PROSPECTIVE ANALYSIS OF LINGUISTIC ANALYSIS AS A METHOD FOR ASSESSING TRAUMA SYMPTOMS AFTER HURRICANE HARVEY AMONG HOUSTONIAN ADULTS

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by

Kaisa K. Marshall

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Kaisa K. Marshall

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APPROVED:

Amanda Venta, PhD
Dissertation Director

Maria Barker, PhD
Committee Member

Temilola Salami, PhD
Committee Member

Craig Henderson, PhD
Committee Member

Abbey Zink, PhD
Dean, College of Humanities and Social Sciences

ABSTRACT

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Hurricane Harvey was one of the most destructive hurricanes in United States' history and negatively impacted a majority of Houstonians. Posttraumatic stress disorder (PTSD) symptoms are a common consequence for individuals who experience this form of trauma. Additionally, a dose-response effect has been documented in trauma symptoms following natural disaster, with more severe trauma related to increased symptomology. Given the severity of Hurricane Harvey, Houstonians constitute a high-risk population for experiencing heightened trauma symptoms. Limitations of current methods (e.g. self-report, clinical interview) for assessing trauma symptoms are particularly salient after a large-scale natural disaster, when the availability of mental health resources may be especially limited. The aim of the current study was to use the computer program Linguistic Inquiry and Word Count (LIWC) to analyze Houstonian adults' narratives about Harvey (collected online in response to a brief prompt shortly after the event) to determine if specific linguistic markers are associated with an individual's PTSD symptomology concurrently (one to two months post-disaster) and prospectively (six months post-disaster). Results indicate that greater use of biological process words (e.g., blood, pain), its subcategory body words (e.g., hands, spit), and fewer cause words (e.g., because, effect) were related to increased trauma symptoms at baseline. Additionally, use of fewer cognitive process words and greater use of bio words at baseline predicted greater symptom change at follow up, extending previous research

findings. Findings suggest that linguistic analysis may be an important component of assessment and treatment monitoring of trauma symptoms after a hurricane.

KEY WORDS: Trauma symptoms, Linguistic analysis, Assessment, Natural disaster

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CHAPTER I
Introduction

Hurricane Harvey

In late August 2017, Houston, Texas, was hit by one of the most damaging natural disasters in United States history, Hurricane Harvey. Indeed, it is estimated to have caused nearly $125 billion dollars in damage, making it one of the most destructive hurricanes to hit the U.S. (National Oceanic and Atmospheric Administration, 2018), and resulted in more than 80 fatalities. Additionally, two-thirds of Houstonians were negatively impacted through home and vehicle damage as well as disruptions in employment and income; and one in nine individuals were still displaced from their home as of December, nearly three and half months later (Hamel et al., 2017). While the physical destruction is evident, there are other lasting effects of Hurricane Harvey that are less apparent, such as the mental health of affected residents. In fact, a recent survey suggests that 32% of individuals in the Texas counties affected by Harvey reported adverse effects to their mental health (e.g., taking new medication for mental health problems, increased alcohol use) as a result of the hurricane, with 18% specifically reporting worsened mental health. With this in mind, the broad aim of the proposed study was to examine the utility of a new, simple assessment in predicting posttraumatic distress. Specifically, the present study examined if the psycholinguistic properties of short narratives produced by Houstonians about the hurricane, collected online, predicted their trauma symptomology both concurrently and prospectively.

Trauma Symptoms Following a Natural Disaster

Although events such as combat, sexual assault, and life-threatening accidents have more typically been examined in the literature in association with psychological

distress and trauma symptoms, such symptoms can also result from natural disasters (D'Andrea, Chiu, Casas, & Deldin, 2012). In fact, it is not uncommon for individuals who are exposed to a natural disaster, like a hurricane, to develop debilitating posttraumatic stress disorder (PTSD) symptoms (Nolen-Hoeksema & Morrow, 1991; Galea, Nandi, & Vlahov, 2005; Tang, 2006; Pietrzak et al., 2012). Broadly, PTSD is characterized by impairing trauma-related symptoms such as intrusive re-experiencing, avoidance of trauma related stimuli, increased psychological arousal, and mood-related changes, all resulting from exposure to a traumatic event and lasting for longer than a month (American Psychological Association, 2013). Based on a meta-analysis of trauma symptoms after disasters, it is estimated that up to 85% of individuals who are affected by a natural disaster will experience acute stress symptoms (Tang, 2006), and estimates of PTSD after a natural disaster range from five to 60% (Galea et al., 2005).

More specifically, in a longitudinal study examining rates of PTSD in Texas residents after Hurricane Ike, researchers found that five percent of participants met criteria for PTSD two to five months post disaster (Pietrzak et al., 2012). In an additional study on PTSD symptoms following Ike, several types of hurricane-related consequences (e.g., damage to residence/vehicle, loss of possessions, injury) were found to be predictive of increased trauma symptoms (Hirth, Leyser-Whalen, & Berenson, 2013). However, a notable limitation of the study was that the self-reported data was collected between two months and two years post hurricane, which authors suggest put it at risk for recall bias (Hirth et al., 2013). Also notable is that a dose-response effect has been documented in the trauma symptoms that result from natural disasters, with more severe traumatic experiences giving rise to increased trauma symptoms (Galea et al., 2005;

Ying, Wu, Lin, & Jiang, 2014). Therefore, not only are trauma symptoms prevalent following a natural disaster but also it can be assumed that rates of trauma symptoms will be particularly elevated after Hurricane Harvey given the severity of the event compared to other hurricanes that have affected the U.S. Against this background, it is clear that trauma symptoms among individuals exposed to natural disasters are a great societal and mental health concern. As Hurricane Harvey affected a large population, it is critical to gain a better understanding of the different ways in which this experience influenced Houstonians' mental health. Notably though, this inquiry is contingent upon accurate measurement of individual's trauma symptoms in the post-disaster environment and over time.

Challenges in Measuring Trauma Symptoms

Unfortunately, there are currently numerous impediments to measuring trauma and its effects on individuals after a disaster. Information regarding trauma symptoms is typically gathered through self-report questionnaires or clinical interviews. Though self-report is a common method for gathering information about trauma (Fricker & Smith, 2001; Galea et al., 2005), the accuracy of information gathered through this method can be called into question. Relying on respondents to provide accurate information is a major limitation of obtaining data through self-report in general, and it is particularly problematic when a respondent is reporting sensitive information in which repercussions, such as stigmatization, could follow (Butcher, Kretschmar, Lin, Flannery, & Singer, 2014). Because trauma is a sensitive topic, a victim's report of resulting symptoms may be at risk for response bias, which can manifest as either minimizing socially undesirable behaviors or exaggerating behaviors that would be perceived as positive (Butcher et al.,

2002; Paulhus, 2002). For instance, a victim of trauma might alter a report about subsequent trauma symptoms in order to avoid the emotional impact of the trauma or protect oneself from the repercussions of disclosing those symptoms (Fricker & Smith, 2011). On the other hand, an individual might also exaggerate the severity of symptoms in order to ensure access to services, a situation which might be particularly relevant after a natural disaster when additional state and federal mental health services are made available (Texas Department of State Health Services, 2016). More concerning, it has been documented that individuals experiencing symptoms of PTSD lack the knowledge to recognize those symptoms (Harik, Matteo, Hermann, & Hamblen, 2017), which inherently impacts their ability to report them accurately and adds additional complication to measuring trauma symptoms via self-report. Ultimately, the accuracy of self-reports about trauma symptoms is contingent upon the victim's disclosure, which leaves the potential for response bias and inaccurate information.

Considering the challenges associated with self-report data, some clinicians advocate for clinical interviews with the rationale that a trained professional can ask appropriate questions and discern the symptoms the victim is actually experiencing. However, a victim's reluctance to discuss trauma symptoms impacts the information extracted by clinical interviews. For instance, victims may try to avoid recalling traumatic events (a PTSD symptom in itself), resulting in a reluctance to talk about trauma at all (Walsh, Jamieson, Macmillan, & Trocme, 2004). As a clinician can only assess what a victim outwardly expresses, avoidance regarding trauma symptoms can present a serious limitation to clinical interviews. Thus, accuracy and honesty can be difficult to determine in these situations, and contribute to the challenge of obtaining an objective measure of

trauma symptoms as a result of natural disasters. Consequently, even if the method of measuring trauma symptoms is flawless, other challenges, such as a victim's willingness to discuss symptoms or the accuracy of their report of those symptoms, prevent researchers and clinicians from gathering objective and in-depth data about trauma symptoms.

Furthermore, clinical interviews rely on an individual's clinical judgment, which is not only subjective but often inaccurate when assessing symptoms and assigning a diagnosis (Jenson & Weisz, 2002; Guy, 2008). In fact, Zimmerman and Mattia (1999) posit that when using clinical interviews, half of actual PTSD cases are missed. More problematic is that agreement among evaluators is low when diagnosing disorders in which symptoms are not directly observable (Jenson & Weitsz, 2002), such as trauma symptoms. Reliability is also influenced by a clinician's subjectivity. For instance, a clinician's preconceived notions and biases have been found to affect clinical judgment (Garb, 2005), meaning that reasonable clinicians will disagree about the same case due to individual differences. Moreover, expressions, other non-verbal cues, and race of the interviewer have been found to influence levels of disclosure (Keenan, McGlinchey, Fairhurst, & Dillenburger, 2000; Springman, Wherry, & Notaro, 2006). Therefore, no matter how well trained or professional a clinician is, there are still individual characteristics about that clinician that will affect the information extracted and the consequent decision-making, compounding the cost, time, and personnel-intensive limitations of clinical interview methods.

