.

References

Adler, J. M., Lodi-Smith, J., Philippe, F. L., & Houle, I. (2016). The Incremental Validity of Narrative Identity in Predicting Well-Being A Review of the Field and Recommendations for the Future. *Personality and Social Psychology Review*, *20*(2), 142-175.

American Psychiatric Association. (2013). *DSM 5*. American Psychiatric Association.

Amir, N., Stafford, J., Freshman, M. S., & Foa, E. B. (1998). Relationship between trauma narratives and trauma pathology. *Journal of traumatic stress*, *11*(2), 385-392.

Andrews, J., Zaman, W., Merrill, N., Duke, M., & Fivush, R. (2015). Gender differences in adolescent birth narratives. *Journal of Applied Research in Memory and Cognition*, *4*(4), 356-362.

Bauer, J. J., McAdams, D. P., & Pals, J. L. (2008). Narrative identity and eudaimonic well-being. *Journal of happiness studies*, *9*(1), 81-104.

Benish, S. G., Imel, Z. E., & Wampold, B. E. (2008). The relative efficacy of bona fide psychotherapies for treating post-traumatic stress disorder: A meta-analysis of direct comparisons. *Clinical psychology review*, *28*(5), 746-758.

Bohanek, J. G., Fivush, R., & Walker, E. (2005). Memories of positive and negative emotional events. *Applied Cognitive Psychology*, *19*(1), 51-66.

Bonanno, G. A., & Mancini, A. D. (2012). Beyond resilience and PTSD: Mapping the heterogeneity of responses to potential trauma. *Psychological Trauma: Theory, Research, Practice, and Policy*, *4*(1), 74.

Brewin, C. R. (2001). Memory processes in post-traumatic stress disorder. *International Review of Psychiatry*, *13*(3), 159-163.

Brewin, C. R., & Holmes, E. A. (2003). Psychological theories of posttraumatic stress disorder. *Clinical psychology review*, *23*(3), 339-376.

Brewin, C. R., Dalgleish, T., & Joseph, S. (1996). A dual representation theory of posttraumatic stress disorder. *Psychological review*, *103*(4), 670.

Brouwers, M. C., Sorrentino, R. M., Roney, C. J., & Hanna, S. E. (2004). Predicting the impact of trauma disclosure on physiological responses: How cognitive style challenges our ideas about coping. *Journal of Social and Clinical Psychology*, *23*(5), 697.

Chung, H., & Breslau, N. (2008). The latent structure of post-traumatic stress disorder: tests of invariance by gender and trauma type. *Psychological medicine*, *38*(04), 563-573.

Crespo, M., & Fernández-Lansac, V. (2016). Memory and narrative of traumatic events: A literature review. *Psychological trauma: theory, research, practice, and policy*, *8*(2), 149.

D'Andrea, W., Chiu, P. H., Casas, B. R., & Deldin, P. (2012). Linguistic predictors of post-traumatic stress disorder symptoms following 11 September 2001. *Applied Cognitive Psychology*, *26*(2), 316-323.

Ehlers, A., Hackmann, A., & Michael, T. (2004). Intrusive re-experiencing in post-traumatic stress disorder: Phenomenology, theory, and therapy. *Memory*, *12*(4), 403-415.

Fivush, R., Bohanek, J. G., Zaman, W., & Grapin, S. (2012). Gender differences in adolescents' autobiographical narratives. *Journal of Cognition and Development*, *13*(3), 295-319.

Foa, E. B., Molnar, C., & Cashman, L. (1995). Change in rape narratives during exposure therapy for posttraumatic stress disorder. *Journal of traumatic stress*, *8*(4), 675-690.

Foa, E., Riggs, D., Dancu, C., & Rothbaum, B. (1993). Reliability and validity of a brief instrument for assessing post-traumatic stress disorder. Journal of Traumatic Stress, 6, 459-474.

Gray, M. J., & Lombardo, T. W. (2001). Complexity of trauma narratives as an index of fragmented memory in PTSD: A critical analysis. Applied Cognitive Psychology, 15, 171–186.

Halligan, S. L., Michael, T., Clark, D. M., & Ehlers, A. (2003). Posttraumatic stress disorder following assault: the role of cognitive processing, trauma memory, and appraisals. *Journal of consulting and clinical psychology*, *71*(3), 419.

Hellawell, S. J., & Brewin, C. R. (2004). A comparison of flashbacks and ordinary autobiographical memories of trauma: Content and language. *Behaviour Research and Therapy*, *42*(1), 1-12.

Kearns, M. C., Ressler, K. J., Zatzick, D., & Rothbaum, B. O. (2012). Early interventions for PTSD: a review. *Depression and anxiety*, *29*(10), 833-842.

Michael, S. T., & Snyder, C. R. (2005). Getting unstuck: The roles of hope, finding meaning, and rumination in the adjustment to bereavement among college students. *Death studies*, *29*(5), 435-458.

