

2009

Posttraumatic Stress Disorder in women after Hurricane Katrina: predictors and symptom endorsement

Julia E. Thompson

Louisiana State University and Agricultural and Mechanical College, jtho143@tigers.lsu.edu

Follow this and additional works at: https://digitalcommons.lsu.edu/gradschool_theses



Part of the [Psychology Commons](#)

Recommended Citation

Thompson, Julia E., "Posttraumatic Stress Disorder in women after Hurricane Katrina: predictors and symptom endorsement" (2009). *LSU Master's Theses*. 4026.

https://digitalcommons.lsu.edu/gradschool_theses/4026

This Thesis is brought to you for free and open access by the Graduate School at LSU Digital Commons. It has been accepted for inclusion in LSU Master's Theses by an authorized graduate school editor of LSU Digital Commons. For more information, please contact gradetd@lsu.edu.

POSTTRAUMATIC STRESS DISORDER IN WOMEN AFTER HURRICANE
KATRINA: PREDICTORS AND SYMPTOM ENDORSEMENT

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Arts

in

The Department of Psychology

by
Julia E. Thompson
B.A., University of Arkansas at Little Rock, 2006
December 2009

Table of Contents

List of Tables.....	iv
Abstract.....	v
Introduction.....	1
Definitions of Posttraumatic Stress.....	2
Current Controversies.....	4
Recommendations for <i>DSM-V</i>	6
Prevalence and Predictors.....	7
Hurricane Katrina.....	10
Current Study and Hypotheses.....	11
Method.....	13
Participants.....	13
Measures.....	15
Questionnaire of Hurricane Related Information-Parent.....	15
Posttraumatic Stress Diagnostic Scale.....	15
Procedures.....	16
Results.....	18
Missing and Excluded Data.....	18
Rates of Trauma Endorsement.....	18
PTSD Symptom Severity over Time.....	18
Symptom and Criteria Endorsement.....	21
Zero-Order Correlations for T1 Posttraumatic Stress Symptom Severity.....	23
Regression Analysis for T1 Posttraumatic Stress Symptom Severity.....	24
Zero-Order Correlations for T2 Posttraumatic Stress Symptom Severity.....	24
Hierarchical Regression Analysis for T2 Posttraumatic Stress Symptom Severity.....	25
Discussion.....	28
The Trauma Criterion.....	28
Individual Symptom and Criterion Endorsement.....	29
Changes in PTSD Severity Levels over Time.....	31
Predictors of PTSD Symptom Severity over Time.....	32
Limitations and Future Directions.....	33
References.....	34
Appendix A: Consent Form.....	39
Appendix B: Demographic Questionnaire.....	41

Appendix C: Questionnaire of Hurricane Related Information--Parent.....	45
Vita.....	47

List of Tables

Table 1: <i>DSM-IV-TR</i> Diagnostic Criteria (A-D) for PTSD.....	3
Table 2: Comparison of Demographic Data between Displaced and Non-Displaced Participants.....	14
Table 3: Type of Trauma Endorsed.....	19
Table 4: PTSD Symptom Severity by PTSD Criteria across T1 and T2.....	20
Table 5: Individual Symptom Description and Endorsement.....	22
Table 6: Percentage of Participants Who Met Each Criterion.....	23
Table 7: T1 (4-7 months post-hurricane) Zero-Order Correlations Among all Variables.....	24
Table 8: Simultaneous Regression Analysis Evaluating Predictors of PTSD Symptom Severity at T1.....	25
Table 9: T2 (14-17 months post-hurricane) Zero-Order Correlations Among all Variables.....	25
Table 10: Hierarchical Regression Analysis Evaluating Predictors of PTSD Symptom Severity at T2.....	26

Abstract

Hurricane Katrina devastated areas of New Orleans and caused the evacuation of most of the city's residents. Many people were exposed to dangerous storms and flooding and lost many of their possessions. One of the most common psychological disorders following a disaster is Posttraumatic Stress Disorder. This study describes the PTSD symptom endorsement of a sample of women who experienced Hurricane Katrina. In addition, many of these women had previous trauma histories which are also described. Participants included 287 women from New Orleans, Jefferson and East Baton Rouge Parish recruited for a larger study on mother's and children's psychological functioning in the aftermath of Katrina. Participants completed the Posttraumatic Stress Diagnostic Scale and a hurricane exposure questionnaire at 4-7 months (T1) and 14-17 months (T2) post-Katrina. Trauma history, hurricane exposure and demographic variables such as race, income and education were entered into a regression analysis to predict PTSD symptom severity at Time 1. These variables and PTSD symptom severity at T1 were entered into a second regression analysis to predict PTSD symptom severity at T2. At T1, hurricane exposure, trauma history and education predicted T1 PTSD symptom severity. At T2, only T1 PTSD symptom severity was significantly predictive of T2 PTSD symptom severity. Results of the analyses and the description of symptom endorsement are discussed in light of current criticisms about the conceptualization of PTSD.

Introduction

Natural disasters often have devastating consequences including psychological distress. Although most people who experience a natural disaster do not suffer long term psychological consequences, there is a significant minority who will (Breslau, 2002a; Galea, Tracy, Norris & Coffey, 2008). One of the most common psychological disorders experienced by disaster victims is Posttraumatic Stress Disorder (PTSD; Norris, 1992; Brewin, Andrews, and Valentine, 2000; Breslau, 2002a; Acierno et al., 2007). Several variables are associated with increased symptoms of PTSD including female gender, lower socioeconomic status, multiple trauma exposure and degree of disaster exposure (Breslau, 2002b; Norris, Friedman, Watson, Byrne, Diaz & Kaniasty, 2002). Information provided by women affected by Hurricane Katrina allows a unique opportunity to explore these predictors and symptomatic experience.

Although it is easy to assume that experiencing a natural disaster would be the most salient trauma to its victims, this may not be the case when multiple traumas are present. It is important to understand trauma history prior to a natural disaster in order to best account for disaster related trauma (Banyard, Williams & Siegal, 2001; Frazier et al., 2009; North, Suris, Davis, & Smith, 2009). The purpose of this study is to evaluate the role of trauma history and hurricane exposure in PTSD severity in women following Hurricane Katrina. In addition, many victims of Katrina were minorities and of low socioeconomic status. Studies have shown that these factors are related to higher rates of PTSD (Adams & Boscarino, 2005; Norris, 1992; Perilla, Norris & Lavizzo, 2002; Pole, Gone & Kulkarni, 2008) Also, an evaluation of PTSD symptom endorsement may be useful in understanding how this sample experienced psychopathology after a disaster. This study reviews the literature on symptoms and predictors of PTSD and the impact of Hurricane Katrina on the development of symptoms of PTSD.

Definitions of Posttraumatic Stress

The definition and conceptualization of PTSD has evolved in the past several decades. In the initial *Diagnostic and Statistical Manual of Mental Disorders, 1st edition (DSM-I; APA, 1952)*, the symptoms associated with a traumatic event were diagnosed as a gross stress reaction. The literature surrounding gross stress reactions developed out of symptoms seen in returning World War I and World War II veterans (Andreasen, 2004; Archibald, Long, Miller & Tuddenham, 1962). Symptoms such as amnesia, startle reactions and dissociation were associated with the disorder. *DSM-II* (APA, 1968) omitted gross stress reaction as a diagnosis only to reincorporate the associated symptoms under PTSD in *DSM-III* (APA, 1980). PTSD continued to be diagnosed primarily among veterans who reported intense arousal and vivid images or “flashbacks” of events that occurred during their tour of duty, but evidence was accumulating for the presence of PTSD among civilians. The *DSM-III* incorporated non-combat related traumatic events with the caveat that they be outside the realm of normal human experience (Andreasen, 2004). The *DSM-IV-TR* continued the trend of incorporating non-combat traumas but broadened the criteria to include more common traumatic experiences (Friedman, Resick, & Keane, 2007).

The current definition of PTSD, according to the *DSM-IV-TR*, is summarized in Table 1. In addition to experiencing a traumatic event (Criteria A1 and A2), a diagnosis of PTSD is based on five additional criteria. Criteria B, C, and D are categories based on specific symptom clusters: Recurrent thoughts and experiences (Criterion B); avoidance or numbing (Criterion C); and increased arousal (Criterion D; See Table 1 for a list of specific symptoms). These symptoms must be present for at least 1 month (Criterion E) and cause significant impairment in daily functioning (Criterion F; APA, 2000).

Table 1. DSM-IV-TR Diagnostic Criteria (A-D) for PTSD*

Criterion A	1. The person experienced, witnessed or was confronted with an event that involved actual or threatened death or serious injury to self or others.
(Must have experienced both symptoms)	2. The person's response involved intense fear, helplessness or horror.
<hr/>	
Criterion B	1. Recurrent thoughts, images or perceptions
(Must have experienced at least 1 symptom)	2. Recurrent dreams
	3. Acting or feeling as if the traumatic event were reoccurring.
	4. Intense psychological distress to internal or external cues that resemble the event.
	5. Physiological reactivity when exposed to internal or external cues that resemble the event
<hr/>	
Criterion C	1. Effort to avoid thoughts, feelings or conversations about the trauma
(Must have experienced 3 or more symptoms)	2. Efforts to avoid activities, people or places that arouse recollections of the trauma
	3. Inability to recall important aspects of the trauma
	4. Diminished interest or participation in significant activities
	5. Feeling of detachment from others
	6. Restricted range of affect
	7. Sense of foreshortened future

(table con't.)