Indeed, interviewing individuals about trauma symptoms not only takes the time of the victim but also consumes the clinician's time, resulting in a long and expensive

process (Sisteré, Domènech Massons, Pérez, & Ascaso, 2014). Furthermore, not only does the actual interview take time but the training required to be competent in conducting such an interview can take two to three days (Shaffer, Fisher, Luca, Dulcan, & Schwab-Stone, 2000), limiting the number of clinicians and researchers able to conduct clinical interviews. This issue becomes particularly complicated by a natural disaster that affects a large number of people, reducing the availability of trained clinicians conducting the interviews. In fact, it is most common for information about trauma symptoms to be collected by a lay person following a natural disaster given the magnitude of individuals affected, and there is presently no consensus in the field about the best instrument for use by lay persons (Galea et al., 2005) increasing the likelihood for error and variability in symptom measurement in the post-disaster context. Therefore, not only are there inherent flaws in the clinical interview method of gathering information, there are also few trained clinicians who are capable of assessing symptoms as well as time constraints that decrease the feasibility of this method following a natural disaster.

It is clear that self-reports and clinical interviews have limitations that impede the accurate measurement of trauma symptoms, as they are both affected by subjectivity. Reluctance and partial disclosures by victims exacerbate the challenge of obtaining objective information about trauma symptoms. Furthermore, these methods can only assess the content that is expressed by the individual, not any underlying cognitive processing. Indeed, both methods ultimately rely upon the self-reported content of the respondent, with no objective or observational data available. Being able to tap in to objective metrics of cognitive processing regarding trauma symptoms could give

clinicians a more accurate understanding of the symptoms an individual is experiencing. Accordingly, researchers need to explore other methods for obtaining more in-depth information regarding an individual's psychological state and trauma symptoms, for instance, the way individuals talk about their trauma as a metric of symptom severity. A method that obtains objective information about trauma symptom severity, beyond what is being endorsed by the individual, is necessary. Further, in the post-disaster context, methods that utilize few resources and have potential for large-scale application are needed.

Linguistic Inquiry and Word Count (LIWC)

Given the aforementioned challenges inherent in measuring the effects of trauma following a natural disaster, and more broadly, recent research has aimed to better understand how to assess symptom severity and treatment progress for those who experience traumatic events (Miller & Veltkamp, 1995; Butcher et al., 2014). Advances in technology have been a tremendous asset in combating some of the aforementioned methodological challenges in the assessment of trauma symptoms. Recently, the analysis of a victim's language has been used to evaluate symptomology and cognitive processing (Gray & Lombardo, 2001; Ng, Ahishakiye, Miller, & Meyerowitz, 2015; Marshall, Henderson, Barker, Sharp, Venta, 2017). To date, the most common method of linguistic analysis uses the computer program Linguistic Inquiry and Word Count (LIWC; Pennebaker, Booth, & Francis, 2007). LIWC is a computer program that analyzes language by searching for and counting psychologically-relevant words across multiple text files (Tausczik & Pennebaker, 2010). LIWC analyzes every word in a narrative, determines if it is in the dictionary and then places the word into a category. For instance,

the word “the” is determined to be in the dictionary, and is then categorized as an article, whereas the word “hurt” would be put in the category emotionality and then specified as a negative emotion word. LIWC is also able to produce objective characteristics of the narrative, such as word count, narrative length, and use of speech fillers (e.g., um, like, you know; Jaeger, Lindblom, Parker-Guilbert, & Zoellner, 2014). Thus, LIWC is able to evaluate a narrative and transform subjective content into objective data.

Prior trauma research using LIWC broadly indicates that LIWC assesses three cognitive processes particularly relevant to trauma symptoms: attentional focus, emotionality, and thinking styles. Attentional focus measures an individual’s priorities, intentions, and processing through analyzing pronoun use and verb tense (Tausczik & Pennebaker, 2010). For instance, an individual experiencing emotional pain is more likely to focus on himself and subsequently use first-person singular pronouns (Rude, Gortner, & Pennebaker, 2004). Furthermore, to gain a better understanding of how an individual is experiencing the world, emotionality is another variable that can be evaluated. This category analyzes the extent to which emotion (positive or negative) words are used, the valence of those emotion words, and how the emotion words are expressed (Tausczik & Pennebaker, 2010). Finally, thinking styles refer to language use that reflects how an individual is processing and interpreting information to make sense of the environment. Thinking style is evaluated by analyzing the conjunctions, nouns, verbs, and cognitive process words individuals use to connect thoughts (Tausczik & Pennebaker, 2010). These cognitive processes are assessed through LIWC identifying specific linguistic markers corresponding to 80 different categories; the categories used by LIWC range from simple (e.g., articles) to more complex (e.g., cognitive process

words) and are reviewed in the following section. While these are just a few of the many cognitive processes assessed by LIWC, they are particularly important to understanding the language use of an individual who has experienced trauma and have produced the most robust relations within post-trauma language use, as evidenced by the literature base reviewed in the next section.

Overall, the goal of LIWC is to use objective linguistic data to glean information about an individual's cognitive processing, including attentional focus, emotionality, and thinking styles. Thus, LIWC evaluates language beyond the surface level content an individual is expressing and may provide more in-depth data on trauma symptoms and processing. In fact, recent research provides support for LIWC's ability to tap into individual's well-being beyond their subjective report. Specifically, researchers aimed to determine if language use could predict the neurobiological processes that are indicative of nonconscious well-being (e.g., stress, depression, anxiety) above and beyond their self-report (Mehl, Raison, Pace, Arevalo, & Cole, 2017). Findings indicate that, in fact, language use is able to predict the genetic expressions that are indicative of well-being better than individuals' reported affective experience (Mehl et al., 2017). In other words, analyzing language use provides greater insight into individuals' mental health and overall well-being than their subjective report of health and affective experience. These findings implicate the importance of language use, specifically LIWC metrics, in objectively measuring individual's cognitive and affective states.

LIWC and PTSD

Accumulating research suggests that evaluating the linguistic markers of trauma narratives can provide important insight into a victim's psychological state and

potentially predict later symptomology (Gray & Lombardo, 2001; Ng et al., 2015; Marshall et al., 2017). Within the three broad cognitive processes mentioned (i.e., attentional focus, emotionality, and thinking style) specific linguistic markers have been determined to be associated with trauma symptomology. Current literature focuses primarily on trauma narratives produced by adults and has found emotion words, pronoun use, and cognitive process words to be the strongest predictors of PTSD symptoms; additionally, increased word count and increased use of somatosensory detail have been shown to predict PTSD symptoms (Alvarez-Conrad, Zoellner, & Foa, 2001; Gray & Lombardo, 2001; Papini, Yoon, Rubin, Lopez-Castro, & Hien, 2015; Crespo & Fernández-Lansac, 2016). Thus, the current study proposes to analyze the linguistic markers that are most common in the three broad categories relevant to trauma; specifically, emotion words within emotionality, cognitive process words within thinking styles, pronoun use and somatosensory detail within attentional focus, as well as word count (Eid, Johnsen, & Saus, 2005; Tausczik & Pennebaker, 2010; Jaeger et al., 2014; Papini et al., 2015).

Emotion words. Existing literature is mixed about the relation between PTSD symptoms and various emotion words, including general affect words, negative emotion words, and positive emotion words. Specifically, a recent meta-analysis conducted on 22 studies of trauma narratives since 2004, found that use of negative emotion words, but not general affect is related to increased PTSD symptoms (Crespo et al., 2016). However, in contrast with the Crespo et al., (2016) meta-analysis, an earlier meta-analysis revealed that affect words in general were prominent within narratives produced by individuals suffering from PTSD (O'Kearney & Perrott, 2006). Additionally, Eid et al. (2005) found

that negative emotional expression present in trauma narratives is related to trauma-specific symptoms and psychological distress. This finding was also supported by Jaeger et al., (2014) who reported that in female assault survivors, increased use of both positive and negative emotion words was related to PTSD symptoms. However, in Jaeger et al.'s (2014) study, both negative and positive emotion words were related to lower PTSD re-experiencing symptoms. Therefore, there is evidence to support both positive and negative relations between use of emotion words (i.e., general affect, negative, and positive) in a trauma narrative and PTSD symptoms.

Cognitive process words. Numerous studies have also established an association between cognitive process words and PTSD symptoms. Cognitive process words are those that express causal and insightful thinking (e.g., Tausczik & Pennebaker, 2010). Overall, greater use of cognitive process words, like "think" and "hence," is associated with lower PTSD symptoms (Alvarez-Conrad et al., 2001; Jaeger et al., 2014). Specifically, trauma narratives with increased use of cognitive process words predicted lower PTSD symptoms (Jaeger et al., 2014). This result is echoed in trauma-exposed females who were currently being treated for PTSD, such that greater use of cognitive process words in their trauma narrative was associated with decreased symptom severity (Alvarez-Conrad et al., 2001). Furthermore, in trauma-exposed adults with a diagnosis of PTSD, cognitive flexibility, a construct closely related to cognitive process words, was negatively related to symptom severity (Papini, et al., 2015). This further supports the notion that the more often cognitive process words are used in a trauma narrative, the less severe manifesting PTSD symptoms are.

