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The role of hurricane exposure and life disruption as predictors of child post-traumatic stress symptomatology following hurricane Katrina

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THE ROLE OF HURRICANE EXPOSURE AND LIFE DISRUPTION AS PREDICTORS OF CHILD POST-TRAUMATIC STRESS SYMPTOMATOLOGY FOLLOWING HURRICANE KATRINA

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ABSTRACT

While many children emotionally recover following a disaster (Salzer & Bickman, 1999), possibly one-third of children will experience significant psychological distress or post-traumatic stress symptoms which cause interference with their daily school and home functioning (Vernberg, La Greca, Silverman, & Prinstein, 1996). Research supports the role that exposure, loss, and disruption play in increasing Post-Traumatic Stress Disorder (PTSD) severity in children following disasters (La Greca, Silverman, Vernberg, Prinstein, 1996; Verberg et al., 1996). However, there are no assessments or questionnaires that have investigated what type of events during and following a hurricane are most predictive of post-traumatic stress reactions. Using logistic regression analyses, the current study examines children's hurricane experiences and post-hurricane events in order to develop as assessment tool with psychometric properties that predicts post-traumatic stress symptomatology in children. The 20 items retained for the Hurricane Experiences and Life Disruption (HELD) Questionnaire were found to be significantly predictive of PTSD symptomatology.

INTRODUCTION

The most commonly reported mental health reactions for natural disaster adult victims include Post-Traumatic Stress Disorder (PTSD), anxiety, depression, and increased substance abuse, as well as physical health reactions (Acierno, Lawyer, Rheingold, Kilpatrick, Resnick, & Saunders, 2007; Galea, Vlahov, Resnick, Ahern, Susser, Gold, et al., 2003; Kessler, Galea, Jones, & Parker, 2006; Vlahov, Galea, Ahern, Resnick, & Kilpatrick, 2004). For all persons affected by natural disasters, the aftermath extends beyond financial burdens regarding reconstruction and repair of homes and infrastructure.

The most commonly evaluated psychological effects of disasters experienced by children are generally associated with trauma-related variables, such as proximity, exposure to severity, reported emotional experiences, and parental development of psychological symptoms (Earl, Smith, Reisch, & Jung, 1998; Daugherty, Lonigan, Finch, & Shannon, 1991; Swenson, Saylor, Powell, Stokes, Foster, & Belter; 1996). Although most children recover emotionally following a disaster (Salzer & Bickman, 1999), a sizable minority of children experience significant psychological distress or PTSD symptoms for months or years afterward (Vernberg, La Greca, Silverman, & Prinstein, 1996).

Researchers have identified important variables that impact PTSD symptom severity including degree of exposure to the traumatic event (Lonigan, Shannon, Finch, Daugherty, & Taylor, 1991), female gender (Green et al., 1991; Pynoos et al., 1993; Vernberg et al., 1996), ethnic minority (Garrison et al., 1993; 1995; La Greca et al., 1996; Shannon, Lonigan, Finch, & Taylor, 1994), age or developmental level (Swenson, Saylor, Powell, Stokes, Foster, & Belter, 1996), individual and family coping behavior (La Greca et al., 1996; Vernberg et al., 1996; Vigil & Geary, 2008; Wasserstein & La Greca, 1998), maternal psychopathology (Swenson et al.,

1996) and social support (La Greca et al., 1996; Pina, Villalta, Ortiz, Gottschall, Costa, & Weems, 2008; Vernberg et al., 1996; Weems, Pina, Costa, Watts, Taylor, & Cannon, 2007).

Although disasters share common elements, no two are alike; each presents its own unique experiences, challenges, and consequences. Most studies include assessment of the degree to which someone has experienced a disaster. However, the focus traditionally has remained on the psychological consequences of a disaster rather than on specific aspects of disaster exposure and events taking place immediately after the disaster such as loss of income or property. Terr (1991) describes how "secondary stressors" such as property loss can affect an individual's adjustment, perhaps as much as experiencing the event. Silverman and La Greca (2002) noted that "few studies have directly and systematically investigated the specific number and types of on-going stressors that children encounter in the aftermath of disasters and their specific short- and long-term effects on children's disaster reactions."

Therefore, the purpose of the current study is to identify the role of exposure and secondary stressors as related to hurricane experiences in children and adolescents. Life-threatening experiences, loss, disruption from one's home environment, and disruption from one's school environment will specifically be tested as predictors of PTSD.

The following reviews how disasters are defined and conceptualized, and then focuses on child and adolescent PTSD symptoms as well as other outcomes following a natural disaster. Next, specific and unique factors related to Hurricane Katrina are described. Finally, studies that assessed the effects of experiencing a hurricane in predicting post-disaster child reactions are discussed. Particular attention will be paid to the methods regarding previous research and how past researchers has attempted to assimilate and construct aspects of exposure and subsequent aftermath for school-age children.