Nemeroff, C. B., Bremner, J. D., Foa, E. B., Mayberg, H. S., North, C. S., & Stein, M. B. (2006). Posttraumatic stress disorder: a state-of-the-science review. *Journal of psychiatric research*, *40*(1), 1-21.

Peace, K. A., & Porter, S. (2004). A longitudinal investigation of the reliability of memories for trauma and other emotional experiences. Applied Cognitive Psychology, 18, 1143–1159.

Porter, S., & Birt, A. R. (2001). Is traumatic memory special? A comparison of traumatic memory characteristics with memory for other emotional life experiences. *Applied cognitive psychology*, *15*(7), S101-S117.

Porter, S., & Peace, K. A. (2007). The scars of memory a prospective, longitudinal investigation of the consistency of traumatic and positive emotional memories in adulthood. *Psychological science*, *18*(5), 435-441.

Rubin, D. C., Berntsen, D., & Bohni, M. K. (2008). A memory-based model of posttraumatic stress disorder: evaluating basic assumptions underlying the PTSD diagnosis. *Psychological review*, *115*(4), 985.

Rubin, D. C., Boals, A., & Berntsen, D. (2008). Memory in posttraumatic stress disorder: properties of voluntary and involuntary, traumatic and nontraumatic autobiographical memories in people with and without posttraumatic stress disorder symptoms. *Journal of Experimental Psychology: General*, *137*(4), 591.

Scott, W. J. (1990). PTSD in DSM-III: A case in the politics of diagnosis and disease. *Social problems*, *37*(3), 294-310.

Sermpezis, C., & Winter, D. A. (2009). Is trauma the product of over-or under-elaboration? A critique of the personal construct model of posttraumatic stress disorder. *Journal of Constructivist Psychology*, *22*(4), 306-327.

Sotgiu, I., & Mormont, C. (2008). Similarities and differences between traumatic and emotional memories: Review and directions for future research. *The Journal of Psychology*, *142*(5), 449-470.

Tromp, S., Koss, M. P., Figueredo, A. J., & Tharan, M. (1995). Are rape memories different? A comparison of rape, other unpleasant, and pleasant memories among employed women. Journal of Traumatic Stress, 8, 607–627.

Tuval-Mashiach, R., Freedman, S., Bargai, N., Boker, R., Hadar, H., & Shalev, A. Y. (2004). Coping with trauma: Narrative and cognitive perspectives. *Psychiatry*, *67*(3), 280-293.

Van der Kolk, B. A. (1994). The body keeps the score: Memory and the evolving psychobiology of posttraumatic stress. *Harvard review of psychiatry*, *1*(5), 253-265.

Table 1
Descriptive

	Mean	SD	Min	Max
Factual Elaboration				
Time 1	1.22	1.06	0	3
Time 2	1.66	1.08	0	3
Interpretive Elaboration				
Time 1	0.34	0.73	0	3
Time 2	0.6	0.97	0	3
PTSD Symptom Scale				
Baseline Total PTSD Symptoms	6.22	9.49	0	36
One-Month Follow-Up	15.75	12.45	0	46
Twelve-Month Follow-Up	10.39	12.13	0	49

Table 2
Paired Sample t-test Over Time

	Time 1		Time 2		*t*	*p*
	M	*SD*	*M*	*SD*		
Interpretive Elaboration	.34	0.73	0.6	0.97	-1.846	.074
Factual Elaboration	1.22	1.06	1.66	1.08	-2.109	.042

Table 3
Correlations between stress at each time point, elaborations at each time point, and change in elaborations scores

	BL-PDS	PTSD 1 mo.	PTSD 12 mo.	FE T1	FE T2	IE T1	IE T2	△IE	△FE
BL-PDS	_	_	_	_	_	_	_	_	_
PTSD 1 mo.	.402** .001 61	_	_	_	_	_	_	_	_
PTSD 12 mo.	.501** .000 67	.649** .000 61	_	_	_	_	_	_	_
FE T2	-.070 .570 68	-.178 .169 61	-.185 .133 67	_	_	_	_	_	_
FE T2	.181 .298 35	.061 .739 32	.209 .227 35	.071 .684 35	_	_	_	_	_
IE T1	.095 .439 68	-.063 .628 61	-.094 .450 67	.522** .000 68	.087 .621 35	_	_	_	_
IE T2	.092 .600 35	.316 .078 32	.161 .356 35	-.175 .315 35	.395* .019 35	-.154 .376 35	_	_	_
△IE	.047 .787 35	.379* .032 32	.185 .288 35	-.427* .010 35	.284 .098 35	-.586** .078 35	.891** .000 35	_	_
△FE	.135 .441 35	.244 .178 32	.432* .009 35	-.663* .000 35	.700** .000 35	-.377* .026 35	.422* .012 35	.519* .001 35	_

Note.
BL-PDS = Baseline Posttraumatic Symptoms; PTSD 1 mo. = PTSD Symptoms at 1 month; PTSD 12 mo. = PTSD Symptoms at 12 months; FE T1 = Factual Elaboration at Time 1; FE T2 = Factual Elaboration at Time 2; IE T1 = Interpretive Elaboration at Time 1; IE T2 = Interpretive Elaboration at Time 2; Change in Interpretive Elaboration over Time = ∆IE ; Change in Factual Elaboration over Time = ∆FE.