Criterion D	1. Difficulty falling or staying asleep
(Must have experienced	2. Irritability or outbursts of anger
2 or more symptoms)	3. Difficulty concentrating
	4. Hypervigilance
	5. Exaggerated startle response

*Note: According to the Diagnostic and Statistical Manual of Mental Disorders-IV-TR (APA, 2000).

Current Controversies

Several researchers have taken issue with the way PTSD is currently conceptualized in the *DSM-IV-TR* (Bodkin, Pope, Detke & Hudson, 2007; McNally, 2009; North et al., 2009; Spitzer, First, & Wakefield, 2007). Areas of debate include the wide variety of experiences encompassed by the definition of trauma, the assumption of causality between the stressor and the resulting disorder, and the high rate of false-positive diagnoses.

Because much of the early literature on PTSD developed out of research of returning veterans, the trauma criterion generally meant experiencing war (Andreasen, 2004; Archibald et al., 1962). Authors of the *DSM-IV* wanted to maintain the distinction that PTSD was related to a traumatic event, but expand the definition to include modern research showing PTSD symptoms occurring in common situations (Spitzer, 2007). As a result of the expanded definition, researchers studying prevalence rates have found samples where as many as 89.6% of adults have experienced a trauma (Breslau, 2002a). McNally (2007 & 2009), however, believes this is a result of “conceptual bracket creep” which is the over-expansion of the definition of trauma (McNally, 2007 & 2009). Specifically, McNally argues that by including not only events that a person directly experiences or witnesses, but also events a person is “confronted with” broadens the definition to include indirectly experienced traumatic events (Suvak, Maguen, Litz, Silver,

Holman, 2008; Zimering, Gulliver, Knight, Munroe & Keane, 2005). Including such a wide array of experiences prevents inquiry into research questions about psychobiological mechanisms associated with trauma experience because the population under investigation would be too heterogeneous to draw any valid conclusions (McNally 2009).

This issue was highlighted in a study on the September 11th, 2001 attacks on the World Trade Center. Many people in New York could see the destruction of the twin towers from miles away, and most of the nation saw eye-witness accounts on television which would qualify as being confronted with an event involving actual death. In fact, researchers found that hours of television coverage was predictive of PTSD symptom levels (Schlenger et al., 2002), but critics like McNally argue that exposure to a traumatic event via television is going too far. In addition, traumatic experiences under the current DSM definition have included many common negative events such as hearing about the death of a loved one, experiencing dental surgery or going through a divorce (Mol et al., 2005). This, however, is an overly broad interpretation of the A1 Criterion which, McNally (2009) argues, was not the original intention of the DSM-IV authors.

A second issue with the trauma criteria is the assumption of causality between the specific stressor and the resulting symptoms (North et al., 2009). Posttraumatic Stress Disorder is one of only a few disorders where etiology (in this case the trauma), in addition to symptomatic presentation, is necessary for diagnosis. North and colleagues (2009) report that the current definition of PTSD is vague as to the relationship between trauma and the resulting disorder. The DSM-IV, diagnostic criteria indicate symptoms need only occur following a traumatic event implying a temporal, but not causal, relationship. However, later, the text refers to symptom characteristics, “resulting from” the event (p. 463) which implies a causal link between trauma and symptoms. North and colleagues do not imply that all attempts at creating a causal link between the traumatic event and subsequent symptoms should be removed, as this would lead to

the need for a diagnosis of what they jokingly refer to as, “nonstressor stress disorder” (p. 36). Instead, they caution against using a simple model of causation whereby an individual traumatic event causes subsequent symptoms.

A third point of contention is the high rate of false positive diagnoses. Bodkin and colleagues (2007) found in a group referred for depression and PTSD, 78% of participants who were judged as having experienced a traumatic event were found to meet diagnostic criteria for PTSD. More importantly, 78% of participants who had not experienced a traumatic event also met all other criteria for PTSD. Bodkin and colleagues (2007) argue that this high incidence of PTSD without a definable stressor is a result of the non-specificity of many PTSD symptoms. Symptoms such as sleep disturbances, difficulty concentrating, and irritability are common to other disorders such as anxiety and depression which limits the specificity of the diagnosis (Brunello et al., 2007). In addition, most people report intrusive thoughts, distressing dreams, or efforts to avoid situations that recall the stressful event when experiencing sub-syndromal stressors like difficulty at work or an upcoming stressful event. This brings into question both the applicability of those symptoms and the utility of the trauma criterion (Bodkin et al., 2007).

Recommendations for *DSM-V*

With a new edition of the DSM in development, several authors have made recommendations for revising the criteria for PTSD—many revolving around the trauma criterion. One recommendation is a narrower definition of a traumatic event including only those events directly experienced or witnessed, and to remove the additional phrasing “confronted by” to prevent diagnosis based on indirect experience (McNally, 2009; Spitzer, 2007). A second recommendation, by Maier (2007) as cited by North and colleagues (2009) is to conceptualize PTSD as a “multifactorial disorder” that takes into account pre, peri-, and post event factors when determining the link between trauma and subsequent symptoms.

Authors also have recommended raising the diagnostic threshold to improve the specificity of the diagnosis either by removing certain non-specific symptoms or increasing the threshold for symptom severity (McNally, 2009; North et al., 2009; Spitzer, 2007). Spitzer (2007), for example, recommends that symptoms be beyond the severity of everyday negative experiences and linked to a specific trauma through trauma specific cues. McNally (2009) proposes to remove the phrasing, “clinically significant distress” from the functional impairment criterion (Criterion F), leaving, “impairment in social, occupation or other important areas of functioning” (p. 486; See also, McHigh and Triesman, 2007; North et al., 2009).

Prevalence and Predictors

Although the current diagnostic criteria for PTSD has resulted in a high prevalence rate for experiencing a trauma, the prevalence rate for developing PTSD is much lower. Rates of PTSD range from five-six percent in men and 10-14% in women (APA, 2000). Unfortunately, for those who develop PTSD following a disaster there are serious physical and mental implications including a lower quality of life and poorer physical health (Green, Lindy, Grace, & Leonard, 1992; Zoellner, Goodwin, & Foa, 2000).

Studies have found that PTSD symptoms tend to diminish over time; however, a small subset of victims continues to show symptoms months and years after the event. Galea et al. (2003) reported that in a demographically representative sample of over 1,000 participants who experienced the September 11th, 2001 terrorist attacks, almost 25% of participants endorsed clinical or subclinical levels of PTSD one month after the attack, but only 5.3% experienced symptoms six months after the attack. Likewise, 6% of victims of an avalanche experienced PTSD symptoms two weeks post-event, but only 3% were still experiencing significant symptoms after 4 months (Johnsen, Eid, Lovstad, Michelsen, 1997).

Past studies have examined many variables predictive of PTSD. According to Freedy, Resnick and Kilpatrick (1992), PTSD predictors can be divided into three categories: pretrauma, peri-trauma and posttrauma. Pretrauma variables include demographic variables. For example, although men are more likely to experience a traumatic event, women are more likely to report clinically significant symptoms of PTSD (Aksaray, Kortan, Erkaya, Yenilmez, Kaptanoglu, 2006; Breslau, 2002b; Pulcino, Galea, Ahern, Resnick, Foley & Vlahov, 2003).

The types of trauma associated with men and women, also tend to differ. Women are more likely to experience sexual assault or intimate partner violence, whereas men are more likely to experience violent physical assault and motor vehicle accidents (Breslau, Davis, Andreski, Peterson, and Schultz, 1997; Breslau, Chilcoat, Kessler, Peterson, and Lucia, 1999; Tolin & Foa, 2006). The type of trauma typically experienced by men versus women does not account for the gender differences in PTSD rates. Breslau (2002b) found that in a matched sample of assault victims, 36% of women were diagnosed with PTSD while only 6% of men received the diagnosis. Reasons for the gender differences are unclear, but women seem to be at increased risk for the development of PTSD after a traumatic event.

Previous trauma exposure also predicts PTSD resulting from a secondary event. A study of a large sample of participants (n=2368) living in New York City on September 11th, 2001 found that symptoms of PTSD after the World Trade Center attacks were predicted in part by past traumas (Adams & Boscarino, 2006). In general, prior trauma shows a modest ability to predict subsequent PTSD symptoms; however, severe prior trauma (higher exposure), multiple traumas, and childhood trauma seem to exacerbate future PTSD symptoms. (Banyard et al., 2001; Brewin et al., 2000).

The literature is inconsistent as to whether race predicts PTSD. In a review of the disaster literature, Norris, Friedman, Watson, Byrne, Diaz, & Kaniasty (2002) found that people

of minority status generally higher rates of PTSD than those of majority status. For example, white males were more likely to experience a traumatic event, but African American males were more likely to present with PTSD (Norris, 1992). Some researchers, however, have found increased rates of PTSD in Latinos compared to that of African Americans or Caucasians (Adams, 2006). This finding, however, does not rule out differences altogether. Some evidence suggests that African Americans may endorse more PTSD symptoms but not have higher diagnostic rates (Zayfert, 2008; Pole, Gone & Kulkarni, 2008).

Race is strongly linked to socioeconomic status (SES). The correlation between low SES and minority status makes it difficult to pinpoint whether race, poverty or both contribute to the prediction of PTSD in trauma victims. Low SES status also is associated with increased risk for PTSD, so it is possible that both ethnicity and SES contribute to a higher incidence PTSD (Rivera and Miller, 2007). This can be mitigated somewhat by controlling for education and income levels which has not been consistently seen in the literature.