Conceptualizations of Natural Disasters

The American Academic of Pediatrics (AAPWDG, 1995) defines disasters as "overwhelming events that affect a community, involve the destruction of property, potentially including injury or loss of life." Most conceptualizations of disasters focus on the event as being out of a person's "normal realm" of experiences, having elements of social and personal disruption that follow the event, and involving many people or a community (Green, 1991).

Distinguishing Natural Disasters from Other Forms of Trauma

Disaster research differentiates natural and human-made disasters. Silverman & La Greca (2002) explains that natural disasters are the results of forces of nature; this includes events such as hurricanes, earthquakes, floods, and tornadoes. Human-made disasters are typically caused by human error or involvement, or the malfunctioning of technology; this includes events such as warfare, terrorism, bombings, school shootings, and airplane crashes. Although events such as motor vehicle accidents, community violence, or residential fires are also traumatic experiences for children, they are not typically included in this definition because they lack the aspect of widespread community disruption (Silverman & La Greca, 2002).

A "disaster victim" is an individual who has been directly exposed to a traumatic disaster or directly experiences personal disruption as a consequence of the disaster. Individuals can also be considered "victims" of disaster when they are indirectly affected by the disaster through a variety of pathways, such as observing others suffering through direct exposure, or exposure to the disaster via the media (Saylor, 1993). Stressors after a natural disaster vary due to the unique impact of each disaster, ranging from loss of daily routines, to displacement from home and community (Azarian & Skriptochenko-Gregorian, 1998; Silverman & La Greca, 2002; Terr, 1991).

Risk Factors for Children Post-Disaster

In the last two decades, researchers have focused on children's reactions after experiencing a disaster with PTSD symptoms being the most commonly studied outcome. A model for understanding such variables linked to symptom emergence was first developed by Korol (1990) and Green et al. (1991). La Greca and colleagues (1996) identified four broad categories of events or emotions that impact children's psychological outcome post-disaster. These were: (1) aspects of traumatic exposure, such as life threat, loss, or disruption, (2) preexisting characteristics of the child, including demographic characteristics and pre-disaster functioning, (3) characteristics of the post-disaster recovery environment, such as available social support, stressors, and major life events, and (4) the child's psychological resources, such as coping skills (Silverman & La Greca, 2002).

Aspects of Traumatic Exposure. Several aspects of the traumatic event are seen as integral to the emergence of children's reactions. The perception of life threat has been viewed as essential to the development of PTSD symptoms (Green et al., 1991, La Greca et al. 1996, 1998; Lonigan Shannon, Finch, Daugherty, & Taylor, 1991); and the greater the perception of threat to their lives or loved ones, the higher the endorsement of PTSD symptoms. Loss of personal possessions, disruption from daily routines, displacement from school and home have been identified as possibly contributing to PTSD symptoms emergence (La Greca et al., 1996; Vernberg et al., 1996). As discussed previously, these secondary stressors can last for weeks, months, or potentially years and significantly challenge a family's ability to adapt and cope. Silverman and La Greca (2002) explain that situations such as hurricanes, earthquakes, or residential fires usually involve a larger series of life-stressors caused by the disaster, including loss of residence and personal possessions, transferring to a different school, changes in parents' employment, and changes in a family's financial resources. Proximity to the event, with closer

proximity associated with more severe, is consistently reported (Goenjian, Molina, Steinberg, Fairbanks, Alvarez, Goenjian, et al., 2001; La Greca et al., 1996; Lengua, Long, Smith, & Meltzoff, 2005; Pynoos & Nader, 1988). Duration and intensity of life-threat are also seen as potential variables associated with post-disaster reactions, although these factors have been less studied than other aspects of exposure (Nader, Pynoos, Fairbanks, & Frederick, 1990; Vernberg & Verela, 2001).

Pre-Existing Child Characteristics. Several characteristics of children have also emerged as risk-factors following a disaster. Demographic variables, including age, gender, and ethnicity, are usually the main focus of such characteristics. Although a common variable in disaster research, conclusions regarding age-related differences have been inconsistent. Some researchers have found younger children at greater risk for severe post-disaster reactions (Lonigan et al., 1991; Shannon et al., 1994), while others have found minor or no significant differences between age groups (Green et al., 1991). Researchers suggest that different age groups may experience different manifestations of post-disaster reactions. For example, preschool children have shown higher levels of behavioral disturbance, while older children may experience more PTSD symptoms (Huzziff & Ronan, 1999). Females generally report greater levels of PTSD symptoms and other psychological symptoms than males after experiencing a variety of natural disasters (Garrison et al., 1995; Goenjian et al., 2001; Roussos, Goenjian, Steinberg, Sotiropoulou, Kakaki, Kabaos, et al., 2005; Shannon et al., 1994,). However, Vernberg and colleagues (1996) concluded that the effects of gender regarding symptom severity are modest and the clinical meaning behind such differences is uncertain.