In contrast, longitudinal studies that have examined trauma symptoms and

language use over time have demonstrated that greater use of cognitive processing words predict less symptoms reduction when reassessed. Specifically, D'Andrea, Chiu, Casas, and Deldin (2012) reported that in undergraduate students, following September 11th, lasting PTSD symptoms, measured five months after the event, were predicted by greater use of cognitive process words in their narrative produced a week after the traumatic event. Moreover, in a sample of inpatient adolescents, greater use of cognitive process words at admission was related to lasting trauma symptoms at time of discharge, approximately one month later (Marshall et al., 2017). It was hypothesized that adolescents who used fewer cognitive process words at admission had more room for improvement during their inpatient hospitalization, due to increased PTSD symptoms, and therefore benefitted more from their treatment than those who used more cognitive process words initially (Marshall et al., 2017). Findings from these two studies, however, are inconsistent with the rest of the literature on cognitive process words, which suggests that greater use of these words is associated with fewer PTSD symptoms. However, they are the only studies in non-military samples to use prospective data, thus they are the only studies that can provide insight into continuing trauma symptoms. Critically, these longitudinal studies have important implications because by measuring linguistic markers and presenting symptoms immediately after a trauma exposure and then linking these variables with manifesting symptoms months later, these studies provide support for linguistic markers' ability to predict symptom change in the months following a traumatic event. In sum, based on the methodology used (i.e., longitudinal or concurrent), findings on the association between cognitive process words and trauma symptoms contradict each other, warranting further research.

Pronoun use. Empirical research also links pronoun use and PTSD symptomology. A pronoun is any word that substitutes as a replacement for a noun or noun phrase, such as "I," "we," or "who." Findings from Jaeger et al. (2014) established that greater use of pronouns in general was related to increased trauma related guilt and dissociation. More specifically, research indicates that a diagnosis of PTSD is positively associated with third-person singular pronouns (i.e., he/she) but negatively related to third-person plural pronouns (i.e., they; Papini et al., 2015; Mehl et al., 2017). Papini and colleagues (2015) also reported a positive association between the severity of re-experiencing symptoms and singular pronouns in general. Likewise, lasting PTSD symptoms have been found to be related to greater use of first-person singular pronouns (e.g., I; D'Andrea et al., 2012). In contrast, these findings were not replicated in an inpatient adolescent sample, such that no associations between general pronoun use and trauma symptoms were found and first person singular pronouns were not related to symptomology over time (Marshall et al., 2017). Although these inconsistencies could be the result of language differences between adults and adolescents, further research is needed to determine how pronoun use, both first and third person, function as linguistic markers of PTSD symptomology.

Somatosensory detail. As previously mentioned, the meta-analysis on language use within trauma narratives determined that somatosensory details are often used in trauma narratives, however, it did not discern if use of these words were related to PTSD symptoms (Crespo et al., 2016). This assertion was echoed by Beaudreau (2007) in the comparison of neutral, positive, and trauma narratives produced by community dwelling adults, which found that compared to other narratives, trauma narratives contain more

somatosensory details, especially when the event occurred recently (Beaudreau, 2007). Additionally, Beaudreau (2007) determined that increased references to body states and symptoms in narratives were associated with PTSD symptoms as well as poorer adjustment. These findings are echoed by Marshall et al. (2017) who found that body words (e.g., ache, heart), a subcategory of somatosensory detail, was related to increased trauma symptoms. Further evidence for a link between somatosensory detail and PTSD symptoms comes from an evaluation of trauma narratives produced about genocide and symptomology measured six years later (Ng et al., 2015). All sensory detail words were analyzed but only tactile details (e.g. feel, touch) were associated with a greater risk of PTSD avoidance six years later. Therefore, it is well established that somatosensory details are an important characteristic of trauma narratives. However, additional research is needed to determine which particular details represent a relation with presenting PTSD symptoms.

Word Count. Both word count and narrative length appear in the literature and essentially measure the same element, how much an individual talks or writes about the trauma. While these linguistic markers provide a fair amount of overlap, each appear individually within the literature, thus it is important to consider the evidence surrounding both constructs. However, the current study will simply refer to it as word count. Literature exists supporting the link between increased word count and narrative length with trauma symptoms but how this relation functions has yet to be determined. Firstly, it is important to mention that trauma narratives have been found to be lengthier than narratives on other topics (Crespo et al., 2016). Within trauma narratives though, the evidence is mixed. For example, one study examining community dwelling adults posited

that longer trauma narratives were associated with better psychological adjustment (Beaudreau, 2007). Contrastingly, when comparing narratives of trauma exposed adults with and without subsequent PTSD, those in the PTSD group produced lengthier narratives. Notably, though, this difference in length between the two groups did not reach a level of significance, thus it can only be stated that there was a trend toward longer narratives in the PTSD group (Gray & Lombardo, 2001). This trend is supported by Ng et al. (2015) who found that increased word count in narratives about genocide was associated with greater hyperarousal six years later. Likewise, Marshall et al. (2017) documented that youths with increased trauma symptoms following sexual abuse use used more words in their descriptions of the account. These studies lend support to the notion that longer narratives or those containing more words are related to later PTSD symptoms. Conversely, word count was not found to be a significant marker in narratives of women being treated for PTSD, such that there was no relation between the two constructs (Alvarez-Conrad et al., 2001). These results lead to indeterminate conclusions about the link between narrative length/word count and trauma symptomology, making further exploration of the ability of these linguistic markers to predict PTSD symptoms and severity even more important.

In sum, LIWC analysis can provide important and objective insight into the psychological state of adult trauma victims. Specifically, (a) emotion words, (b) cognitive process words, (c) pronoun use, (d) somatosensory detail, and (e) word count have been identified as relevant linguistic markers of PTSD symptom severity in trauma narratives. Additionally, longitudinal studies of trauma symptomology advocate that there is evidence that linguistic markers, specifically cognitive process words and first-person

pronouns, can also predict symptom change in the months following trauma. While there are well-established links between linguistic markers in trauma narratives and PTSD symptomology, further research needs to be conducted to parse out the exact nature of these relations, as the literature base is only in its early stages of development and prior research has documented mixed findings. More importantly, although language use has been examined after human-made disasters (i.e., terrorist attacks, genocide), no study to date has conducted a LIWC analysis of narratives following a natural disaster, particularly a hurricane. As existing literature indicates that LIWC is able to provide objective information that can assist in assessing trauma symptoms, does not require a clinician for administration, and can be used to quickly analyze information from large groups of people, it is particularly well suited for the post-disaster context.

Theoretical Framework

In addition to the existing literature on LIWC and PTSD, Ehlers and Clark's (2000) cognitive model of PTSD provides guidance on how language use is theoretically related to trauma symptomology. In their model, they suggest that reexperiencing primarily consists of sensory impressions and the associated emotions, suggesting somatosensory and affect words would be more common in the narratives of individuals experiencing increased trauma symptoms. More specifically, the model posits that individuals who have not processed their trauma are more likely to use affect words, typically negative emotion words (Eid et al., 2005; Crespo et al., 2016) when describing the incident, rather than using cognitive words, and cognitive process words would predict fewer symptoms as they suggest greater understanding and processing of the traumatic event. This theory is consistent with existing literature that links increased

trauma symptoms with greater use of somatosensory detail and emotion words (Beadreau, 2007; Ng et al., 2015; Crespo et al., 2016; Marshall et al., 2017) and fewer cognitive process words (Jager et al., 2014).

On the other hand, longitudinal studies appear to contradict this theory as they document greater use of cognitive process words predicting lasting trauma symptoms (D'Andrea et al., 2012; Marshall et al., 2017). One explanation that has been posited is that those individuals who initially use sensory and affect words to describe their trauma have more room for improvement, due to increased PTSD symptoms, and may show reduced symptomology as they process and gain understanding related to their trauma; whereas the opportunity for symptom improvement is reduced for those individuals who use cognitive process words early on (Marshall et al., 2017). Regardless, Ehlers and Clark's (2000) cognitive model of PTSD provides a framework for investigating how language use about a traumatic experience relates to subsequent trauma symptomology and existing literature in the field is generally consistent with the theory. However, additional research is needed to confirm these assertions and, in particular, clarify how language use is related to symptomology over time.

Current Study

In sum, trauma symptoms following natural disasters are prevalent and may be particularly problematic after Hurricane Harvey given the magnitude of its destruction and the variety of ways in which it affected Houstonians. Unfortunately, current methods pose several challenges to gaining accurate measures of trauma symptoms. These challenges are the potential for response bias in self-reports and innate subjectivity associated with clinical interviews. Most problematic after a natural disaster though is the

time and resources needed to conduct standard clinical interviews, which interfere in gathering objective information about trauma symptoms when large populations are affected. Due to these limitations, it has been difficult to obtain accurate, in-depth, and objective measures of trauma symptoms following such events. However, recent advances in technology have assisted in producing objective measures of trauma symptoms, most commonly through linguistic analysis produced by LIWC. Using LIWC, linguistic markers relevant to trauma symptoms have been established, however, further research is still warranted. Indeed, research has yet to address this association following a natural disaster. Given the prevalence of trauma symptoms following a hurricane (Tang, 2006), the severity of Hurricane Harvey (NOAA, 2018), and lack of research (Crespo et al., 2016), there is a great need to understand how Houstonians talk about their exposure to a traumatic event and if it is related to their trauma symptoms.

Therefore, the aim of the current study was to use narrative data collected online and the computer program LIWC to analyze the language use of adults in the greater Houston area and determine whether specific linguistic markers were associated with an individual's current symptomology. Using the response to a simple prompt about Hurricane Harvey, linguistic markers were analyzed and compared to the individual's trauma symptomology assessed through self-report methods. Specifically, we evaluated if hypothesized LIWC metrics were related to individuals' current trauma symptoms assessed via self-report. Based on the existing literature, we expected use of (a) more emotion words (i.e., affect, positive, and negative), (b) fewer cognitive process words, (c) greater pronoun use (i.e., first and third person), (d) more somatosensory detail, and (e) greater word count to be associated with increased trauma symptoms. Additionally, to

better understand the lasting effects of such an event, follow up data was collected six-month after the hurricane to determine whether linguistic markers assessed at baseline were able to predict symptom change over time. Although limited, prior research indicates fewer cognitive process words and fewer first person pronouns (D'Andrea et.al., 2012; Marshall et al., 2017) at baseline relate to greater symptom change (i.e., decreased trauma symptoms). Thus, it was predicted that use of fewer cognitive process words and first-person pronouns at baseline would predict a greater reduction in symptomology over time.