Peri-trauma predictors refer to factors that occur during or as a direct and immediate result of the traumatic event. Severity of traumatic exposure is the primary example. Many variables have been used to evaluate the construct of exposure such as proximity to the disaster, financial loss, exposure duration, perceived safety, degree of injury and loss of loved ones (Acierno et al., 2007; Chung, Dennis, Easthope, Werrett, & Farmer, 2005). Perception of life-threat consistently is a strong predictor of PTSD irrespective of the type of traumatic event, but other variables differ depending on the trauma. The degree of trauma severity related to an assault may depend on whether a weapon was used, the duration of the assault, or whether or not the victim knew the assailant. In contrast, trauma severity in a disaster situation may be better operationalized by the length of displacement, financial impact, and the amount of devastation to one's family or community. No matter how exposure is operationalized, however, severity levels

consistently predict future psychological outcomes (Norris et al., 2002). Another peri-trauma predictor is the perception of fear and danger. Those who report higher rates of fear during the traumatic event are more likely to have subsequent symptoms of PTSD (Tucker, Pfefferbaum, Nixon, Dickson, 2000).

Posttrauma predictors reflect variables that have a continuing impact once the initial threat has passed. Variables such as continued financial strain, chronic re-exposure and chronic health problems exacerbate negative outcomes of exposure to a natural disaster (Norris, Slone, Baker, and Murphy, 2006). While these are important factors in assessing the long-term impact of a traumatic event, they will not be the focus of the current study.

Hurricane Katrina

Hurricane Katrina struck the gulf states of Alabama, Mississippi and Louisiana on August 29th, 2005 creating one of the worst natural disasters in the history of the United States. In addition to the hurricane force winds that roared through New Orleans, the flooding caused by breaches in the levy system caused billions of dollars in damage, over 1600 deaths and the evacuation of over two thirds of the New Orleans Metropolitan area (U.S. Census Bureau, 2006). Families were separated during the chaos of evacuation, and those stranded by the flooding were forced to endure temperatures exceeding 90°F in deplorable conditions. While damage was, certainly, the most severe in New Orleans, the surrounding parishes also endured severe storms and the resulting damage. Many of the hardest hit were low income minority families who could least afford the devastation to their homes and livelihood (Chen et al., 2007).

Research is beginning to emerge in the aftermath of Katrina. Initial studies have looked at prevalence rates of psychological disorders and found elevated rates of PTSD ranging from 14.9%-30.3% (Galea et al., 2007; Galea, et al., 2008; Kessler et al., 2008). Kessler and colleagues (2008) found that rates of PTSD increased over time; baseline prevalence was 14.9%

(five to eight months post-Katrina), but follow-up rates were 20.9% when measured one year post-Katrina. In addition, hurricane exposure also was predictive of PTSD symptoms (Galea et al., 2007).

The effects of Hurricane Katrina were particularly severe on low-SES families living in the most vulnerable areas of New Orleans (Bourque, Siegel, Kano & Wood, 2006). Also, historically, New Orleans has had a high African American population. Both low income and minority status make Katrina victims a unique and especially vulnerable sample that has not been well researched in the disaster literature (Chen et al., 2007).

Current Study and Hypotheses

The purpose of this study is to evaluate variables predicting PTSD in women affected by Hurricane Katrina. Predictors of PTSD include: demographic characteristics such as race, education level and income level, level of hurricane exposure (life-threatening events and loss due to Katrina), and trauma history. These variables are compared over two time periods, first from four to seven months post-Katrina and then 14-17 months post-Katrina.

In addition, an evaluation of symptoms related to PTSD is reported for the women living in Orleans and Jefferson Parish who were most severely affected by Hurricane Katrina. This evaluation includes symptom endorsement and trauma history. The location from which the sample was drawn is comprised of a large percentage of low-income African Americans who were displaced from their homes. This sample may have been uniquely impacted by Hurricane Katrina, and their outcomes related to PTSD may also be unique.

Last, this study evaluates PTSD symptom severity at four to seven months and 14-17 months post-Katrina in order to assess the stability of PTSD symptoms over time. The following hypotheses are put forth in this study:

1. Hurricane exposure, trauma history, and minority status will positively predict PTSD symptom severity among women impacted by Hurricane Katrina while income and education levels will negatively predict PTSD symptom severity.
2. PTSD symptom severity will decrease between T1 (4-7 months post-Katrina) and T2 (14-17 months post-Katrina).
3. PTSD at T1 will be predictive of PTSD at T2, but previous predictors from T1 (hurricane exposure, prior trauma history, income, education and minority status) will not be as strongly related to PTSD at T2 and may change altogether.
4. No hypotheses are put forth regarding the type and frequency of symptom endorsement or traumatic events endorsed by this sample of women, but an in-depth description is provided in light of the criticisms of the current *DSM-IV* diagnostic criteria for PTSD and with reference to recommendations for the *DSM-V*.

Method

Participants

For purposes of the analysis of trauma endorsement, symptom endorsement, criteria endorsement and rates of PTSD symptom severity, only women who were displaced as a result of Hurricane Katrina were included. This includes women from Orleans and Jefferson Parish (n=223). Descriptive statistics, (frequency, mean, median, standard deviation and percentages) were used to describe demographic characteristics of the study such as age, race, income and education of participants. Of this sample, 66.4% were African American, 25.1% were Caucasian, 4.4% were Asian, 2.6% were Hispanic and 1.3% were of other races/ethnicities, and the mean age was 39 years. Median income was below \$25,000 and median education included partial completion of college.

A second sample of women was obtained as a comparison sample. These women lived in East Baton Rouge Parish and were not displaced from their homes during Hurricane Katrina. The two samples were combined in the regression analyses to increase the variability of hurricane exposure as a predictor of PTSD symptom severity. The displaced sample and non-displaced sample did not differ significantly on demographic characteristics except education level which was marginally significant $t(277)=2.090, p=.038$. Median education level was partial completion of college for both groups. The displaced group showed significantly higher levels of hurricane exposure ($M=5.62$) than the non-displaced group ($M=1.55$) as measured by their total score on the hurricane exposure questionnaire, $t(231)= -9.578, p<.001$. The combined sample consisted of 287 women. Additional demographic data of the combined, displaced and non-displaced sample are described in Table 2. In addition, because so few non-African American minority women participated, the race variable was collapsed into Caucasian and non-Caucasian for all further analyses.

Table 2. Comparison of Demographic Data between Displaced and Non-Displaced Participants

	Entire Sample n=287	Displaced n=223	Non-Displaced n=64	Comparison Statistic	Significance Level
Age (in years)	M=39 (SD=7.53)	M=39.06 (SD=7.69)	M=38.95 (SD=7.23)	$t(278) = -.095$	<i>n.s</i>
Race				$t(285) = -1.516$	<i>n.s</i>
Caucasian	76	56	20		
African American	190	148	42		
Asian	12	10	2		
Hispanic	6	6	0		
Other	3	3	0		
Education				$t(277) = 2.090$	$p = .038$
6th grade or less	1	1	0		
Junior high	5	3	2		
Partial high school	33	27	6		
High School Grad	76	67	9		
Some College	99	73	26		
College Grad	45	32	13		
Graduate Degree	19	12	7		
Income Prior to Hurricane				$t(264) = .919$	<i>n.s</i>
\$0-4,999	40	36	4		
\$5,000-9,999	32	21	11		
\$10,000-14,999	28	22	6		
\$15,000-24,999	39	30	9		
\$25,000-34,999	38	32	6		
\$35,000-49,999	27	23	4		
\$50,000-74,999	41	27	14		
\$75,000-99,999	13	10	3		
\$100,000 +	7	6	1		
Marital Status				$t(278) = 1.595$	<i>n.s</i>
Never Married	87	68	19		
Married	125	102	23		
Separated	22	16	6		
Divorced	41	28	13		
Widowed	5	3	2		

Measures

Demographic information was collected (age, race, marital status and education), as well as information about pre-Katrina and post-Katrina income and employment status (See Appendix B for more detail).

Hurricane Exposure Questionnaire

Hurricane impact was measured in adults using a hurricane exposure questionnaire. This questionnaire was based on a parallel children's exposure questionnaire developed by Vernberg, LaGreca, Silverman, & Prinstein (1996). Exposure variables such as lack of housing, damage to property, out-of-pocket expenses and life-threatening or dangerous experiences during and immediately after the storm were measured. In addition, questions about subjective fear were also measured. Two main factors were derived from this scale, life-threat and loss/disruption (See Appendix C). This measure has shown good reliability in child samples (Vernberg et al, 1996; La Greca, Vernberg, Silverman, Vogel, & Prinstein, 1996), but is new to the adult literature. For the purposes of this study, the two factors, life-threat and loss/disruption were combined to increase internal consistency. Alpha for the total score was .805 for the total sample indicating good reliability.

Posttraumatic Stress Diagnostic Scale

The Posttraumatic Stress Diagnostic Scale is a 49 item, self-report questionnaire that assesses PTSD symptom severity and parallels *DSM-IV-TR* diagnostic criteria (PDS; Foa, 1995). Items are rated according to symptom endorsement, severity, and duration using a multiple-choice or yes/no response format. Items 1-14 prompt respondents to describe both the number and type of traumatic events that have been experienced in their lifetime. Item 15 assesses length of time since the most recent trauma. Items 16-21 assess via a yes/no format whether the

participant experienced *DSM-IV-TR* criteria A1 and A2 (actual or threatened death or injury and helplessness or horror).