Child ethnicity and cultural background has been less studied than other demographic variables (Rabalais, Ruggerio, & Scotti, 2002). Although limited, several studies have found that minority youth report greater PTSD symptom severity following a disaster (Jaycox, Elliott,

Collins, Berry, Marshall, Klein, et al., 2004; La Greca et al., 1996, 1998; Lengua et al., 2005; Lonigan et al. 1991).

Aspects of the Recovery Environment. Elements of the post-disaster environment may augment children's reactions following disasters. Among studied variables, social support, parental psychopathology, and parental distress have been the most investigated. Support given to children and their families following disasters likely reduces the distress experienced in the wake of a disaster (La Greca et al. 1996; Vernberg et al., 1996). Several researchers have concluded that certain populations, particularly those less educated and of minority status, may receive less social support and assistance following a disasters (Kaniasty & Norris, 1995; Kilijanke & Drabek, 1979; Pina et al., 2008).

Parents' own reactions and stress levels following disasters may affect children's functioning. Because natural disasters most always affect the family unit, it is not uncommon to see similar psychological reactions among parents and children (Foy, Madvig, Pynoos, & Camilleri, 1996).

Child Psychological Resources. The fourth and final factor influencing child reactions after disasters are psychological resources. The "psychological resources" of a child include personal characteristics, such as strong beliefs of self-efficacy, an internal locus of control, adequate or positive coping strategies, and social skills (Vernberg, 1999). Silverman and La Greca (2002) note personal psychological resources are integral to the concept of resiliency (i.e. the idea that some individuals function well despite undergoing extraordinary adverse circumstances; see Garmezy, 1993).

Hurricane Katrina: Characteristics of an Unprecedented Storm

On August 29, 2005, Hurricane Katrina, a category 4 storm made landfall on the United States Gulf Coast destroying the homes and infrastructure of 90,000 square miles between New

Orleans, Louisiana and Mobile, Alabama. It was the third deadliest hurricane and one of the most costly natural disasters in United States history (U.S. Department of Homeland Security, 2006). It was estimated that approximately one million people evacuated from the Gulf Coast region, with nearly half coming from New Orleans (Elliott & Pais, 2006). While almost 80% of New Orleans residents evacuated prior to the storm's landfall, approximately 150,000 people remained in the city of New Orleans; the majority of those residents were poor, disabled or hospitalized, or lacked private transportation necessary to evacuate (Hurricane Katrina, 2005; U.S. Census Bureau, 2004).

The following day, the levees protecting the city of New Orleans from Lake Pontchartrain and the Mississippi River were breached, flooding the New Orleans metropolitan area of Orleans, St. Bernard, and Jefferson Parishes. Due to floodwaters, residents who did not evacuate were trapped in their homes, places of work, or last minute in-city shelters, such as the New Orleans Superdome (Gabe, Falk, McCarty, & Mason, 2005). During the week that followed, residents were without electricity, water, or access to food while awaiting rescue from local and federal agencies. Local and national news began reporting incidences of crime, theft, assault, and looting (Nossiter, 2005). People seeking rescue were airlifted off rooftops or had to wade through flood waters to seek dry ground. Furthermore, due to the triage-like nature of the search and rescue efforts, many individuals were separated from family members and were taken via bus or airplane to various cities throughout the country (Gabe et al., 2005; U.S. Department of Homeland Security, 2006). During the following weeks, television news media consistently covered the ongoing disaster, with images of looting, rooftop rescues, and wide-spread destruction.

The total economic loss after Katrina was estimated to be $100 billion, with $50-70 billion estimated for Louisiana (U.S. House of Representatives, 2006). The flood and wind-

damage to home and civic-infrastructure created large-scale displacement; the Census Bureau estimated that by December that year 500,000 individuals had been displaced with approximately 160,000 of those persons being under the age of 18 (U.S. Census Bureau, 2005). A reported 220,000 Louisiana jobs were lost due to the storm (Gabe et al., 2005). Within the metropolitan area, 875 schools were damaged and 40 schools were completely destroyed. Roof damage was universal and an estimated 250,000 homes sustained high levels of flooding. The Army Corps of Engineers indicated that 22 million tons of debris was removed from the New Orleans metropolitan area; this included roof debris, flooded cars, and entirely gutted homes and their contents.