Conducting a LIWC analysis provides objective data about how individuals write about their experience and how that relates to subsequent trauma symptomology. Gaining a better understanding of individuals' experiences related to the hurricane and resulting symptomology has important implications for both treatment and assessment, particularly given the inevitability that Houstonians will continue to experience hurricanes. LIWC can provide a source of objective data that can be integrated with measures of an individual's current symptoms, allowing for more accurate measurement of symptoms on a large scale that requires no trained clinicians or formal clinical interviewing/assessing. Accurate measurement is fundamental in identifying individuals in need of intervention and, further, developing an effective treatment plan (Ganellen, 2007). Furthermore, if LIWC can aid in predicting symptom change, it will further enhance the efficiency of treatment. By being able to generally predict the progression of a client's symptom change early on, clinicians and therapists can collaborate proactively to customize treatment and strategize how to manage foreseeable challenges (Verlinden et al., 2015). Consequently, the extra layer of knowledge that LIWC analysis might provide clinicians and therapists would be

invaluable, making the evaluation of its relation with trauma symptoms a necessity.

CHAPTER II

Methods

Participants

The current study used data collected shortly after Hurricane Harvey (1 to 2 month post-disaster) and then collected follow-up data (six months post-disaster) from the same participants. At baseline, Houstonian adults were recruited for participation via Craigslist (an online advertisement website and discussion forum), Reddit (social news and media aggregation website), local listservs, and word-of-mouth. Sample size varied by the timeframe of the measurement being used, such that for the PTSD symptom measure at baseline $n = 123$ and for PTSD symptom measure at both baseline and follow up $n = 61$. Notably, those participants who were missing follow up data were significantly different with regards to age, $t(117) = -2.947$ $p = .014$, race, *Chi-Square* = 16.443; $p = .014$, and education level, *Chi-Square* = 20.978; $p = <.001$. However, they were not different on IES-R baseline scores $t(119) = -.548$, $p = .585$. Participants ranged from 18 to 73 years of age ($M = 30.02$, $SD = 12.08$) and the racial/ethnic breakdown was as follows: 51.2% Caucasian, 6.5% Asian, 11.4% African-American, 26.0% Hispanic/Latina, and 4.5% Multiracial or other. To ensure quality linguistic analysis, only those participants who wrote about Hurricane Harvey using greater than 50 words was included in this study (Tausczik & Pennebaker, 2010). Six participants were excluded based on this criteria.

Procedure

Subjects were recruited for participation via Craigslist (an online advertisement website and discussion forum) and Reddit (social news and media aggregation website),

local listservs, and word-of-mouth. Interested individuals followed a provided link to the Qualtrics survey and read through a cover letter and consented to the study by pressing next, at which time they were provided a space to enter their email, which was subsequently attached to an ID number. They then completed a battery of self-report questionnaires and provided a brief write up about Hurricane Harvey. Using the email participants provided, they were contacted to complete the six-month follow up survey, which consisted of a self-report battery and the same prompt to write about Hurricane Harvey. Upon completion of each survey, subjects were entered in a drawing for a chance to win one of three $50 Target gift cards. IRB approval from the appropriate institution was obtained.

Measures

Demographics. To gather demographic information about the participants, several standard identifying questions were asked: age, gender, race/ethnicity, marital status, sexual orientation, education level, employment information (i.e., employed, hours per week, income). Participants were also asked how long they have lived in Texas, and specifically Houston, as well as residence type and how prepared they felt for Hurricane Harvey. Finally, to assess how affected they were by Harvey, participants indicated all the ways in which they were impacted. Specifically, they responded to the question, "How were you affected by Hurricane Harvey? Check all that apply," with responses ranging from "witnessing flooding" to "loss of a loved one." This question was used to compute a count variable of the number of stressors individuals were exposed, in order to gauge how they were affected.

Posttraumatic Stress Disorder Symptoms. The Impact of Events Scale- Revised (IES-R; Weiss, 2007) was used at the baseline and six-month follow up survey to assess posttraumatic stress. The IES-R is a 22-item self-report measure of the subject's posttraumatic stress level related to a particular event. The measure contains three subscales of important factors of PTSD: avoidance, hyperarousal, and intrusion. Subjects are asked to report their distress level over the past seven days on a 5-point Likert scale ranging from 1 (not at all) to 5 (extremely). This yields a dimensional T-score ratings of PTSD symptoms, with higher scores indicating greater PTSD symptoms.

Objective Language Analysis. To evaluate how participants responded to a prompt about Hurricane Harvey at baseline and follow-up, a content-analysis computer program, Linguistic Inquiry and Word Count (LIWC), was used. The prompt read, "Please write at least five sentences about Hurricane Harvey." The LIWC program analyzes the text from the online survey and computes the total percentage of words in each linguistic category. These percentages are then converted to 100-point scales along a 0-100 dimension based upon "research based composites" (Pennebaker Conglomerates Incorporated, 2015). Linguistic markers that were used for the current project are (a) emotion words, (b) cognitive process words total score (c) pronoun use total score, (d) somatosensory detail, and (e) word count and all of their accompanying subcategories.

CHAPTER III

Results

Concurrent Analyses

Bivariate correlations between the Impact of Events Scale (IES-R), LIWC metrics, and age are presented in Table 1. Although correlations with the IES-R did not reveal a significant relation with cognitive process words in general, a subcategory (i.e., cause words) was significantly related to IES-R total score. Specifically, a negative relation between cause words and IES-R total was found. Additionally, the biological process portion (i.e., bio words) of somatosensory detail, as well as a subcategory (i.e., body words) were significantly correlated with the IES-R. Indeed, correlations with the IES-R indicate a positive relation between IES-R total score and bio and body words. No evidence of a significant relation between pronoun use, emotion words, or age and the IES-R was demonstrated.

Regarding severity of trauma exposure, participants responses to "How were you affected by Hurricane Harvey?" ranged from experiencing 0 to 7 stressors, with participants endorsing experiencing 2.57 traumas on average ($M = 2.57$, $SD = 1.29$).

Longitudinal Analyses

To measure the trajectory of symptom change, the variance of the slope was constrained to 0 in order to identify the model. No evidence of problematic skewness (all smaller than ± 1) or kurtosis (all smaller than ± 2) was noted in baseline data. Little's test indicated that data was missing at random (*Chi-Square* = 74.332; p =.155); thus, maximum likelihood estimation was appropriate as a method for handling missing data at the follow-up timepoint.

Baseline linear model was examined to determine the symptom change from baseline (1 to 2 months post-disaster) to follow up (six months post-disaster). Regarding the baseline linear model, as would be expected for a community sample, the average total symptom score at baseline was low ($Mean_{Int}$ = 16.193, *SE*= 3.497), well below the IES-R clinical cut off of 24 and there was significant variability in these scores at baseline ($Variance_{Int}$ = 73.879, *SE* =15.449, *z*= 4.782, *p* <.001). The average slope parameter indicated that trauma symptom scores declined linearly by 9.176 points from baseline to follow up and this decrease was significant (*p* <.001). LIWC metrics, cognitive process words, and the subcategories: first person pronouns, bio words, and body words, were added to the model as covariates. Relations between predictor variables measured at baseline and growth parameters appear in Table 2. Regarding the intercept parameter, bio words and body words were associated with increased total symptoms at baseline. Bio words were negatively associated with the slope parameter, indicating that participants who used greater bio words experienced greater symptom reduction. Insight words were positively associated with the slope parameter, such that participants who used more insight words at baseline experienced less symptom reduction over time.

Exploratory Analyses

To unpack significant relations, bivariate correlations between the Impact of Events Scale (IES-R) subscales, LIWC metrics, are also presented in Table 1. In relation to the IES-R Avoidance scale, significant relations were revealed with word count, bio words, body words, and death words (e.g., coffin, kill), and all evidenced positive relations. Additionally, significant relations were revealed in relation to the IES-R

Intrusion subscale, namely positive correlations with bio and body words. Finally, regarding the IES-S Hypervigilance subscale, correlations indicate a significant relation with impersonal pronouns and body words. Indeed, correlations with the IES-R Hypervigilance subscale indicate a negative relation with impersonal pronouns (e.g., it's, those) and a positive relation with body words.

CHAPTER IV

Discussion

The first aim of the study was to examine if LIWC metrics that have been linked to PTSD symptoms in adults after various human-made disasters are also related to trauma symptoms after a natural disaster, specifically a hurricane. Based on the existing literature, it was predicted that greater use of emotion words, pronouns, somatosensory detail, increased word count, as well as fewer cognitive process words would be associated with increased trauma symptoms. Results partially supported our hypotheses, with greater use of biological process words (bio words; e.g., blood, pain) and one of its subcategories body words (e.g., hand, spit), which are both components of somatosensory detail, and fewer cause words (e.g., because, effect; a subcategory of cognitive process words) related to higher levels of trauma symptoms. Notably, when the unique variance of these linguistic markers in predicting baseline trauma symptoms was examined, only bio and body words remained significant predictors, suggesting that perhaps these have the strongest association with trauma symptoms.