Items 22-38 assess the symptom clusters of reexperiencing, avoidance and arousal (Criteria B, C and D) with a four-point multiple choice format which provides increasing levels of symptom severity. Symptom severity is assessed by summing items 22-38. Foa (1995) provides cutoff scores for determining 'mild', 'moderate', moderate-to-severe' and 'severe' symptomatology. Participants with a score from one to 10 had mild symptoms; those with a score of 11-20 had moderate symptoms; those with a score of 21-35 had moderate-to-severe symptoms; and those with a score above 35 had severe symptom levels.

Items parallel symptoms listed in the *DSM-IV-TR*, and those rated as being experienced 'once a week/once in awhile' or greater are considered endorsed as per the manual's instructions. Items 39 and 40 assess onset and duration of symptoms (Criterion E). Items 41-49 assess functional impairment across different settings via a yes/no format. Functional impairment is endorsed if one or more of the items are marked 'yes'.

The Posttraumatic Stress Diagnostic Scale assessed posttraumatic symptoms and trauma endorsement at T1. The Total Severity Score was the dependent variable in the regression analyses at T1 and T2. Previous studies have shown that it is a reliable and valid tool for assessing PTSD symptoms in the absence of a clinical interview (Foa, Cashman, Jaycox, and Perry, 1997; Griffin, Uhlmansiek, Resick, Mechanic, 2004, Sheeran & Zimmerman, 2002). The reliability for all three subscales and the total measure was above $\alpha = .85$ indicating good reliability within this sample.

Procedures

The data used in the current study was part of a larger data set evaluating mother's and children's psychological functioning in the wake of Hurricane Katrina. After receiving

Institutional Review Board approval, permission was obtained from schools in Orleans, Jefferson and East Baton Rouge Parish to recruit mothers with children in 4th-8th grade to participate. For the initial study (T1), students were provided with either flyers containing information about the study or packets containing information about the study, consent forms (See Appendix A), demographic forms and parent self-report questionnaires that they provided to their mothers.

Questionnaires included the hurricane exposure questionnaire, Posttraumatic Stress Diagnostic Scale, and other questionnaires that were part of a larger data set. Interested mothers completed and returned the questionnaires to their child's school where they were collected by the research staff. Mothers who submitted questionnaires were contacted by a trained researcher to confirm their consent to participate. Mothers were also provided referral information for mental health services, if requested.

For the second wave (T2) mothers were contacted about their continued interest in participation and asked to provide updated contact information. Then, they were mailed packets containing the *PDS* and other questionnaires not used in this study that they completed and returned via prepaid, pre-addressed envelopes. All identifying information was removed from the mother responses for T1 and T2 and packets were identified through codes that matched participant data.

Participants were compensated multiple ways. For T1, they were entered into a cash prize drawing or received \$20.00. For T2, mothers individually received \$25.00.

Results

Missing and Excluded Data

Because the criteria for PTSD require a preceding traumatic event, participants who did not endorse experiencing a traumatic event were excluded from all analyses. Nineteen women were excluded as a result. Of the remaining participants, missing responses were replaced through mean substitution which applies an estimated mean based on available cases to the missing data. Most missing data was randomly distributed; however, item 21 was omitted from some PDS questionnaires at T1 only. This item referred to feelings of helplessness or horror during a traumatic event and was not essential for evaluating the PDS criteria as there were two questions evaluating the construct (item 20 also evaluated helplessness or horror). In cases where item 21 was omitted, the response from item 20 was used as the sole indicator of endorsement.

Rates of Trauma Endorsement

Frequencies and percentages were used to characterize the number and type of traumatic events experienced among the participants. The most commonly reported traumatic event by the New Orleans sample was experiencing a natural disaster (88.7%). In addition, over one fourth (26.9%) reported experiencing an accident, fire or explosion. Assault, life-threatening illness, and other traumatic event were each endorsed by at least 10% of the sample. A summary of the types of trauma endorsed is provided in Table 3. Looking beyond individual traumas, nearly half of participants (45.1%) reported experiencing more than one traumatic event, and over one-fourth of participants (26.6%) reported experiencing more than two traumas.

PTSD Symptom Severity over Time

Overall, there was a relatively high rate of participants who met criteria for PTSD, and rates did not decrease significantly between T1 and T2. Specifically, at T1 (four to seven months

post-Katrina), 24.4% of participants met criteria for PTSD. At T2, 14-17 months post-Katrina 24.2% met criteria for PTSD.

Table 3. Type of Trauma Endorsed

Trauma Type	% Endorsed
Natural Disaster	88.7
Accident/fire/explosion	26.9
Life-threatening illness	18.9
Non-sexual assault by known assailant	13.0
Non-sexual assault by stranger	12.6
Other traumatic event	10.8
Sexual abuse	8.9
Sexual assault by known assailant	5.9
Sexual assault by stranger	5.0
Imprisonment	5.0
Military Combat/war zone	2.9
Torture	0.4

In addition to providing rates of PTSD symptoms, the *PDS* also provides a symptom severity score. This score is useful for evaluating more subtle changes in symptom endorsement. Severity levels were reported for the entire New Orleans sample, those who met criteria for PTSD and those who did not meet criteria for PTSD across T1 and T2 (See Table 4). Of those who met criteria for PTSD at T1, the vast majority (98.2%) had moderate or greater symptoms and over one fifth had symptoms indicative of severe psychopathology. Of those who did not

meet criteria for PTSD, most showed mild or no symptoms (68.5%); however, the remaining 41.5% experienced moderate or greater symptoms. These symptoms do not take into account duration or functional impairment, and so they may be transient, but it should be noted that 4.1% of participants had severe symptom levels, although they did not meet criteria for PTSD.

Table 4. PTSD Symptom Severity by PTSD Criteria across T1 and T2

Severity Level*	% Endorsed					
	Total Sample		Meets Criteria for PTSD		Does Not Meet Criteria for PTSD	
	T1	T2	T1	T2	T1	T2
No Symptoms	14.9	20.2	0	0	19.7	26.8
Mild	36.4	42.6	2.1	4.3	47.6	54.9
Moderate	21.0	17.0	29.2	30.4	18.4	12.7
Moderate-to-Severe	20.0	16.0	47.9	52.2	10.9	4.2
Severe	7.7	4.3	20.8	13.0	3.4	1.4

*From Foa, E. B. (1995). *PDS Manual*. Minneapolis, MN: NCS, Pearson Inc.

Symptom severity at T2 shows only a slightly less grim picture. While the rate of those who met criteria for PTSD did not drop between T1 and T2 (from 24.4%-24.2%), symptom severity decreased significantly between T1 and T2 $t(86)=4.176, p<.001$ for the combined sample. Taking a closer look, however, most of this decrease occurred among participants who did not meet criteria for PTSD at T2. A paired samples t-test comparing symptom severity at T1 and T2 shows a significant decrease for participants who did not meet criteria for PTSD, $t(65)=4.102, p<.001$, but no significant change for those who continued to meet criteria for PTSD, $t(18)=1.173, n.s.$ Upon examination, it appears that there is a reduction between T1 and T2 in the number of participants who met criteria for PTSD and endorsed severe symptom levels only. At T1, 20.8% of participants who met criteria for PTSD had severe symptom levels, but by T2 only 13.0% experienced severe symptom levels which is a 7.8% reduction. The general trend for

participants who did not meet criteria for PTSD was a lessening in the severity of symptoms or to report no longer having symptoms. By T2, over 81.7% of participants reported having mild or no symptoms of PTSD as compared to 67.3% at T1.

Symptom and Criteria Endorsement

Symptom endorsement was analyzed using percentages based on the three categories of PTSD symptoms (reexperiencing, avoidance, and arousal) and criteria endorsement was defined according to the *DSM-IV-TR* (APA, 2000). An evaluation of the rates of response to individual symptoms reveals a generally consistent pattern of endorsement. Twelve of 17 symptoms within the clusters of reexperiencing, avoidance and arousal were endorsed by approximately 30-50% of participants. Four symptoms were endorsed by more than 50% of respondents and include: “Intense psychological distress to internal or external cues that resemble the event” (62.3%), “difficulty falling or staying asleep (57.3%), recurrent thoughts, images or perceptions” (54.1%) and “efforts to avoid thoughts, feels or conversations about the trauma” (50.5%). On the low end, only one question was endorsed by less than 30% of participants and that was, “Inability to recall important aspects of the trauma” (28.6%). Table 5 provides the rates of endorsement for each symptom.

Upon examination of each criterion for PTSD, one apparent trend is that each criterion is endorsed by nearly half of the participants or more. The reexperiencing symptom cluster (Criterion B) was endorsed by over three fourths of participants, but the avoidance and arousal clusters (Criterion C and Criterion D) were endorsed by approximately half of participants (47.0% and 54% respectively). Thus, rates of symptomatology were high in the immediate months after Hurricane Katrina. Likewise, the items pertaining to helplessness and horror also were endorsed at a high rate (over two thirds of participants endorsed both of those items) as

compared to the final count of participants who met criteria for PTSD. Table 6 shows the breakdown of endorsement for each criterion.