Due to the extensive damage of the city's infrastructure, the affected communities experienced high levels of secondary stressors. Families had to find "extended" temporary housing until they could return safely and then until they could restore their homes to suitable conditions for living. Many adults had to find interim work until their places of employment were repaired and resumed operation. Those residents who did return in the weeks and months following the storm endured problems with obtaining electricity, drinkable running water, television for news updates, and limited grocery resources. Often one or two members of a family returned to the area to aid in the reconstruction, while the children resided with extended family and enrolled in schools in neighboring cities until their schools reopened (Asmus, Stokes, & Lacour, 2006). The Hurricane Katrina Community Advisory Group Report dated August 29, 2006, surveyed adults in Louisiana, Mississippi, and Alabama about their stresses since Hurricane Katrina. The most endorsed stressors included high dissatisfaction in dealing with F.E.M.A. and the insurance industries, extreme physical adversity, major financial loss, grief due to the death of a loved one, and extreme psychological adversity (Brewin, Galea, Jones, Kendrick, Kessler, King, et al., 2006). As compared to responses from other impacted areas,

responders who resided in the New Orleans metropolitan area endorsed all stressors more frequently. Given the unprecedented nature of the secondary stressors related to Hurricane Katrina, it may be likely that the psychological impact may be as significant as the physical and financial damage.

Post-Traumatic Stress Symptomatology in Children

Research has documented the extent to which adult victims experience post-disaster reactions. Research has shown that adult disaster victims often report increased PTSD, anxiety, and depressive symptoms as well as increased substance use. (e.g., Acierno et al., 2007; Galea et al, 2002, 2003; Kessler et al., 2006; Vlahov et al., 2002, 2004). By comparison, research focused on assessing child post-disaster reactions is relatively limited with only a small percentage of studies on the effects of disasters focusing on children (Norris, 2002). As with adults, PTSD is the most commonly researched psychological response.

PTSD is an anxiety disorder that can develop after exposure to a terrifying event in which physical harm or life-threat occurred or was threatened. People with PTSD have persistent or recurring memories or thoughts of the event and develop avoidance of stimuli associated with the trauma. People with PTSD may also experience emotional numbing, physiological reactivity to cues that resemble the event, feelings of detachment from others, restricted range of affect, increased arousal, and difficulty concentrating, among other symptoms (American Psychiatric Association, 1994). Children may experience symptoms different from those of adults. For example, DSM-IV Arousal cluster symptoms (such as difficulty sleeping, irritability or anger, difficulty concentrating, hypervigilance, and/or exaggerated startle response) have been shown to have poor diagnostic utility in child and adolescent trauma victims (Lonigan et al., 1998; Sack, Seeley, & Clark, 1997). Garrison and colleagues (1993) found that one year after Hurricane

Hugo, only 2-6% of adolescents met full PTSD criteria, while 20% exhibited reexperiencing symptoms, 9% exhibited avoidance symptoms, and 18% exhibited symptoms of hyperarousal.

Some researchers propose moving beyond focusing solely on PTSD as the primary outcome factor, and emphasize targeting various components of psychological distress, such as general anxiety (La Greca et al., 1998), specific fear (Dollinger, O'Donnell, & Staley, 1984), depression (Nolen-Hoeksema & Morrow, 1991; Papadatos, Nikou, & Potamianos, 1990), as well as inattention, behavioral problems, conduct problems and disruptive behavior (Belter et al., 1991; La Greca et al., 1998; Saylor et al., 1992; Shaw et al. 1995). Following an earthquake, Papadatos and colleagues (1990) targeted psychiatric problems in a sample of 172 high school students. Using a general symptom checklist and a measure of depression, they found that 69% of students reported severe depressed mood and 34.9% indicated severe levels of general psychological symptoms. Lonigan and colleagues (1991, 1994) examined children's development of PTSD symptoms and found that while only 5. 42% of children in their sample met criteria for full PTSD, 51% exhibited a decline in school performance. La Greca, Silverman, & Wasserstein (1998) examined pre- and post-hurricane psychological outcomes following Hurricane Andrew. Although the primary focus of their study examined predictors of PTSD, among their results they observed increased anxiety from pre- to post-disaster in children with high exposure levels. Asarnow (1999) noted that one year following the Northridge Earthquake, higher PTSD scores in children (sample age mean = 13) were associated with concurrent depression, general anxiety and peer adjustment difficulties. There has also been evidence that children may experience decreases in academic achievement following a disaster (Vincent, La Greca, Silverman, Wasserstein, & Prinstein, 1994).

Assessing Hurricane "Exposure" and Issues in Assessment

Trauma exposure and loss following a disaster are consistently the strongest predictors of PTSD symptoms in children (Vogel & Vernberg, 1993). The measurement of exposure and loss has varied considerably across studies (Saylor & DeRoma, 2002). Most studies wishing to assess "hurricane impact" or "exposure to hurricane-related events" create their own questionnaire (Hardin, Weinrich, Weinrich, Hardin, and Garrison, 1994; Hensley & Varela, 2008; Pina et al., 2008; Swenson, Saylor, Powell, Stokes, Foster, & Belter, 1996; Vernberg et al., 1996; Weems et al., 2007).