Prior literature, similar to present findings, indicates that somatosensory details are common in trauma narratives and have been found to be related to increased trauma symptoms. Somatosensory details can be broken down into sensory experiences and references to biological and body states, both of which have been linked to trauma symptoms (Beaudreau, 2007; Ng et al., 2015; Marshall et al., 2017). Indeed, Beaudreau (2007) determined that increased references to body states and symptoms in narratives were associated with PTSD symptoms as well as poorer adjustment; and Marshall et al., (2017) documented a positive relation between body words and youth self-reported

trauma symptoms, which present findings replicate. However, inconsistent with a prior finding of a positive association between trauma symptoms and subcategories of sensory details (Ng et al., 2015), present findings did not link sensory detail words to trauma symptoms, suggesting that perhaps references to body states and biological processes are stronger indicators of trauma symptoms. Regardless, an explanation for these findings is that perceptual detail in trauma narratives bring about the intrusive, distressing memories typical in PTSD (Ehlers & Clark, 2000; Greenhoot et al., 2013). In fact, when examined at the subscale level, intrusion symptoms of the IES-R had the strongest positive association with bio and body words. Therefore, it may be that when individuals describe their trauma experience, they use these perceptual details and body state references because they are re-experiencing the event, to some extent, at that time. It has also been suggested that narratives dominated by perceptual details rather than cognitive process words are associated with greater symptomology because the individual has been unable to make sense of the trauma, and thus, is using somatosensory details rather than causal and insight words to describe the event (Ehlers & Clark, 2000).

This notion is further supported by the present study's findings on cognitive process words. In fact, cause words, a subcategory of cognitive process words, were found to be negatively related to trauma symptoms at baseline, bolstering such an explanation. Although only one subcategory of cognitive process words, cause words, was associated with decreased trauma symptoms, these results may highlight the importance of understanding the *cause* of a traumatic experience when processing the event. In general, the negative relation between cognitive process words broadly and trauma symptoms has been consistently documented in existing literature (Alvarez-

Conrad et al., 2001; Jaeger et al., 2014). Findings on bio, body, and cause words complement each other and indicate that those individuals who are experiencing increased trauma symptoms are more likely to use somatosensory details and fewer cognitive process words when describing the traumatic event. These results mirror previous findings that have also documented the combination of increased somatosensory detail and fewer cognitive process words being characteristic of trauma accounts from individuals experiencing increased symptomology. For instance, Marshall and colleagues (2017) demonstrated that greater use of body words and fewer insight words (a subcategory of cognitive process words) were indicative of greater trauma symptoms in inpatient adolescents.

Furthermore, the use of reduced cognitive process words is consistent with the conceptual framework through which literature views PTSD. For instance, cognitive models of PTSD (e.g., Information Processing Model, Ehlers and Clark's) theorize that individuals with PTSD cannot integrate the traumatic event with their already existing beliefs and underlying schemas, and then this inability to integrate competing information results in cognitive avoidance (Barlow, 2014). In other words, individuals with PTSD become stuck by their inability to process and understand the traumatic event. Additionally, from a psychodynamic perspective, the process of mentalizing, which enables an individual to reflect on his/her own mind in order to make sense of internal experiences (Fonagy, 1991), is hindered by traumatic experiences and subsequent symptoms. In both perspectives, the aim of treatment is to reduce avoidance of unwanted thoughts, feelings, and internal experiences by promoting metacognitive processes and ultimately processing of the trauma.

With regards to exploratory analyses in the present study, findings indicate that greater use of death words and increased word count were related to avoidance symptoms. These findings mirror results in existing literature (Alvarez-Conrad et al., 2001; Ng et al., 2015; Marshall et al., 2017). Specifically, previous studies document greater use of death words is related to increased symptom severity (Alvarez-Conrad et al., 2001); it is intuitive that individuals who provide a narrative with a greater emphasis on death related words are more likely to experience heighted trauma symptoms. Similarly, prior studies have also documented increased trauma symptoms to be associated with greater word count (Ng et al., 2015; Marshall et al., 2017), although findings in general have been indeterminate about the function of word count in trauma narratives. In putting these two findings together, it is unclear why death words and word count were only related to the avoidance symptoms in this sample. It may be that these individuals are engaging in avoidance behaviors when providing their account of the hurricane by focusing more on the broad aspects of the hurricane, such as facts about the number of resulting deaths, and using more words to do so, in an attempt to distance themselves from a discussion of their internal state instead. Regarding the Hypervigilance scale, results indicate a negative association with impersonal pronouns (e.g., it's, those). Although existing literature has documented the importance of pronouns in trauma narratives, no prior studies have discussed impersonal pronouns, and thus, it is unclear why such words were only related to the hypervigilance scale. Importantly though, these analyses were exploratory, and warrant replication before substantive conclusions can be stated, but highlight avenues for future research.

The second aim of this study was to determine if LIWC metrics that have been

linked to symptom change after various human-made disasters (D'Andrea et al., 2012; Marshall et al., 2017) would also predict significant symptom change over time in the aftermath of a hurricane. Specifically, it was predicted that fewer cognitive process words and first-person pronouns would significantly predict symptom change across time; in other words, greater use of cognitive process words and first-person pronouns would predict lasting trauma symptoms. Results partially support these hypotheses, in that there was evidence of a significant effect of insight words (a subcategory of cognitive process words) on the slope of change in trauma symptoms from baseline to follow up. Indeed, individuals who used fewer cognitive process words when writing about Harvey at baseline demonstrated a greater decrease in trauma symptoms as compared to individuals who used more cognitive process words. Conversely, those individuals who used more cognitive process words at baseline demonstrated less decrease in trauma symptom reduction over time. These findings are consistent with the only studies that have examined symptom change over time using LIWC metrics (D'Andrea et al., 2012; Marshall et al., 2017). Similar to these prior studies, and in the context of the first aim of the study, individuals who endorsed greater use of cognitive process words (i.e., cause words) at baseline experienced fewer trauma symptoms, and demonstrated less reduction in trauma symptoms over time. It may be that these individuals had less room for improvement, given their lower level of trauma symptoms, and thus evidenced lasting symptoms.

Notably, despite insight words being indicative of symptom change over time, they were not related to trauma symptoms at baseline, but rather cause words, a different subcategory of cognitive process words were. One possibility for this outcome could be

the subtle difference in the depth of cognitive processing between cause and insight words. For instance, cause words (e.g., because, effect) could be more indicative of a simplistic understanding of an event (i.e., cause and effect). Whereas insight words (e.g., think, know) may suggest a deeper, more reflective understanding of an event (i.e., "I know I could not have stopped the damage"). Therefore, it may be that using words indicative of a basic understanding of why an event happened is more predictive of individuals initial symptom response but using words that suggest a more in-depth and reflective conceptualization of an event predict individuals' long-term symptomology. However, this is merely a hypothesis and further research is warranted to better understand these relations. Regardless, subcategories of cognitive process words in general appear to be relevant to trauma symptoms.

Although not included as a hypothesis, given the strong relation bio and body words demonstrated with baseline trauma symptoms, these linguistic markers were included in analyses examining symptom change over time. Only bio words were found to have a significant effect on symptom change over time, in that those individuals who used greater bio words in writing about Harvey at baseline demonstrated greater symptom reduction at follow up. Again, in the context of findings from aim one, individuals with more severe PTSD symptoms also used greater bio words at baseline and experienced greater symptom reduction over time. It may be that these individuals had more room for improvement, due to higher PTSD symptoms, and therefore demonstrated greater reduction in symptoms. Findings on the use of insight words and bio words and how they relate to symptom change over time again complement each other and are consistent with theoretical model driving the present investigation, Ehlers

and Clark's cognitive model of PTSD. Indeed, the theory suggests that those with increased symptoms are more likely to use perceptual details rather than cognitive process words, due to re-experiencing symptoms and difficulty processing the event, when describing a traumatic event. It makes sense then that the current study provides evidence for different trajectories in trauma symptoms over time based on an individual's initial language use, as it is indicative of the severity of their trauma symptoms and the room they have for improvement in those symptoms.

Contrary to our hypothesis, first person pronouns did not predict significant symptom change across time. This was not surprising though, given that first person pronouns, or any category of pronouns, were not related to total trauma symptoms at baseline. This finding is consistent with one of the prior studies examining the utility of LIWC metrics in predicting symptoms change over time (Marshall et al., 2017) and is at odds with the other (D'Andrea et al., 2012). The inconsistency in the findings on first person pronouns could reflect the difference in methodology across the studies, as D'Andrea et al. (2012) asked about trauma symptoms specific to the 9/11 attacks, whereas Marshall et al. (2017) and the present study collected trauma accounts indirectly by querying experiences, in general, related to a stressful event. Another possible explanation is the difference in the type of traumatic experience assessed across these studies, as one examined a terrorist attack in a community sample (D'Andrea et al., 2012), one examined sexual abuse in an inpatient sample (Marshall et al., 2017), and the present study examined a natural disaster in a community setting. Nevertheless, further research is warranted to uncover the nature of pronoun use and how it relates to trauma symptomology.

As this was the first study to examine linguistic markers and trauma symptoms after a natural disaster, it makes a contribution to the existing literature. The present findings indicate that LIWC metrics are related to trauma symptoms after a hurricane and their change over time, replicating findings from existing literature. Further, it extended the literature base of linguistic markers and trauma symptoms to a post-natural-disaster population. It can serve as a foundation for other studies examining language use and change in trauma symptoms over time, in particular for studies examining natural disasters. Along with expanding the literature base, the current findings have implications for the assessment and treatment of trauma symptoms. One of the main motivations for this study was the limitations of collecting trauma symptom data via self-report and clinical interview, especially after a natural disaster. Mounting evidence documents that LIWC is able to provide objective information that can be integrated into the assessment of trauma symptoms, which the present findings further support. As an accurate measurement of symptoms is essential for effective treatment planning, the current findings provide a valuable tool for tailoring treatment to individuals. More importantly, the methodology used in the present study demonstrates that such an approach could be used to gather a more accurate measurement of symptoms on a large scale that requires no trained clinicians or formal clinical interviewing/assessing, a crucial asset after a natural disaster. Also, the use of an open-ended prompt, like that in the current study, to question lay people about a traumatic event may mitigate the risk of inadvertently exacerbating trauma symptoms, further highlighting the potential benefit of the present methodology.