Figure 1
Descriptive

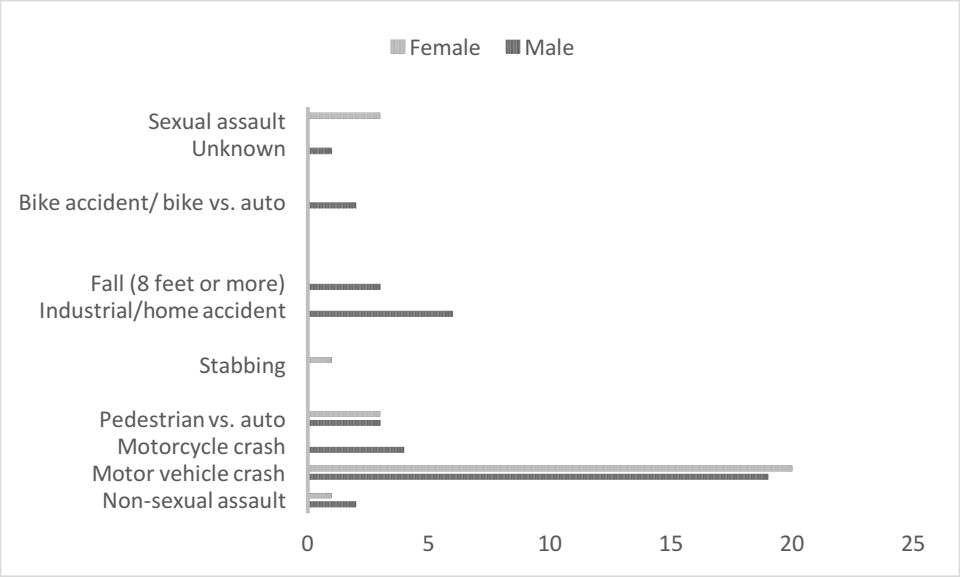

Figure 2
Change in Factual Elaboration and PTSD Symptoms at 12- month follow-up

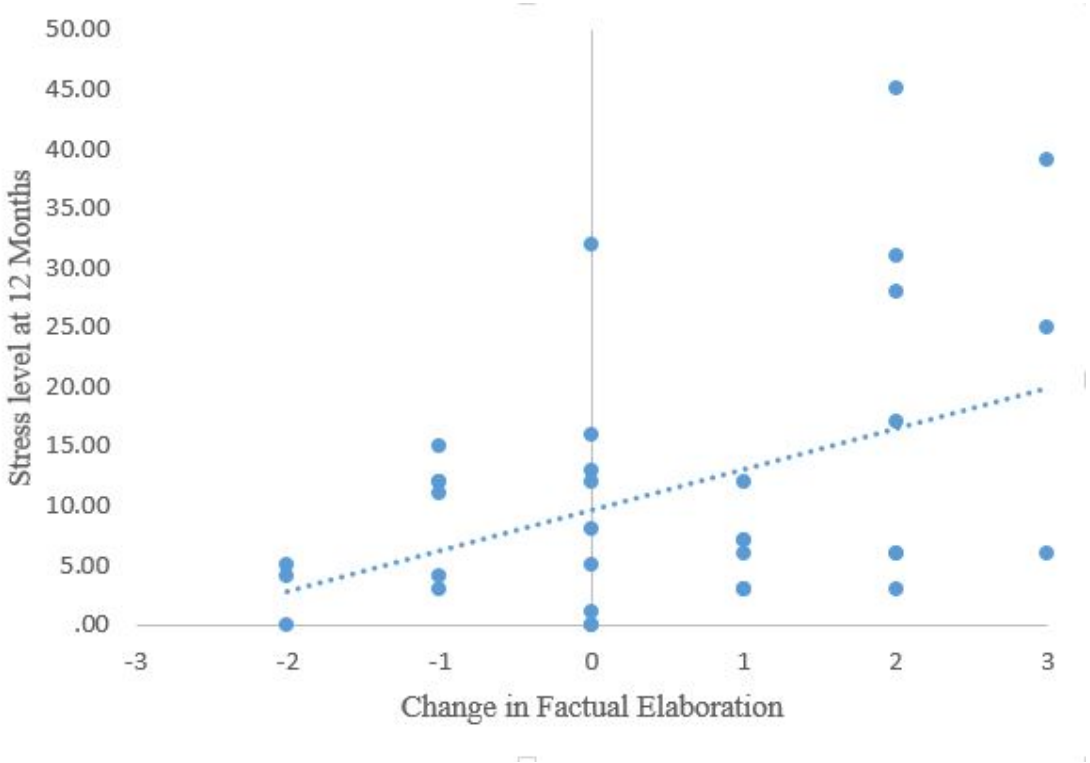

Figure 3
Change in Interpretive Elaboration and PTSD Symptoms at 12-month follow-up