A more commonly used measure for use with children after experiencing a hurricane was developed by Vernberg, La Greca, Silverman, and Prinstein (1996). The Hurricane-Related Traumatic Experiences questionnaire (HURTE) was developed to measure the degree of exposure and loss in elementary school children after Hurricane Andrew (e.g. Eth & Pynoos, 1985; Green 1991; Korol 1990; Terr, 1989). The HURTE (see Table 1) is a 17-item self-report questionnaire, that delineated the children's experiences into three sections: Perceived Life-Threat (1 item), Life-Threatening Experiences (6 items), and Loss-Disruption Experiences (10 items). All items are answered in a "yes" or "no" format. Items were developed "rationally from the author's clinical experiences with interviewing children and adults who were affected by Hurricane Andrew," along with examining the post-disaster supplement from the Diagnostic Interview Schedule (DIS; Robins & Smith, 1993). The authors included one item taken verbatim from the DIS to "assess a child's perception of threat to his or her own life" (Perceived Life-Threat). The six items categorized under Life-Threatening Experiences targeted "specific, observable events" witnessed during the hurricane and were used to measure exposure to life-threat. The ten items used to measure Loss-Disruption reflected the post-hurricane period experienced by the child.

Table 1.

Hurricane Related Traumatic Experiences (HURTE) Questionnaire – Time1

Perceived Life Threat

1. At any time during the hurricane, did you think that you might die?

Life-Threatening Experiences

1. Did windows or doors break in the place you stayed during the hurricane?
2. Did you get hurt during the hurricane
3. Did you see anyone else get badly hurt during the hurricane?
4. Did you have to go outside during the hurricane because the building you were staying in was badly damaged?
5. Did a pet you liked get hurt or die during the hurricane?
6. Did you get hit by anything falling or flying during the hurricane?

Loss-Disruption Experiences

1. Was your home badly damaged or destroyed by the hurricane?
2. Were your clothes or toys ruined by the hurricane?
3. Has it been hard to see your friends since the hurricane because they moved or you moved?
4. Did you or your family have trouble getting enough food or water after the hurricane?
5. Did you move to a new place because of the hurricane?
6. Did you have to go to a new school because of the hurricane?
7. Did you have to live away from your parents for a week or more because of the hurricane?
8. Has anyone stolen anything from your home since the hurricane?
9. Did one of your parents lose his or her job because of the hurricane?
10. Did your pet run away or have to be given away because of the hurricane?

The authors found that the HURTE scores accounted for more than 60% of the variance in PTSD symptom severity in children following Hurricane Andrew. The authors concluded that aspects of "exposure," life-threat, and loss-disruption, were all important to predicting PTSD symptoms in children. The authors indicated that as not all disasters involve life-threatening events, clearer descriptions of "exposure" as related to trauma may assist in clarifying the prediction of PTSD symptom emergence (e.g. Lonigan et al. 1991, 1994; Pynoos & Nadar, 1998).

In a follow-up study, La Greca and colleagues (1996) created a Time 2 HURTE to assess children's self-reports of continuing loss and disruption. The Time 2 HURTE (see Table 2) consisted of ten questions, five of which were answered in "yes/no" format. One item asked, "How many times have you moved since the hurricane?; for this item responses of "two times" or "more" were scored as 1, and responses of "none" or "once" were scored as 0. Four items asked about the degree to which the respondent felt "bothered by" his or her environment or problems related to post-hurricane life. Response choices "Not at all" or "A little" received a score of 0; response choices "A lot" or "A whole lot" received a score of 1. These ten items were summed to obtain a total score of loss/disruption events since the hurricane.

In an unpublished manuscript from May 2005, Vernberg attempted to develop psychometric properties for the HURTE. Using the Time 1 (Vernberg et al., 1996) and Time 2 items (La Greca et al., 1996) he calculated sensitivity, specificity, positive predictive power, negative predictive power, and odds ratios (Pina, Silverman, Alfano, & Saavedra, 2002) for individual HURTE items. He concluded that six of the nine Life Treat items had significant odds ratios in predicting PTSD. However, only three of the eleven Loss-Disruption items significantly predicted PTSD. Only two of the ten items related to events "Since the Hurricane," were significant.

Other researchers have attempted to clarify the role of disaster exposure in predicting PTSD symptoms in youth. One year after Hurricane Hugo, Hardin and colleagues (1994) created a self-report survey entitled "The Carolina Adolescent Health Project Survey" (CAHPS) to assess the extent to which exposure was related to psychological distress . The CAHPS included five components: demographic variables, Hurricane Hugo exposure, non-violent and violent life events, social support and self-efficacy, and psychological distress. Total exposure to

Table 2.