Table 5. Individual Symptom Description and Endorsement

	Symptom Description	% Endorsed
Reexperiencing (Criterion B)	Recurrent thoughts, images or perceptions.	54.1
	Recurrent dreams.	38.0
	Acting or feeling as if the traumatic event were reoccurring.	36.7
	Intense psychological distress to internal or external cues that resemble the event.	62.3
	Physiological reactivity when exposed to internal or external cues that resemble the event.	38.9
Avoidance (Criterion C)	Effort to avoid thoughts, feelings or conversations about the trauma.	50.5
	Efforts to avoid activities, people or places that arouse recollections of the trauma.	43.6
	Inability to recall important aspects of the trauma	28.6
	Diminished interest or participation in significant activities.	39.1
	Feeling of detachment from others	42.3
	Restricted range of affect	31.4
	Sense of foreshortened future	41.4
Arousal (Criterion D)	Difficulty falling or staying asleep	57.3
	Irritability or outbursts of anger	47.2
	Difficulty concentrating	44.0
	Hypervigilance	39.9
	Exaggerated startle response	41.3

Individual criteria did not show great predictive utility. Of those who met criteria for the reexperiencing cluster, only 30.2% went on to meet full criteria for PTSD. Of those who met criteria for the avoidance cluster, 49.6% met full criteria for PTSD. The same figure for the

arousal cluster was 42.3%. Thus, no one symptom or symptom cluster was able to predict any greater than about half of the participants who met PTSD diagnostic criteria.

Table 6. Percentage of Participants Who Met Each Criterion

Criterion	Description	% Endorsed
Criterion A 1	Experienced or witnessed actual or threatened death or injury during event	66.1
Criterion A 2	Intense fear, helplessness, or horror	69.0
Criterion B	Reexperiencing the event	75.5
Criterion C	Avoidance of stimuli related to the event and numbing	47.3
Criterion D	Increased arousal	56.4
Criterion E	Duration of disturbance	49.4
Criterion F	Clinically significant impairment	51.4
Meets symptom criteria	Meets criteria for reexperiencing, avoidance and arousal symptoms	55.2
Meets all criteria	Endorses all 7 PTSD criteria	24.4

Zero-Order Correlations for T1 Posttraumatic Stress Symptom Severity

Bivariate correlations were conducted with the combined sample of participants (displaced and non-displaced). Results are presented in Table 7. The predictor variables, hurricane exposure and number of traumas, were positively correlated with the criterion variable, PTSD symptom severity. Of the demographic variables, both education and income were negatively correlated with the criterion variable. Race was not correlated with the criterion variable, but was negatively correlated with both income and number of traumas, and positively correlated with hurricane exposure. Education and income were positively correlated, but income and hurricane exposure had a significant negative correlation.

Table 7. T1 (4-7 months post-hurricane) Zero-Order Correlations Among all Variables

Variable	1	2	3	4	5	6
1. Race	---	-.074	-.445**	.231**	-.157**	.022
2. Education		---	.442**	-.081	.119	-.172**
3. Income			---	-.261**	.081	-.122*
4. Hurricane Exposure				---	.057	.232**
5. Number of Traumas					---	.187**
6. Posttraumatic Stress Symptom Severity						---

^a Race is coded 1 for Caucasian and 2 for non-Caucasian; * $p < .05$; ** $p < .01$

Regression Analysis for T1 Posttraumatic Stress Symptom Severity

A simultaneous regression analysis was conducted to determine if number of traumas, hurricane exposure and demographic characteristics (race, education and income) were predictive of posttraumatic stress symptom severity at T1. All variables were entered in step one as there was no theoretical reason to suspect that one variable would be more predictive than another.

The results indicated that the model was significantly predictive of posttraumatic stress symptom severity, $F(5,305)=7.983$, $p < .001$. Factors that significantly contributed to the model included hurricane exposure, number of traumas, and education level. A small but significant amount of variance ($R^2 = .116$) can be attributed to this model and its ability to predict posttraumatic stress symptom severity (see Table 8 for a summary of the regression analysis).

Zero-Order Correlations for T2 Posttraumatic Stress Symptom Severity

Bivariate correlations on all variables were conducted with the combined sample of participants (displaced and non-displaced). Results are presented in Table 9. Hurricane exposure,

number of traumas, and symptom severity at T1 were significantly and positively correlated with symptom severity at T2. Income was significantly and negatively correlated with T2 symptom severity.

Table 8. Simultaneous Regression Analysis Evaluating Predictors of PTSD Symptom Severity at T1.

Variable	Regression Analysis	
	<i>B</i>	<i>β</i>
Hurricane Exposure	.821**	.207**
Number of Traumas	1.433**	.195**
Race	-.367	-.014
Education	-1.708*	-.174*
Income	-.067	-.013

Note. $R^2 = .116^{**}$; * $p < .01$; ** $p < .001$; all other variables *n.s.*

Hierarchical Regression Analysis for T2 Posttraumatic Stress Symptom Severity

A second regression analysis was conducted using the same variables to predict posttraumatic stress symptom severity at T2 with the addition of PTSD symptom severity at T1 entered as a predictor variable. The purpose of entering T1 symptom severity was to judge whether or not there is utility in continuing to account for demographic variables, hurricane exposure and number of trauma over time in the presence of continued symptoms. Variables were entered into a multiple regression analysis. In step one, posttraumatic symptom severity was entered as the sole predictor. In step two, all other variables (race, income, education, hurricane exposure and prior trauma) were entered into the regression equation.

Table 9. T2 (14-17 months post-hurricane) Zero-Order Correlations Among all Variables

Variable	1	2	3	4	5	6	7
1. Race ^a	---	-.074	-.445**	.231**	-.157**	.022	.061

(table con't.)

2. Education	---	.442**	-.081	.119*	-.172**	-.046
3. Income	---		-.261**	.081	-.122*	-.093*
4. Hurricane Exposure		---		.057	.232*	.094**
5. Number of Traumas				---	.187*	.119*
6. Posttraumatic Stress Symptom Severity (T1)					---	.355**
7. Posttraumatic Stress Symptom Severity (T2)						---

^a Race is coded 1 for Caucasian and 2 for non-Caucasian; * $p < .05$; ** $p < .01$

The results indicated that PTSD symptom severity at T1 was predictive of PTSD symptom severity at T2 [$F(1,309)=44.554, p < .001$]. No variables entered at step two were significant (See Table 10 for further details). Although income, hurricane exposure, and previous trauma showed significant correlations with PTSD symptom severity at T2, they did not significantly increase the variance beyond what was already contributed by symptom severity at T1. This factor contributed 12.6% of the variance associated with T2 PTSD symptom severity.

Table 10. Hierarchical Regression Analysis Evaluating Predictors of PTSD Symptom Severity at T2.

Variable	Step One		Step Two	
	<i>B</i>	β	<i>B</i>	β
T1 Symptom Severity	.247*	.355*	.239*	.344*
Hurricane Exposure			-.032	-.011
Number of Previous Traumas			.319	.062
Race			.817	.044
Education			.221	.032

(table con't.)

Income

-.199

-.054

Note. $R^2 = .126^*$ for Step 1; $\Delta R^2 = .009$ for Step 2.

* $p < .001$; all other predictors *n.s.*

Discussion

The purpose of this study was to describe the PTSD symptom endorsement of a sample of women affected by Hurricane Katrina and compare their experience with current critiques of the *DSM-IV-TR* definition of PTSD. This study found partial evidence in support of the arguments made about the conceptualization of PTSD by current researchers in the field of trauma study (McNally, 2009; North et al., 2009; Spitzer et al., 2007; Bodkin et al., 2007). In addition, demographic variables, hurricane exposure and trauma history were used as predictors of PTSD symptom severity at two time points. The hypothesis that these variables would predict rates of symptom severity at T1 was partially supported. The hypothesis that symptom severity at T1 would be the strongest predictor of symptom severity at T2 was also supported.

The Trauma Criterion

One of the primary criticisms with the current PTSD diagnostic criteria is the inclusion of indirect experiences as traumatic events. Events like hearing about the death of a loved one, or witnessing a traumatic event on television can be construed as a traumatic event because they fall under the auspices of, “being confronted with” an event that involved actual death or physical harm (p. 467; APA, 2000). Authors have argued that this has diluted the trauma criterion to the point that almost any negative event can be categorized as a trauma (McNally, 2009; Spitzer et al., 2007). In the current sample, the traumas reported did not fall under the category of being “confronted” with an event, as most were direct experiences with Hurricane Katrina.

That being said, over two thirds of participants endorsed witnessing an event that involved actual or threatened death or harm to themselves or others and feeling helplessness or horror during the event. This supports the idea that experiencing a traumatic event is, in fact, very common, and even among a highly exposed population, it does not accurately indicate who will go on to meet criteria for PTSD as shown by the lower rate of participants who met criteria

for PTSD (24.4%; Breslau, 2002a). This study does not strongly support the idea of conceptual bracket creep as proposed by McNally (2009), but it does show that the trauma criterion, as it currently stands, does little to discriminate between those who will go on to meet full criteria and those who will not.

There is, however, evidence to support the alternative proposed by North and colleagues (2009). North's group proposed that the current trauma definition is too simplistic because it links current symptoms to a single trauma. Instead, North and colleagues cite Maier's multifactorial model (2007) which proposes a cumulative effect of trauma experiences on subsequent symptoms. This study shows partial support for Maier's model in that number of traumas positively predicted PTSD symptom severity at T1. It is possible that, in some cases, multiple traumas create an accumulated burden of psychopathology that cannot be attributed to a single event. Previous trauma was not predictive of T2 symptom severity, but keep in mind, that the number of traumas was based on T1 trauma reports and this could have changed between T1 and T2.