Perhaps most importantly though, the present study demonstrated that cognitive

process words and somatosensory details have the ability to predict trauma symptoms change over time. Knowing which linguistic markers are associated with increased symptomology, and the likely trajectory of symptoms based on the language used in a trauma account, may assist clinicians in more accurately targeting specific psychological processes as mechanisms of change in posttraumatic treatment, though specific research in this regard is needed. Indeed, by being able to predict an individual's progression early on in treatment, clinicians and therapists can collaborate proactively to customize treatment and strategize how to manage foreseeable challenges (Verlinden et al., 2015). Further, in non-clinical settings, analyzing linguistic markers in a trauma account could serve as a method for screening and filtering individuals into treatment, allowing for earlier intervention.

Limitations and Conclusion

There are limitations of the current that should be noted. First, LIWC analysis requires that at least 50 words are used in a trauma account for the analyses to be reliable. This inclusion criteria may have biased the data by restricting analysis to those participants who inherently use more words to talk about their trauma, and therefore, may not capture the experience and symptoms of individuals who are reluctant, or even engaging in avoidance behaviors, to discuss the event. Second, only approximately half of the initial sample completed the follow-up survey, significantly reducing the sample size and power of analyses related to symptom change over time. Although maximum likelihood was used to manage sample attrition, the reduced sample size remains a limitation of the present findings. Third, previous research on linguistic markers in trauma narratives have typically used methodologies that ask a participant to produce a

trauma narrative—a collaborative clinical activity undertaken with the supervision of a trusted clinician. The current study however, analyzed a response to an open-ended question in which participants were asked to write about Hurricane Harvey, without specific instructions focusing on their experiences. Additionally, as the current study used an online survey to gather information, participants typed their response about Harvey, and thus had the opportunity to edit and correct their account. It is possible that these differences in the method of extracting this information impacted the narrative, and subsequent data produced by participant. For instance, by directing participants to discuss their experience, the current study may have limited the ability to gather more relative, substantive qualities that are typical in trauma narratives, such as emotions and sensory details.

Notwithstanding these limitations, the current study addressed a gap in the linguistic marker and trauma symptom literature as the first study to examine these constructs after a natural disaster. The present study establishes a framework that can be expanded upon in future research examining these constructs after a hurricane. Lastly, the current methodology has important implications for the assessment and treatment of PTSD broadly, but in particular for the assessment of PTSD after a natural disaster, when large groups of people need to be reached with limited resources.

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APPENDIX

Table 1

Correlations between LIWC metrics, trauma symptoms, and age

Measure	PTSD Total Symptoms	PTSD Avoidance Symptoms	PTSD Intrusion Symptoms	PTSD Hypervigilance Symptoms
Cognitive Process	-.085	-.124	-.067	-.039
Insight	-.066	-.068	-.060	-.054
Cause	-.205*	-.180	-.181	-.175
Discrep	-.026	.023	-.072	-.064
Tentat	-.012	-.079	-.009	.042
Certain	.029	.047	.020	-.007
Differ	.049	-.033	.083	.119
Perceptual Process	.089	.039	.092	.120
See	.061	-.002	.072	.082
Hear	.056	.109	.009	.003
Feel	-.015	-.050	.024	-.008
Biological process	.243**	.288**	.189*	.172
Body	.314**	.216*	.349**	.288**

Measure	PTSD Total Symptoms	PTSD Avoidance Symptoms	PTSD Intrusion Symptoms	PTSD Hypervigilance Symptoms
Health	.095	.130	.075	.056
Ingest	.060	.143	.017	.038
Word Count	.181	.204*	.173	.137
Death	.102	.213*	.033	-.003
Impersonal Pronouns	-.159	-.100	-.144	-.201
Age	-.119	-.178	-.084	-.081

Note. $**p < .01$, $*p < .05$.

Table 2

Relations between predictor variables and growth parameters.

	Estimate	S.E.	P-value
Intercept regressed on			
Cogproc	0.30	1.80	0.87
Insight	-1.42	1.83	0.44
Cause	-1.35	1.98	0.50

(continued)

	Estimate	S.E.	P-value
Discrep	1.66	2.01	0.41
Certain	0.63	2.10	0.77
Tentat	-0.65	1.60	0.69
Differ	-0.37	1.91	0.85
I_Words	-0.22	0.50	0.66
We	0.09	0.55	0.88
Bio	1.95	1.03	0.05*
Body	5.89	2.94	0.05*
Slope Regressed on			
Cogproc	-2.46	1.77	0.16
Insight	4.01	1.87	0.03
Cause	3.09	1.98	0.12
Discrep	-1.72	2.02	0.40
Certain	0.91	2.06	0.66
Tentat	1.23	1.45	0.40

(continued)

	Estimate	S.E.	P-value
Differ	1.18	1.97	0.55
I_Words	-0.40	0.47	0.40
We	-0.45	0.49	0.37
Bio	-3.39	1.01	<0.001*
Body	-1.41	2.79	0.62

*Note. * Statistically significant relation between the growth parameter (i.e., intercept, slope and predictor variables (e.g., LIWC metrics).*

VITA

Kaisa K. Marshall, M.A.

EDUCATION

Candidate — **Doctor of Philosophy (Clinical Psychology, Forensic Emphasis)**
Sam Houston State University
Dissertation: Prospective Analysis of Linguistic Analysis as a Method for Assessing Trauma Symptoms after Hurricane Harvey among Houstonian Adults
(Defended scheduled: 2/4/2019)
Advisor: Amanda Venta, Ph.D.

2017 — **Master of Arts (Clinical Psychology, Forensic Emphasis)**
Sam Houston State University
Thesis: Linguistic Markers of Trauma Symptoms Following Sexual Assault in Female Adolescent Inpatients
Advisor: Amanda Venta, Ph.D.

2014 — **Bachelor of Science**
Psychology, *Summa Cum Laude*
Sam Houston State University
Minor: Criminal Justice

CLINICAL EXPERIENCE

August 2016 – Present — **Assistant Forensic Evaluator**
Psychological Services Center
Sam Houston State University
Huntsville, Texas

Responsibilities:

- Conduct court-ordered pre-trial evaluations (i.e. competency to stand trial and mental state at the time of the offense for adults; fitness to proceed and criminal responsibility for juveniles)
- Consult with supervisors to formulate psycholegal opinions in accordance with state statutes
- Co-author forensic evaluation reports for the court including psycholegal opinion and treatment recommendations

Population: Ethnically diverse, male and female, adults and adolescents involved in the justice system in several rural counties; evaluations conducted in jails or in outpatient clinic

Supervisors: Mary Alice Conroy, Ph.D., ABPP & Wendy Elliott, Ph.D., Darryl Johnson, Ph.D.

August 2018 – Present **Clinic Coordinator**
Psychological Services Center at Sam Houston State University
Huntsville, Texas

Responsibilities:

- Complete telephone intake interviews of potential clients and managed waitlists and clinical case assignments
- Lead weekly meetings of clinicians and supervisors to assign cases and facilitate group discussion of clinical/ethical issues and mediated clinic concerns between student clinicians, staff, and supervisors
- Assist in conducting and arranging reduced cost clinical services for individuals seeking an Extreme Hardship evaluation
- Facilitate and arrange services from outside referral agencies to the clinic
- Supervise peers in clinic policy, procedure, and record-keeping and conducted Quality Assurance reviews of clinic case files each semester

Population: A diverse, low-income, multi-ethnic population of children, adolescents, and adults with diagnoses including serious mental illness, substance use history, mood and anxiety disorders, personality disorders, family, and academic stress

Supervisor: Mary Alice Conroy, Ph.D., ABPP, Clinic Director

October 2016 – Present **Practicum Student-Individual Evaluator**
Psychological Services Center at Sam Houston State University
Huntsville, Texas

Responsibilities:

- Conduct psychodiagnostic evaluations on juveniles as ordered by the juvenile courts or probation departments from multiple surrounding counties
- Assessments included use of intelligence, achievement, and adaptive behavior measures
- Author integrated reports, and provide treatment and placement recommendations

Population: Ethnically diverse, justice-involved youth

Supervisor: Wendy Elliott, Ph.D.; Darryl Johnson, Ph.D.

August 2016 – Present

Practicum Student-Individual Therapist & Evaluator
Psychological Services Center
Sam Houston State University
Huntsville, Texas

Responsibilities:

- Provide individual evidence-based interventions to adults and families including Acceptance and Commitment Therapy (ACT), Cognitive Behavioral Therapy (CBT), components of Dialectical Behavioral Therapy (DBT), Motivational Interviewing (MI), Cognitive Processing Therapy (CPT), and supportive counseling
  - Conduct intake evaluations and author intake reports
  - Formulate detailed treatment plans and closely monitor treatment goals
  - Engage in suicide risk assessment and prevention
- Conduct comprehensive assessments utilizing methods such as clinical and collateral interviews, intelligence and achievement testing, personality and psychopathology testing, neuropsychological testing, and autism testing
  - Author comprehensive, integrated reports
  - Communicate assessment results and recommendations to clients

Population: A diverse, low-income, multi-ethnic population of children, adolescents, and adults with diagnoses including serious mental illness, substance use history, mood and anxiety disorders, personality disorders, family, and academic stress

Supervisors: Jaime Anderson, Ph.D.; Wendy Elliott, Ph.D.; Darryl Johnson, Ph.D.; Ramona Noland, Ph.D., LSSP; Chelsea Ratcliff, Ph.D.; David Nelson, Ph.D.