Hurricane Related Traumatic Experiences (HURTE) Questionnaire – Time 2

Since the Hurricane
1. Is one of your parents now out of a job?
2. Living in a house with a roof that leaks?
3. Have to travel longer to get to your school?
4. Living in the house where you lived before?
5. Has the damage to your house been fixed?
6. How many times have you moved?
7. How bothered by the way things look at home?
8. How bothered by the way things look in the neighborhood?
9. How bothered by family members not getting along?
10. How bothered by problems spending time with friends?

the hurricane was measured by five items, each of which ranged from "0" indicating no exposure, to "4" indicating maximum exposure. The five items assessed whether the students were with their parents or others during the hurricane, experienced the death or injury of a friend or family member, suffered physical injury to the self, were forced to move out of their home, and feared being injured. The authors found that increased hurricane exposure was correlated with psychological distress. However, the measure of "exposure" was fairly limited in scope and only contained one item related to hurricane aftermath.

Interested in the impact of Hurricane Hugo on younger developmental levels, Swenson and colleagues (1996) investigated trauma-related emotional symptoms and general behavior problems in preschool children fourteen months after the storm. The authors created a "Hurricane Experiences Questionnaire" which reflected families' experiences such as: where they were residing at the time of the storm?, did they stay in town during the hurricane?, did the respondent experience significant distress or believe a loved one might die?, the length of time the family was removed from their home, and the "extent of any property loss, income loss,

disruption of routine or distress due to the storm." Parent respondents also completed other questionnaires, including the Pediatric Emotional Distress Scale (PEDS; Saylor, Swenson, Stokes, & Taylor, 1999), and two others questionnaires created for the purpose of the study: a life-stressors questionnaire examining various life events using a five-point Likert scale, and a longevity of symptoms questionnaire which focused on amounts of time following Hugo in which parents and their children experienced various symptoms of distress.

The authors' findings were somewhat limited. The only variable found to be a significant predictor of behavioral difficulties exhibited by preschool children was "significant distress of the mother due to the hurricane aftermath." Although some of their findings were consistent with previous research, the authors noted their methodology was flawed, including a lack of ethnic and income diversity, their reliance on mothers' perceptions, and lack of psychometric support for the questionnaire they created.

Several researchers attempting to assess hurricane exposure have used the HURTE but made modifications or added additional items to the questionnaire. Weems and colleagues (2007), for example, assessed exposure to Hurricane Katrina as part of a contextual model to distinguish regional differences. The authors created a 23-question survey based on the HURTE and questionnaires used in other similar studies (Norris, Perilya, & Murphy, 2001). Hensley and Varela (2008) investigated PTSD symptoms and somatic complaints in middle school children after Hurricane Katrina. To assess exposure, the authors utilized the HURTE and added three additional questions to "reflect conditions specific to New Orleans." They used the summation of 25 items to provide a total score of "hurricane-related exposure and disruption from daily routines." Similarly, Pina and colleagues (2008) used questions from the HURTE but added items reflecting events specific to Hurricane Katrina (e.g., lack of food or water, witnessed

people fighting). They used the total number of events endorsed as a covariate in their analyses to assess social support, discrimination, and coping as predictors of PTSD.

Measuring Exposure to Identify Those in Need of Services

Although child-focused disaster research has increased substantially, the use of psychometrically sound, comprehensive measurement of the disaster experience is lacking. The availability of psychometrically sound measures is essential to conducting quality research on variables related to children's adjustment following a disaster. The need for well constructed measures that are not time consuming also is very important in identifying individuals most at risk for developing psychological symptoms.

Purpose of the Current Study

Psychological symptoms seen in children after experiencing a disaster may persist for months or years. Research consistently indicates that the degrees of exposure to and loss from a disaster are the most important predictors of psychological distress in children (Kreuger & Stretch, 2003). Thus, evaluating exposure and loss with the use of a comprehensive, psychometrically sound instrument is very important to the quality of research on children's adjustment.

The HURTE remains the most referenced questionnaire for measuring children's hurricane experiences. However, the HURTE, as well as all other available measures were constructed rationally and have questionable psychometric characteristics. The conceptualization of "exposure" utilized in the HURTE includes life-threatening experiences and loss/disruption as the significant variables accounting for PTSD symptomatology. Expanding on this conceptualization, the current study will develop a comprehensive, psychometrically sound measure of hurricane experiences. The purpose of the current study is to (1) create the Hurricane Experiences and Life-Disruption (HELD) survey, including the item generation and selection, as

well as elimination of items; and (2) to compare the predictive utility of the HELD to that of the HURTE.