Individual Symptom and Criterion Endorsement

Few symptoms within the reexperiencing, avoidance or arousal symptom clusters stood out as potential predictors of PTSD. Overall, most symptoms were endorsed by roughly 30-50% of the given sample. One of the criticisms of the current definition of PTSD is that it contains many symptoms of general pathology such as sleep disturbances, inability to concentrate and irritability, and these symptoms are not indicative of PTSD as a unique disorder (Bodkin et al., 2007). In the present sample, these items were endorsed at similar rates to the more specific items. The most highly endorsed item, "Intense psychological distress to internal or external cues that resemble the event," which was endorsed by 62.3% of the sample, was a situation specific item. The high rate of endorsement may possibly reflect the fact that damage related to the

hurricane remained visible for months (and years) after the storm providing continued reminders of the event.

Looking at participants who met criteria for the three symptom clusters, reexperiencing, avoidance and arousal, also shows a generally high rate of endorsement. Criterion B (reexperiencing) was endorsed at a rate of 75.5% of participants, which again, is counter to criticisms that false positives occur because the definition includes symptoms of general pathology (Bodkin et al, 2007). Criteria C (avoidance) and D (arousal) were endorsed by nearly half or greater of participants (47.3% and 54.6% respectively) both of which are much higher than the final rate of PTSD symptom endorsement (24.4%). No symptom cluster showed distinct predictive utility for meeting full PTSD criteria. The avoidance symptom cluster (Criterion C) showed the highest overlap with full criteria. Nearly 50% of participants who met criteria for avoidance went on to meet full criteria for PTSD, but this also means that slightly more than 50% did not.

One possible explanation for the high rate of endorsement of both symptoms and criteria is that many of these symptoms may be part of a normal response to a traumatic event (McHugh & Treisman, 2007). Because most of the women in the sample experienced Hurricane Katrina, their symptoms may be a normal reaction to the ongoing stress of living in a disaster-affected location. Many businesses and schools were closed for an extended period of time after the storm and data was collected four to seven months post-disaster when a return to normal functioning was in the beginning stages. Up until this time, and even beyond the first round of data collection, many neighborhoods still had large amounts of visible debris and damage.

One recommendation by Spitzer and colleagues (2007) is to distinguish between a normal and a pathologic response to a traumatic event. The authors, in no way, try to demean the experiences of those who undergo a traumatic event, but argue that the distinction should be

made in the same way that a distinction is made between depression and bereavement. Both may deserve clinical attention, but they may have different trajectories. One possible solution that the authors recommend is to raise the threshold for meeting many of the symptom criteria. Spitzer and colleagues propose that symptoms should be endorsed only if they show a severity above and beyond that of more common negative events. In addition, the authors suggest developing a V-code to address non-pathological forms of stress reactions that may be of clinical attention.

Changes in PTSD Severity Levels over Time

In the displaced sample, over 24% of participants met criteria for PTSD at T1. Of those who met full criteria, over two thirds showed moderate-to-severe or severe symptom levels. At T2, there was little change in the rate of those who met criteria for PTSD (over 24%). The severity of PTSD symptoms also showed little abatement, although there was a 7.8% drop in the number of participants who were classified as having “severe” levels of PTSD symptoms. This implies that levels of PTSD symptoms were high even over a year after Hurricane Katrina.

Of those who did not meet criteria for PTSD, roughly 14% also had moderate-to-severe or severe levels of symptoms at T1. At T2, however, the group who did not meet criteria for PTSD showed a significant decrease in their symptom severity. By T2, over 80% of participants had either no or mild symptoms and the rate of those with moderate-to-severe and severe symptoms dropped to 5.6%. Again, this brings up the issue of what constitutes a normal response to a traumatic event? Certainly, those who met criteria for PTSD are of clinical concern, especially given the high rates at both T1 and T2, but those who have significant symptoms without a diagnosis might also need mental health services at least in the short term. Spitzer and colleague’s (2007) recommendation of raising the threshold for meeting full criteria would probably still capture those within this sample who met full criteria and had moderate-to-severe and severe symptoms, while developing a V-code for a non-pathological stress reaction may be

an avenue for addressing the needs of the subset of participants in this study who did not meet criteria for PTSD, but still had significantly impairing levels of symptoms. Given that symptom severity at T1 was the only significant predictor of symptom severity at T2, those who have high levels of PTSD symptoms, whether they meet diagnostic criteria or not, are the ones most likely to need mental health services both in the immediate months following the event and long term.

Predictors of PTSD Symptom Severity over Time

The first regression analysis shows that hurricane exposure, number of traumas, and education level were all predictive of PTSD symptom severity at T1. Both hurricane exposure and number of traumas were positively correlated with PTSD symptom severity, while education was negatively associated with PTSD severity. These results are, for the most part, consistent with the literature. Race was not predictive of PTSD severity, but it has been shown to be an inconsistent predictor in past research and usually associated with other socio-economic factors (Norris et al., 2002).

The second regression shows that the best predictor of T2 PTSD symptom severity is previous symptom severity. Income, hurricane exposure and number of trauma were still significantly correlated with T2 PTSD symptom severity, but these factors were not significant predictors in light of previous symptoms. When looking at this from a clinical perspective, it is useful to know that predictors such as exposure, trauma experience and education are initially helpful in determining who will have more severe symptoms, but those with the most severe symptoms are the ones most likely to need continued intervention at follow-up.

Limitations and Future Directions

Limitations of this study should be noted. First, of the original 287 participants at T1 only 141 returned questionnaire data for T2 which is a 49% reduction of the sample size. There is a possibility of a self-selection bias occurring that may explain why rates of participants who continued to endorse symptoms of PTSD remained high at T2. It is possible that participants who no longer met criteria for PTSD chose not to continue participating causing an artificial inflation in the rates of PTSD symptom endorsement at T2. Second, this study sought to explore symptom and criteria endorsement from a more qualitative perspective. These are preliminary analyses, at best, and future research should include more rigorous quantitative methods to predict which participants are most likely to continue having significant symptoms of PTSD. Lastly, PTSD is a complex phenomenon with many factors contributing to its outcome (Maier, 2007). This study chose a limited set of predictors, but there are many more predictors such as social support, coping and cognitive processing that play a role in the etiology of PTSD (Glass, Flory, Hankin, Kloos & Turecki, 2009). Future studies should seek to incorporate these variables in order to create a clearer picture of who is most at risk for experiencing PTSD.

References

- Acierno, R., Ruggiero, K. J., Galea, S., Resnick, H. S., Koenen, K., Roitzsch, J., et al. (2007). Psychological sequelae resulting from the 2004 Florida hurricanes: Implications for postdisaster intervention. *American Journal of Public Health, 97*, 103-108.
- Adams, R. E., & Boscarino, J. A. (2005). Differences in Mental Health Outcomes among Whites, African Americans, and Hispanics Following a Community Disaster. *Psychiatry: Interpersonal & Biological Processes, 68*, 250-265.
- Aksaray, G., Kortan, G., Erkaya, H., Yenilmez, C., & Kaptanoglu, C. (2006). Gender differences in psychological effect of the August 1999 earthquake in Turkey. *Nordic Journal of Psychiatry, 60*, 387-391.
- American Psychiatric Association. (1952). *Diagnostic and statistical manual of mental disorders* (1st ed.). Washington D.C.: Author.
- American Psychiatric Association. (1968). *Diagnostic and statistical manual of mental disorders* (2nd ed.). Washington D.C.: Author.
- American Psychiatric Association. (1980). *Diagnostic and statistical manual of mental disorders* (3rd ed.). Washington D.C.: Author.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.) Text Revision. Washington D.C.: Author.
- Andreasen, N. (2004). Acute and delayed posttraumatic stress disorder: A history and some issues. *American Journal of Psychiatry, 161*, 1321-1323.
- Archibald, H. C., Long, D. M., Miller, C., Tuddenham, R. D. (1962). Gross stress reaction in combat: A 15-year follow-up. *American Journal of Psychiatry, 119*, 317-322.
- Banyard, V. L., Williams, L. M., & Siegel, J. A. (2001). The Long-Term Mental Health Consequences of Child Sexual Abuse: An Exploratory Study of the Impact of Multiple Traumas in a Sample of Women. *Journal of Traumatic Stress, 14*, 697-715.
- Bodkin, J. A., Pope, H. G., Detke, M. J., & Hudson, J. I. (2007). Is PTSD caused by traumatic stress? *Journal of Anxiety Disorders, 21*, 176-182.
- Bourque, L. B., Siegel, J. M., Kano, M., & Wood, M. M. (2006). Weathering the Storm: The Impact of Hurricanes on Physical and Mental Health. *Annals of the American Academy of Political and Social Science, 604*, 129-150.
- Breslau, N. (2002a). Epidemiologic Studies of Trauma, Posttraumatic Stress Disorder, and Other Psychiatric Disorders. *Canadian Journal of Psychiatry, 47*, 923.