May 2017 – July 2018

Practicum Student – Individual Evaluator
Montgomery County Juvenile Probation Department

Conroe, Texas

Responsibilities:

- Conducted court-ordered and probation-referred psychodiagnostic and psychoeducational evaluations
- Completed semi-structured interviews with minors and their legal guardians

- Reviewed collateral information (i.e., court report information summary, probation supervision reports, etc.)
- Administered, scored, and interpreted measures assessing cognitive abilities, academic achievement, psychopathology, and personality
- Authored integrated reports of clinical findings and recommendations to assist probation department and the court in placement and probation requirement decisions

Population: Justice-involved children and adolescents either detained or on probation

Supervisor: Darryl Johnson, Ph.D.; Wendy Elliott, Ph.D.

ADDITIONAL CLINICAL/PROFESSIONAL EXPERIENCE

August 2016 **Child Attachment Interview (CAI) Training**
The Menninger Clinic
Houston, Texas

Responsibilities:
- Trained on the semi-structured measured and assessed for competence upon completion of training
- Attended a three, full-day training observing and practicing coding the CAI
- Passed three sets of CAI reliability checks to become a certified CAI coder

Supervisor: Yael Shmueli-Goetz, Ph.D.; Amanda Venta, Ph.D.

May 2013 – August 2013 **Undergraduate Intern**
Memphis Child Advocacy Center
Memphis, Tennessee

Responsibilities:
- Special projects assistant to the Executive Director, assisted in planning and implementing special events and activities
- Observed weekly case management meetings
- Observed and discussed the administration of forensic interviews
- Conducted research trends of forensic interviewing and prosecutions through the Center

Supervisor: Nancy Williams, MSW.

TEACHING EXPERIENCE

June 2018 – August 2018

Graduate Teaching Assistant
Human Neuropsychology (PSYC 7374)
Department of Psychology & Philosophy
Sam Houston State University
Huntsville, Texas

Responsibilities:

- Instructed students regarding standardized administration of various neuropsychological measures
- Supervised administration and scoring of numerous neuropsychological measures to ensure student competence upon course completion in preparation for further clinical training

Supervisor: David Nelson, Ph.D.

August 2016 – May 2017

Graduate Teaching Assistant
Introduction to Psychology (PSYC 5395)
Department of Psychology & Philosophy
Sam Houston State University
Huntsville, Texas
Course effectiveness evaluation: 4.5/5

Responsibilities:

- Developed and served as an instructor for course
- Presented weekly lectures, created and administered exams, worked with student to enhance their foundational understanding of psychology

Supervisor: Jorge Varela, Ph.D.

SUPERVISORY EXPERIENCE

May 2017 – August 2017

Peer Supervisor
Introduction to Doctoral Practicum Course (PSYC 8382)
Department of Psychology & Philosophy
Sam Houston State University
Huntsville, Texas

Responsibilities:

- Co-facilitated supervision sessions of first year doctoral students with clinic director
- Reviewed mock therapy session videos with supervisees
- Provided feedback on basic counseling skills
- Served as mock therapy client for students practicing suicide risk assessments

Supervisor: Mary Alice Conroy, Ph.D.

August 2018 – Present **Peer Supervisor**
Capstone Practicum (PSCY 8381)
Department of Psychology & Philosophy
Sam Houston State University

Responsibilities:
- Co-facilitate supervisions sessions of second-year doctoral students with licensed staff psychologist
- Review therapy and assessment session videos with supervisee and provided feedback on clinical documentation, case materials, and integrated reports
- Review and provide feedback on materials for the Capstone comprehensive exam

Supervisors: Craig Henderson, Ph.D.

RESEARCH EXPERIENCE

October 2015 – Present **Graduate Research Assistant**
Youth and Family Studies Lab
Department of Psychology and Philosophy
Sam Houston State University
Huntsville, Texas

Responsibilities:
- Code the Child Attachment Interview as a Certified Coder for various research projects examining diverse populations including inpatient adolescents and recently immigrated youth
- Provide research support through data collection and manuscript development for tenue-track psychology faculty member
- Mentor undergraduate students through the development of a research question, data analysis, and presentation of data

Supervisor: Amanda Venta, Ph.D.

July 2017 – Present **Principal Investigator**
Prospective Analysis of Linguistic Analysis as a Method for Assessing Trauma Symptoms after Hurricane Harvey among Houstonian Adults (Dissertation Project)
Department of Psychology and Philosophy
Sam Houston State University
Huntsville, Texas

Responsibilities:
- Developed a longitudinal project examining language use in trauma accounts of individuals who experienced a hurricane and if linguistic markers predicted trauma symptom change over time
- Collected data in other post-hurricane populations to determine if finding were replicated

Supervisor: Amanda Venta, Ph.D.

May 2017 – Present **Co-Principal Investigator, Graduate Research Assistant**
Houston Survivors of Human Trafficking: Service Utilization, Effectiveness, and Barriers
Department of Psychology and Philosophy
Huntsville, Texas

Responsibilities:
- Assisted in the development of project aims and methodology for a project examining the effect of human trafficking on individuals and families and service utilization of trafficking survivors
- Coordinate communication between research team and women's shelter
- In charge of managing the research team and troubleshooting project-related obstacles
- Assist in data collection

Supervisor: Amanda Venta, Ph.D.

July 2017 – Present **Graduate Research Assistant**
Psychosocial Assessment of Justice Involved Youth
Department of Psychology and Philosophy
Sam Houston State University
Huntsville, Texas

Responsibilities:
- Assist in data collection for a project examining the psychosocial factors in justice-involved youth, the impact of contact with the legal system, and subsequent outcomes
- Manage participant recruitment and consents
- Coordinate communication between youth detention facility and research team
- Assisted in preparation of conference submission and paper presentation
- Assist in managing data entry by undergraduate students

Supervisor: Amanda Venta, Ph.D.

August 2017-
August 2018

Graduate Research Assistant
The Effect of Callous-Unemotional Traits and Peer Influence on Risk-
Taking in Delinquent Adolescents
Department of Psychology and Philosophy
Sam Houston State University
Huntsville, Texas

Responsibilities:

- Managed participant recruitment and consents
- Coordinated communication between youth detention facility and research team
- Assisted in conference submission and presentation

Supervisor: Craig Henderson, Ph.D.

June 2016 –
October 2016

Graduate Research Assistant
Linguistic Markers of Trauma Symptoms Following Sexual Assault in Female Adolescent Inpatients
Department of Psychology and Philosophy
Sam Houston State University
Huntsville, Texas

Responsibilities:

- Designed and implemented statistical analyses using general linear modeling
- Authored full-length manuscript and successfully defended Master's thesis
- Authored conference submission and poster presentation

Supervisor: Amanda Venta, Ph.D.

April 2016 –
December 2016

Contract Researcher
The Lone Star Project: Study of offender trajectories, associations, and reentry
College of Criminal Justice
Sam Houston State University
Huntsville, Texas

Responsibilities:

- Conducted semi-structured interviews of Texas Department of Criminal Justice offenders as part of an NIJ-funded study exploring the implications of gang membership for prison group affiliation, recidivism, and reentry

Supervisor: Erin Orrick, Ph.D.

August 2015 – May 2016	**Graduate Research Assistant** *Resilience and Social Cognition Lab* Department of Psychology and Philosophy Sam Houston State University Huntsville, Texas
Responsibilities:	• Assisted in Hogg Foundation of Mental Health Grant research project on the effects of parental incarceration on adolescents' psychological functioning • Interviewed and assessed adolescents' executive functioning, achievement, and trauma-related symptoms • Assisted with data collection on a project examining college students' personality and psychopathy traits and executive functioning
Supervisor:	Adam T. Schmidt, Ph.D.

April 2014 – July 2015	**Undergraduate Research Assistant** *Resilience and Social Cognition Lab* Department of Psychology and Philosophy Sam Houston State University Huntsville, Texas
Responsibilities:	• Conducted literature reviews for ongoing projects • Data entry and quality control for project examining personality and executive functioning • Data entry for project tracking former offender employment outcomes
Supervisor:	Adam T. Schmidt, Ph.D.

PUBLICATIONS

Venta, A., Galicia, B., Bailey, C., Abate, A., **Marshall, K.,** Long, T**.** (2018) *Attachment and Loss in the Context of U.S. Immigration: Caregiver Separation and Characteristics of Internal Working Models of Attachment in High School Students*. Under Review, Attachment & Human Development. Manuscript under review.

Venta, A., Harmon, J., Abate, A., **Marshall, K**., & Mouton-Odum, S. (2018). *First data supporting an attachment-based model of adolescent social media use*. Child and Adolescent Mental Health**.** Manuscript Accepted.

Marshall, K. Gusler, S., Eshelman., L. (2018). *Say What? What Linguistic Analysis of Trauma Narratives Can Contribute to the Assessment and Prediction of Trauma Symptoms.* Division 56 Trauma Newsletter Fall Issue.

Marshall, K., Abate, A., & Venta, A. (2018) *Posttraumatic stress symptoms and recidivism in serious juvenile offenders: The moderating role of future orientation*. Journal of Child and adolescent Trauma. In Press.

Marshall, K., Henderson, C., Barker, M., Sharp, C., and Venta, A. (2017). *Linguistic Analysis as a Method for Assessing Symptoms after Sexual Trauma among Adolescent Inpatients.* Journal of Child Sexual Abuse.

Abate, A., **Marshall, K. K**., Sharp, C., and Venta, A. (2017). *Trauma and aggression: Investigating the mediating role of mentalizing in female and male inpatient adolescents.* Child Psychiatry & Human Development.