PHASE 1: ITEM GENERATION

The purpose of this phase was to create a large pool of items reflecting child experiences during and after a hurricane from which a subgroup of items would eventually be retained to form the HELD.

Method

To find which events are most predictive of PTSD, a pool of items reflecting hurricane experiences and loss was developed. Just as items from the HURTE were developed from rationale of the authors' clinical experiences, questions for the item pool were developed similarly. Using logically derived items, the purpose of these questions was to identify items regarding child hurricane experiences that offer additional predictive validity of PTSD. These items were developed through expert review as part of a large-scale study examining the effects of Hurricane Katrina. Questions and assessment measures used as part of the larger study were completed by both the child and the mother.

Item Review and Selection

Questions proposed for the item pool were presented to a team of 10 expert practitioners in the field of child psychology. Items were reviewed for appropriateness, relevance, and overall readability. Recommendations were made regarding wording changes, suggestions of additional items, and reported duplicate or redundant items. After eliminating redundant items, 43 items remained, including those from the HURTE, and were retained for the current study (See Appendix A). The readability of the HELD-initial was calculated at reading grade level 4.8 using the Flesch-Kincaid Reading Level Formula (MS Word 2000).

Item Scoring

Scoring for potential items was designed to mirror the scoring of the HURTE. Questions were scored as either receiving "0" or "1" point, dependent upon the response structure "yes" or

"no" respectively. For example, in the HURTE an item such as "Did you see anyone else get hurt during the hurricane?" answered as "yes" receives 1 point. The directionality of the questions also was taken into account when creating the scoring. For example, an original item such as "Have you been able to make new friends since the hurricane?" in which "yes" and "no" were the potential responses, an answer of "no" received 1 point. Nine questions were answered in Likert format but were scored in dichotomous format, similar to La Greca et al. (1996). These items typically reflected discontent with the child's current environment. For example, the question "How happy are you at your new school?" had possible answer choices of "Very Happy, Happy, It's Okay, Unhappy, Very Unhappy." Answers of "Very Happy" or "Happy" received 0-points, while answers of "It's okay", "Unhappy", or "Very Unhappy" received 1-point.

PHASE 2: ITEM SELECTION AND MEASURE REFINEMENT

The purpose of this phase was to reduce the pool of 43 items to produce an inventory of questions highly predictive of PTSD. Items that produce significant odds ratios in predicting PTSD will be retained for the HELD.

Method

Participants

Participants were 258 mother-child dyads recruited from public and private elementary and middle schools in Orleans and surroundings parishes. Participants were recruited from grades 4 through 8 through their schools, three to eight months post-Hurricane Katrina. As part of a larger, grant-based study, all participants identified themselves as being directly impacted by the hurricane.

Participants were excluded based on the following conditions: special education placement due to a mental disability or autism, suspicion of being unable to comprehend or read the questionnaires, or failure to complete all parts of the questionnaire.

Child participants ranged in age from 8 to 16, with an average age of 11.63 (SD = 1.54). The sample was comprised of 44% males and 56% females and was predominately African American (66.3%), with other ethnicities present as well: Caucasian (23.2%), Asian American (4.7%), Hispanic (2.3%), Native American (.8%), and other-race identified (.4%). Approximately 3.1% of the sample failed to identify their race. The majority of the families were of low socioeconomic status, with a mean total yearly family income of approximately $17,000. Child demographics are presented in Appendix B; mother demographics are presented in Appendix C.

Measures

Demographic Questionnaire. A demographic questionnaire was created to obtain participant demographic information regarding child and family characteristics, such as age, gender, grade, family composition, maternal education, employment, and income (See Appendix D). Mothers completed the demographic questionnaire.

Hurricane-Related Traumatic Experiences (HURTE; Vernberg et al., 1996). The HURTE was developed by Vernberg and his colleagues for the purposes of evaluating hurricane-related traumatic experiences. It yields three factor scores: Perceived Life-Threat, Life-Threatening Experiences, and Loss/Disruption. While there are no published findings regarding the psychometric properties of the HURTE, it has established predictive validity (La Greca et al., 1996; Vernberg et al., 1996). The total score yielded by the HURTE will be used in the analyses. The questions that comprise the HURTE will also be separately used in combination with other items related to hurricane exposure in analyses related to prediction of child symptomatology (See Table 1).

Hurricane Experiences and Life Disruption (HELD). Children were asked to answer additional questions related to their experiences before, during, and after the hurricane. The questions include items from the HURTE and also reflect other life-threatening experiences not examined by the HURTE, additional aspects of personal loss, disruption from home environment, disruption from school environment, and personal discontent with one's environment.