- Breslau, N. (2002b). Gender differences in trauma and posttraumatic stress disorder. *Journal of Gender-Specific Medicine*, 5, 34-40.
- Breslau, N., Chilcoat, H. D., Kessler, R. C., Peterson, E. L., & Lucia, V. C. (1999). Vulnerability to assaultive violence: Further specification of the sex difference in post-traumatic stress disorder. *Psychological Medicine*, 29, 813-821.
- Breslau, N., Davis, G. C., Andreski, P., Peterson, E. L., & Schultz, L. R. (1997). Sex differences in posttraumatic stress disorder. *Archives of General Psychiatry*, 54, 1044-1048.
- Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology*, 68, 748-766.
- Chen, A. C., Keith, V. M., Airriess, C., Li, W., & Leong, K. J. (2007). Economic vulnerability, discrimination, and Hurricane Katrina: Health among black Katrina survivors in eastern New Orleans. *Journal of the American Psychiatric Nurses Association*, 13, 257-266.
- Chung, M. C., Dennis, I., Easthope, Y., Werrett, J., & Farmer, S. (2005). A multiple-indicator multiple-cause model for posttraumatic stress reactions: personality, coping, and maladjustment. *Psychosomatic Medicine*, 67, 251-259.
- Ehring, T., Kleim, B., Clark, D. M., Foa, E. B., & Ehlers, A. (2007). Screening for posttraumatic stress disorder: What combination of symptoms predicts best? *Journal of Nervous and Mental Disease*, 195, 1004-1012.
- Freedly, J., Resnick, H., & Kilpatrick, D. (1992). *Conceptual framework for evaluating disaster impact: Implications for clinical intervention*. Washington D.C: American Psychiatric Press.
- Foa, E. B. (1995). *PDS Manual*. Mineapolis, MN: NCS, Pearson Inc.
- Foa, E. B., Cashman, L., Jaycox, L., & Perry, K. (1997). The validation of a self-report measure of posttraumatic stress disorder: The Posttraumatic Diagnostic Scale. *Psychological Assessment*, 9, 445-451.
- Friedman, M. J., Resick, P. A., & Keane, T. M. (2007). PTSD: Twenty-five years of progress and challenges. In *Handbook of PTSD: Science and practice*. (pp. 3-18). New York, NY Guilford Press.
- Galea, S., Brewin, C. R., Gruber, M., Jones, R. T., King, D. W., King, L. A., et al. (2007). Exposure to hurricane-related stressors and mental illness after Hurricane Katrina. *Archives of General Psychiatry*, 64, 1427-1434.
- Galea, S., Tracy, M., Norris, F., & Coffey, S. F. (2008). Financial and social circumstances and the incidence and course of PTSD in Mississippi during the first two years after Hurricane Katrina. *Journal of Traumatic Stress*, 21, 357-368.

- Galea, S., Vlahov, D., Resnick, H., Ahern, J., Susser, E., Gold, J., et al. (2003). Trends of probable post-traumatic stress disorder in New York City after the September 11 terrorist attacks. *American Journal of Epidemiology*, *158*, 514-524.
- Glass, K., Flory, K., Hankin, B. L., Kloos, B., & Turecki, G. (2009). Are coping strategies, social support, and hope associated with psychological distress among Hurricane Katrina survivors? *Journal of Social & Clinical Psychology*, *28*, 779-795.
- Green, B. L., Lindy, J. D., Grace, M. C., & Leonard, A. C. (1992). Chronic posttraumatic stress disorder and diagnostic comorbidity in a disaster sample. *Journal of Nervous and Mental Disease*, *180*, 760-766.
- Griffin, M. G., Uhlmansiek, M. H., Resick, P. A., & Mechanic, M. B. (2004). Comparison of the posttraumatic stress disorder scale versus the clinician-administered posttraumatic stress disorder scale in domestic violence survivors. *Journal of Traumatic Stress*, *17*, 497-503.
- Johnsen, B. H., Eid, J., Lovstad, T., & Michelsen, L. T. (1997). Posttraumatic stress symptoms in nonexposed, victims, and spontaneous rescuers after an avalanche. *Journal of Traumatic Stress*, *10*, 133-140.
- La Greca, A. M., Vernberg, E. M., Silverman, W. K., Vogel, A. L., & Prinstein, M. J. (1994). *Helping children prepare for and cope with natural disasters: A manual for professionals working with elementary school children*. Miami, FL: Authors.
- Maier, T. (2007). 'The criterion a problem revisited: Controversies and challenges in defining and measuring psychological trauma': Comment. *Journal of Traumatic Stress*, *20*, 915-916.
- McHugh, P. R., & Treisman, G. (2007). PTSD: A problematic diagnostic category. *Journal of Anxiety Disorders*, *21*, 211-222.
- McNally, R. J. (2009). Can we fix PTSD in DSM-V? *Depression & Anxiety*, *26*, 597-600.
- McNally, R. J. (2007). Can we solve the mysteries of the National Vietnam Veterans Readjustment Study? *Journal of Anxiety Disorders*, *21*, 192-200.
- Mol, S. S. L., Arntz, A., Metzmakers, J. F. M., Dinant, G.-J., Vilters-Van Montfort, P. A. P., & Knottnerus, J. A. (2005). Symptoms of post-traumatic stress disorder after non-traumatic events: Evidence from an open population study. *British Journal of Psychiatry*, *186*(6), 494-499.
- Norris, F. H. (1992). Epidemiology of trauma: Frequency and impact of different potentially traumatic events on different demographic groups. *Journal of Consulting and Clinical Psychology*, *60*, 409-418.

- Norris, F. H., Friedman, M. J., Watson, P. J., Byrne, C. M., Diaz, E., & Kaniasty, K. (2002). 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981-2001. *Psychiatry: Interpersonal and Biological Processes*, *65*, 207-239.
- Norris, F. H., Slone, L. B., Baker, C. K., & Murphy, A. D. (2006). Early physical health consequences of disaster exposure and acute disaster-related PTSD. *Anxiety, Stress & Coping*, *19*, 95-110.
- North, C. S., Suris, A. M., Davis, M., & Smith, R. P. (2009). Toward validation of the diagnosis of posttraumatic stress disorder. *American Journal of Psychiatry*, *166*, 34-41.
- Perilla, J. L., Norris, F. H., & Lavizzo, E. A. (2002). Ethnicity, culture, and disaster response: Identifying and explaining ethnic differences in PTSD six months after Hurricane Andrew. *Journal of Social & Clinical Psychology*, *21*, 20-45.
- Pole, N., Gone, J. P., & Kulkarni, M. (2008). Posttraumatic stress disorder among ethnoracial minorities in the United States. *Clinical Psychology: Science and Practice*, *15*, 35-61.
- Pulcino, T., Galea, S., Ahern, J., Resnick, H., Foley, M., & Vlahov, D. (2003). Posttraumatic stress in women after the September 11 terrorist attacks in New York City. *Journal of Women's Health*, *12*, 809-820.
- Rivera, J. D., & Miller, D. S. (2007). Continually Neglected: Situating Natural Disasters in the African American Experience. *Journal of Black Studies*, *37*, 502-522.
- Schlenger, W. E., Caddell, J. M., Ebert, L., Jordan, B. K., Rourke, K. M., Wilson, D., et al. (2002). Psychological reactions to terrorist attacks: findings from the National Study of Americans' Reactions to September 11. *Journal of the American Medical Association*, *288*, 581-588.
- Sheeran, T., & Zimmerman, M. (2002). Screening for posttraumatic stress disorder in a general psychiatric outpatient setting. *Journal of Consulting and Clinical Psychology*, *70*, 961-966.
- Spitzer, R. L., First, M. B., & Wakefield, J. C. (2007). Saving PTSD from itself in DSM-V. *Journal of Anxiety Disorders*, *21*, 233-241.
- Suvak, M., Maguen, S., Litz, B. T., Silver, R. C., & Holman, E. A. (2008). Indirect exposure to the September 11 terrorist attacks: Does symptom structure resemble PTSD? *Journal of Traumatic Stress*, *21*, 30-39.
- Tolin, D. F., & Foa, E. B. (2006). Sex Differences in Trauma and Posttraumatic Stress Disorder: A Quantitative Review of 25 Years of Research. *Psychological Bulletin*, *132*, 959-992.
- Tucker, P., Pfefferbaum, B., Nixon, S. J., & Dickson, W. (2000). Predictors of post-traumatic stress symptoms in Oklahoma City: Exposure, social support, peri-traumatic responses. *The Journal of Behavioral Health Services & Research*, *27*, 406-416.

- U.S. Census Bureau. (2006). Hurricane Katrina. *Census Data and Emergency Preparedness*. <http://www.census.gov/Press-Release/www/2005/katrina.htm>. Retrieved November 16, 2008.
- Vernberg, E. M., La Greca, A. M., Silverman, W. K., & Prinstein, M. J. (1996). Prediction of posttraumatic stress symptoms in children after Hurricane Andrew. *Journal of Abnormal Psychology, 105*, 237-248.
- Zayfert, C. (2008). Culturally competent treatment of posttraumatic stress disorder in clinical practice: An ideographic, transcultural approach. *Clinical Psychology: Science and Practice, 15*, 68-73.
- Zimering, R., Gulliver, S. B., Knight, J., Munroe, J., & Keane, T. M. (2006). Posttraumatic stress disorder in disaster relief workers following direct and indirect trauma exposure to Ground Zero. *Journal of Traumatic Stress, 19*, 553-557.
- Zoellner, L. A., Goodwin, M. L., & Foa, E. B. (2000). PTSD Severity and Health Perceptions in Female Victims of Sexual Assault. *Journal of Traumatic Stress, 13*, 635-649.