CONFERENCE PAPER AND POSTER PRESENTATIONS

Marshall, K., Abate, A., Mollenkopf, K., Ney, L., Frazier, B., Venta, A. (2019, March). *Linguistic Analysis of Probation Officers' Court Summary Notes: Differences by Juveniles' Race/Ethnicity.* Paper accepted to the annual convention of the American Psychology Law Society, Portland.

Mattos, L., **Marshall, K**., Christiansen., M., Ryan, L., Henderson, C. (2019, March). *Risky by Association? The Effect of CU Traits and Peers on Risk-Taking in Delinquent Youth*. Data Blitz accepted to American Psychology-Law Society Annual Conference, in Portland, Oregon.

Marshall, K., Abate, A., & Venta, A. (2018, November). *Houston Strong:* Linguistic Markers of Resilience after Hurricane Harvey. Paper presented at the annual convention of the Texas Psychological Association, Frisco, Texas.

Marshall, K., Abate, A., Briones, M.,Venta, A. (2018, March). *The Mediating Role of Hypermentalizing in the Link between Peer attachment and Cyber Aggression.* Poster presented at the annual convention of the American Psychology Law Society, Memphis.

Marshall, K., Abate, A., Godinez, E., & Venta, A. (2017, November). *The moderating role of future orientation in the association between trauma and aggressive recidivism*. Poster submitted to the annual convention of the Texas Psychological Association, Houston.

Marshall, K., Abate, A., & Venta, A. (2017, August). *Trauma and recidivism in serious juvenile offenders: The moderating role of future orientation*. Poster accepted to the annual convention of the American Psychological Association, Washington D.C.

Marshall, K., Long, T., Abate, A., Barker, M., Henderson, C., Venta, A. (2017). *First data on linguistic analysis as a method for assessing symptoms after sexual trauma in adolescents.* Poster presented at the annual convention of the American Psychology Law Society, Seattle.

Abate, A., Harmon, J., **Marshall, K**., Hart, J., Ball, E., Henderson, C., Desforges, D., & Venta, A. (2017). *Perceptions of the legal system and recidivism: Investigating the mediating role of perceptions of chances for success in juvenile offenders*. Paper presented at the annual convention of the American Psychology Law Society, Seattle.

Marshall, K., Abate, A., Hart, J., Venta, A. (2016, November) *Mentalizing and Adolescent Psychopathology.* Paper presented at the annual convention of the Texas Psychological Association, Austin.

Abate, A., **Marshall, K**., Sharp, C., & Venta, A. (2016, November). *Trauma and aggression: Investigating the mediating role of mentalizing in female and male inpatient adolescents.* Paper presented at the annual convention of the Texas Psychological Association, Austin.

Abate, A. C., **Marshall, K. K.**, Sharp, C., & Venta, A. (2016, August). *Trauma and aggression: Investigating a moderating role of hypermentalizing in inpatient adolescents*. Poster presented at the annual convention of the American Psychological Association, Denver.

Hoskowitz, N.A., Schmidt, A. T., **Marshall, K. K**., Harmon, J., & Henderson, C. E. (2016, March). *Psychotropic medication does not decrease delinquent behaviors in at-risk youth over a five year period*. Paper presented at the American Psychology- Law Society Conference, Atlanta, GA.

Ridge, B. E., Pennington, C. R., Bryson, C. N., McCallum, K. E., **Marshall, K. K**., & Schmidt, A. T. (2016, February). *Connecting the dots: Relating executive dysfunction to the externalizing spectrum of psychopathology*. Poster presented at the International Neuropsychological Annual Meeting, Boston, MA.

Pennington, C. R., **Marshall, K. K**., Bryson, C. N., McCallum, K. E., Ridge, B. E., Cheiffetz, R. T., Stanford-Galloway, P., & Schmidt, A. T. (2016, February). *The role of executive functions in externally-valid decision-making processes*. Poster presented at the International Neuropsychological Society annual meeting, Boston, MA.

Formon, D. L**.**, Schmidt, A. T., **Marshall, K.,** & Camins, J. S. (2015, August). *Dollars-and-cents differences in ex-offender employment outcomes.* Poster presented at the APA Annual Conference. Toronto, Ontario.

Pennington, C.R., Schmidt, A.T., Bryson, C.N., Ridge, B.E., McCallum, K.E., **Marshall, K.K**., & Cheiffetz, R.T. (2015, March). *The Triarchic Conceptualization of Psychopathy and the Five Factor Model of Personality in a Diverse College Sample.* Poster presented to the Conference of the American Psychology-Law Society.

Pennington, C. R., Schmidt, A. T., Ridge, B. E., McCallum, K. E., Bryson, C. N., **Marshall, K. K**., & Cheiffetz, R. T. (2015, February). *Personality traits influence processing speed performance in a neurologically intact population.* Poster presented at the International Neuropsychological Society annual meeting, Denver, CO.

PROFESSIONAL SERVICE AND LEADERSHIP

May 2017 – Present
Student Publications Subcommittee Member
Trauma Psychology Newsletter
APA Division 56 Trauma Psychology

Responsibilities:
- Serve as a member of the subcommittee which reviews, selects, and edits articles for the Student Spotlight section
- Mentor student authors through the manuscript development and revision process
- Collaborated with other subcommittee members to write an article for the Fall 2018 edition

Supervisor: Viann Nguyen-Feng, M.A., Colin Mahoney, Ph.D.

June 2017 – May 2018
Student Extern
Sam Houston Area Psychological Association
The Woodlands, Texas

Responsibilities:
- Organized, advertised, and attended monthly meetings and professional development presentations/discussions
- Coordinated meeting meals and maintained and recorded the related budget

Supervisors: Wendy Elliott, Ph.D. & Craig Henderson, Ph.D.

August 2015 – August 2016
Sam Houston State University Campus Representative
APA Division 41- American Psychology-Law Society
Sam Houston State University
Huntsville, Texas

Responsibilities:
- Disseminated information to students and faculty from a professional organization

- Acted as liaison between doctoral program, professional organization, and other entities with psycholegal interests
- Coordinated and planned the Sam Houston State University Social at the Annual AP-LS convention

Supervisor: Beverly Henkel, M.A.

January 2015 – May 2015 **Secretary**
Graduate Student Psychology Organization
Department of Psychology and Philosophy
Sam Houston State University
Huntsville, Texas

Responsibilities:
- Recorded and maintained organization meeting minutes
- Disseminated information to students about organization events
- Participation in two full-day leadership seminar
- Assisted with coordination of community service with a local nonprofit organization (i.e., Hospitality House)

Supervisor: Craig Henderson, Ph.D.

PROFESSIONAL DEVELOPMENT

May 2018 *Critical Thinking in Forensic Psychological Evaluations*
Sam Houston State University
Terry Kukor, Ph.D., ABPP

April 2018 *Gender Diverse Youth: Beyond the Binary*
Sam Houston State University
Megan Mooney, Ph.D.

June 2017 – May 2018 *Monthly Professional Development Presentations*
Sam Houston Area Psychological Association
Topics included:
- Texas Psychological Association Legislative Update
- Barriers to Treatment for Visible Ethnic/Racial Minority Groups
- Working with LGBT Clients
- Working with Religiously Diverse Clients
- Psychologists' Role in Responding to Gun Violence

July 2017 *Motivational Interviewing: Clinical Skills Workshop*
Sam Houston State University
Joseph Mignogna, Ph.D.

May 2017 *Haven Diversity Advocate Training*

	Training for advocating for LGBTQ+ clients Michelle Stone, Psy.D.
April 2017	*Indispensable Forensic Psychology in the Age of Neuroscience* Sam Houston State University Steven J. Morse, J.D., Ph.D.
November 2016	*Getting it Wrong about Miranda Rights: Research on Myths and Misconceptions* Sam Houston State University Richard Rodgers, Ph.D., ABPP
August 2016	*Caring for Our Veteran's Mental Health and the VA* Sam Houston State University Joseph Mignogna, Ph.D.
August 2015 – May 2016	*Monthly Seminar on Clinical Supervision* Mary Alice Conroy, Ph.D., ABPP & Jorge Varela, Ph.D.
April 2016	*Advancing Recidivism Reduction Efforts: RNR Simulation Tool* Sam Houston State University Faye S. Taxman, Ph.D.

Specialty Coursework: Forensic Assessment I & II; Mental Health Law, Human Neuropsychology

REVIEWING EXPEREINCE

2018	Psychological Trauma: Theory, Research, Practice, and Policy, AD Hoc Reviewer Impact Factor, 2.673
2017	Psychopathology, AD Hoc Reviewer Impact Factor, 1.604

HONORS, AWARDS, & SCHOLARSHIPS

November 2016, 2017, 2018	SHAPA Travel Award
August 2017	APA Student Travel Award
Spring 2017	Outstanding Graduate Student Organization
March 2017	AP-LS Conference Student Travel Award
August 2011-May 2014	Athletic Soccer Scholarship

Spring 2014	Who's Who among American Universities and Colleges
Fall 2013- Spring 2014	Psi Chi Honor's Society
Fall 2014	Alpha Chi Honor Society
August 2013	University Transfer Scholarship (3.5-3.99 GPA), Sam Houston State University
August 2013	Elliot T. Bowers Honors Program, Sam Houston State University
August 2011-May 2013	Helen Hardin Honors Program, University of Memphis
Fall 2011	Tiger Top 30
Fall 2011	Emerging Scholars Honor, University of Memphis
Fall 2011	Provost Scholarship, University of Memphis

PROFESSIONAL MEMBERSHIPS

2018 – Present	Division 56 of the APA, Trauma Psychology
2016 – Present	Texas Psychological Association
2015 – Present	American Psychology-Law Society
2015 – 2018	American Psychological Association
2017 – 2018	Sam Houston Area Psychological Association