Appendix A

Consent Form

1. **Study Title:** Predictors of Recovery in Children Evacuated from Hurricane Katrina
2. **Performance Sites:** Schools and temporary shelters in Louisiana
3. **Names and Telephone Numbers of Investigators:** The following investigators are available for questions about this study, M-F, 8:00 a.m.-4:30 p.m:

Mary Lou Kelley, Ph.D. (225)578-4113

4. **Purpose of the Study:** The purpose is to study the effects of Hurricane Katrina on the adjustment of children and their parents and identify factors that aid adjustment.
5. **Participant Inclusion:** Mothers and their children ages 7-14
6. **Number of Participants:** 400
7. **Study Procedures:** You and your child will spend approximately 1.5 hours completing several questionnaires, and return them to the researchers. You and your child may be asked to participate in a structured interview subsequent to completing the questionnaires. You and your child will be asked to complete the questionnaire packet at three, six and twelve month time periods. Your child's teacher will also be asked to complete two questionnaires as well.
8. **Benefits:** A greater understanding of variables related may be a possible benefit. Also, in the case of a needed referral for psychological services if you desire, will be available. Such referrals may include Baton Rouge Mental Health (225-922-9445) or the Psychological Services Center (225-578-1494). Some participants may even find it beneficial to have an opportunity to describe and recall their experiences during and after Hurricane Katrina. Each mother and child pair who complete a packet of questionnaires will be entered into a raffle of \$50.
9. **Risks:** You and your child may become upset while completing the questionnaires because there are questions related to your experiences associated with Hurricane Katrina. We will give referral cards for further psychological services to all participants in the case that they may become emotionally upset. Also, as a mandated reporter of abuse and neglect, **any disclosure or threat of abuse revealed during data collection will be reported to Child Protective Services immediately. You will be verbally notified of this risk prior to data collection. Also, the clinician will inform you if a report is warranted.**
10. **Right to Refuse:** Participants may choose not to participate or to withdraw from the study at any time without penalty.

11. **Right to Privacy:** Results of the study may be published, but no names or identifying information will be included in the publication. Participant identity will remain confidential unless disclosure is required by law.

This study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have questions about participants' rights or other concerns, I can contact Robert C. Matthews, Chairman, LSU Institutional Review Board, (225) 578-8692. I agree to participate in the study described above and acknowledge the researchers' obligation to provide me with a copy of this consent form if signed by me.

Signature of Parent Participant

Date

The study participant has indicated to me that he/she is unable to read. I certify that I have read this consent form to the participant and explained that by completing the signature line above, the participant has agreed to participate.

Signature of Reader

Date

I grant permission for this study's researchers to access my child's past academic records, including his or her school lunch status, placements, and achievement test scores. I understand that my child's identifying information will be removed and coded in to ensure privacy of the information. Also, I understand that by consenting to my and my child's participation in this study, I grant my permission for my child's teacher to complete questionnaires regarding my child's behavior and functioning.

Signature of Parent Participant

Date

Appendix B

Demographic Questionnaire

ABOUT YOU AND YOUR FAMILY

Please fill out the following background information about yourself and your family. Read each item carefully.

Your age: _____

Your spouse's age: _____

Your child's age: _____

Your child's sex: _____

Your Child's School History:

Your child's current grade: _____

School your child attended BEFORE the hurricane? _____

(Circle one: Public or Private)

School your child attends NOW, after the hurricane? _____

(Circle one: Public or Private)

Race:

- _____ White
- _____ Black
- _____ Hispanic
- _____ Asian
- _____ Native American
- _____ Pacific Islander
- _____ Other

Marital Status:

- _____ Never Married
- _____ Married
- _____ Separated
- _____ Divorced
- _____ Widowed

Education: What is the highest level of education completed by?

Yourself

- _____ 6th grade or less
- _____ Junior High school (7th, 8th, 9th grade)
- _____ Partial high school (10th, 11th grade)
- _____ High school graduate
- _____ Partial college (at least 1 year) or specialized training
- _____ Standard college or university graduate
- _____ Graduate professional degree (Master's, Doctorate)

Your Spouse

- _____ 6th grade or less
- _____ Junior High school (7th, 8th, 9th grade)
- _____ Partial high school (10th, 11th grade)
- _____ High school graduate
- _____ Partial college (at least 1 year) or specialized training
- _____ Standard college or university graduate
- _____ Graduate professional degree (Master's, Doctorate)

Past Income: What was the total annual income of your household **BEFORE** the hurricane?
(Combine the income of all the people living in your house right now as well as any government assistance.)

_____ \$0-4,999	_____ \$15,000-24, 999	_____ \$50,000-74,999
_____ \$5,000-9,999	_____ \$25,000-34,999	_____ \$75,000-99,999
_____ \$10,000-14,999	_____ \$35,000-49,999	_____ \$100,000 and up

Current Income: What is the total and **CURRENT** annual income of your household?
(Combine the income of all the people living in your house right now as well as any government assistance.)

_____ \$0-4,999	_____ \$15,000-24, 999	_____ \$50,000-74,999
_____ \$5,000-9,999	_____ \$25,000-34,999	_____ \$75,000-99,999
_____ \$10,000-14,999	_____ \$35,000-49,999	_____ \$100,000 and up

If you are unable to say what your annual income is, what is your monthly income?
\$ _____

Past Occupation: Please provide the following information about your and your spouse’s job(s) **BEFORE** the hurricane.

About You

What was your occupation/job title? (If you were retired, pleased write “retired” and your past occupation. If you did not work outside the home, write “unemployed.”)

If employed, what kind of industry or company? (For example, elementary school, clothing store, hospital, restaurant, etc.)

If employed, what were your job duties? (Please be specific.)

If you were **unemployed before** the hurricane, were you seeking a new job? Yes / No

About Your Spouse

What was your spouse’s occupation/job title? (If they were retired, pleased write “retired” and their past occupation. If they did not work outside the home, write “unemployed.”)

What kind of industry or company did they work for? (For example, elementary school, clothing store, hospital, restaurant, etc.)

What were their job duties? (Please be specific.)

If your spouse was **unemployed before** the hurricane, were they seeking a job? Yes / No

Current Occupation: Please provide the following information about your and your spouse's job(s) **CURRENTLY**.

About You

What is your occupation/job title? (If you are retired, please write "retired" and your past occupation. If you do not work outside the home, write "unemployed." If your job is the same as it was before the hurricane, please write "same.")

If employed, what kind of industry or company? (For example, elementary school, clothing store, hospital, restaurant, etc.)

If employed, what are your job duties? (Please be specific.)

If you are **currently unemployed**, are you currently seeking a new job? Yes / No

About Your Spouse

What is your spouse's occupation/job title? (If they are retired, please write "retired" and their past occupation. If they do not work outside the home, write "unemployed." If their job is the same as it was before the hurricane, please write "same.")

What kind of industry or company did they work for? (For example, elementary school, clothing store, hospital, restaurant, etc.)

What are their job duties? (Please be specific.)

If your spouse is **currently unemployed**, are they currently seeking a new job? Yes / No

Family: Please list the ages and sex of all those living in your household **BEFORE** the hurricane, including yourself, your spouse, other relatives, and all children.

<u>Relationship to you</u>	<u>Age</u>	<u>Sex</u>
_____	_____	<u>Male/Female</u>

What was the TOTAL number of people, including yourself, living in your home **BEFORE** the hurricane? _____

What was the TOTAL number of adults over 18, including yourself, living in your home **BEFORE** the hurricane? _____

What was the TOTAL number of children under 18 living in your home **BEFORE** the hurricane? _____

Appendix C

Questionnaire of Hurricane Related Information- Parent

1. Did windows or doors break in the place you stayed during the hurricane?
 - a. Yes
 - b. No
2. Did you get hurt during the hurricane?
 - a. Yes
 - b. No
3. Did you see anyone else get hurt badly during the hurricane?
 - a. Yes
 - b. No
4. Did your pet die or get hurt during the hurricane?
 - a. Yes
 - b. No
5. Did you get hit by anything falling or flying during the hurricane?
 - a. Yes
 - b. No
6. Overall, how scared or upset were you during the hurricane?
 - a. Not at all
 - b. A little
 - c. A lot
 - d. A whole lot
7. Was your home damaged badly or destroyed by the hurricane?
 - a. Yes
 - b. No
8. Did your child go to a new school because of the hurricane?
 - a. Yes
 - b. No
9. Did you move to a new place because of the hurricane?
 - a. Yes
 - b. No
10. Did you lose your job as a result of the hurricane?
 - a. Yes
 - b. No
11. Has it been hard to see friends since the hurricane because they or you have moved?
 - a. Yes
 - b. No
12. Did your family have trouble getting food or water after the hurricane?

- a. Yes
- b. No

13. Did you lose material possessions, such as clothes as a result of the hurricane?

- a. Yes
- b. No

14. Did your pet run away or have to be given away because of the hurricane?

- a. Yes
- b. No

15. Has anyone stolen anything from you or your home since the hurricane?

- a. Yes
- b. No

Vita

Julia Thompson graduated summa cum laude with a Bachelor of Arts degree from the University of Arkansas at Little Rock in May 2006. She began her graduate studies in child clinical psychology at Louisiana State University in August of 2007 under Dr. Mary Lou Kelley and will receive her Master of Arts degree in December of 2009. Afterwards she plans on continuing to pursue her doctoral degree.