Other Hurricane Related Experiences. As part of a larger study, mothers were asked to complete questions regarding their children's hurricane experiences. In retrospect, these questions would have been best asked to the child (for example "Did your child evacuate for the hurricane?", "Did your child witness violence or abuse during or after the storm?"). It was

ultimately decided that five of the these items should be considered as potential candidates for the HELD with the intention that it was better to assess the role of the event taking place, rather than leave a potential and important void in assessment of life-threatening experiences or loss-disruption.

UCLA PTSD Reaction Index (Pynoos et al., 1998). The UCLA PTSD Reaction Index is a 24-item screening instrument and is a revised version of the widely utilized Child PTSD Reaction Index (CPTSD-RI; Nader, Pynoos, Fairbanks, & Frederick, 1990). This revised measure screens for the diagnosis of PTSD in children and adolescents according to the DSM-IV (American Psychiatric Association, 1994). It has demonstrated high internal consistency, test-retest reliability, and high sensitivity and specificity (Pynoos, Goenjian, & Steinberg, 1998; Rodriguez, Steinberg, Saltzman, & Pynoos, 2001; Steinberg, Brymer, Decker, & Pynoos, 2004). For the purposes of this study, the Index Summary Score was used as an overall indicator of child-reported PTSD symptoms. Steinberg, Brymer, Decker, & Pynoos (2004) recommend using a cut-off score of 38 when detecting PTSD.

Procedure

Following institutional review board approval, permission to recruit in the reopened public schools was obtained from the Orleans and Jefferson Parish school boards. Schools agreeing to participate in recruitment were consulted regarding their preference of how recruitment would take place. Recruitment procedures included the use of flyers sent home to mothers and questionnaire packets sent home directly. When flyers were sent home, interested participants were then provided with the questionnaire packet. All questionnaire packets contained information on the purpose of the study, parental consent forms (Appendix D), contact information for the researchers for the purpose of questions regarding the study and information pertaining to psychological referrals in their area. Packets also contained the above listed

questionnaires (Demographic Questionnaire and Other Hurricane-Related Questions) as well as other measures that were included as part of a larger grant study, funded by the National Institute of Mental Health. Upon the receipt of a completed mother questionnaire packet, including consent for the child to participate, arrangements were made to meet with the child at his or her school to complete the child-report questionnaires. The child was provided information regarding the purpose of the research study and child assent was obtained. Student participants completed the above listed questionnaires, as well other self-report questionnaires incorporated as part of the larger study. Children completed the questionnaires in the presence of a trained member of the research team. Children with reading difficulties were provided with assistance by having the questionnaire read to them.

Depending on the preference of the participating school, various incentives and compensations were utilized, including a $5 cash prize, participation in a pizza party, or coupons to be used at the school's snack shop. Mothers participating were entered into a drawing for a cash prize or were individually compensated $20 for their participation. A coding system was designed to track the dyads and their information allowing for mother and child responses to remain anonymous.

Results

Missing Data

Multiple imputation (MI) techniques (Rubin, 1987) were used to impute missing data. MI replaces each missing value by drawing a random sample of the missing values from its posterior distribution of complete values (observed and missing). The PROC MI and PROC MIANALYZE procedures in SAS 9.1 were used to complete MI for this dataset. Listwise or case deletion would have been inefficient since the multivariate analysis presented in this data set

involves a large number of items. Such procedures would have discarded a high proportion of study subjects, even if the per-item rate of missingness is low, as was the case of this data set.

Descriptive Statistics: PTSD

The UCLA PTSD Index Total mean for the sample was 15.91 (SD = 11.916, score range 0 - 52). The recommended cut-off score of 38 (Steinberg, Brymer, Decker, & Pynoos, 2004) was utilized for classifying PTSD in the sample. This criterion resulted in 13.1% of the sample classified as having PTSD; 86.9% did not meet diagnostic criteria for PTSD.

Item Selection: Logistic Regression

In order to identify those experiences that have the highest diagnostic predictive validity, logistic regression procedures were utilized. Logistic regression is a widely used regression technique for dichotomous variables, such as those being examined in the current study. In logistic regression, the odds ratio (OR) reflects the likelihood of a respondent having PTSD if the item is endorsed. An OR "considers with a single value the base rate of a disorder, the base rate of symptom, the odds of a diagnosis given a symptom, and the odds of a diagnosis given the absence of a symptom" (Lonigan, Anthony, and Shannon, 1998) (see Table 3).

Item Retention

Using SPSS for Windows, Version 16.0.1, odds ratios (OR) were calculated for the 43 items retained from Phase 1. Of those 43 items, 20 had significant odds ratios (see Table 4). The 20 items with significant odds ratios were retained for the HELD. The items were summed for a total HELD score (possible maximum score 20). The score range for the sample was 0 to 18, with a mean of 5.35 (SD = 3.62). The Cronbach alpha coefficient for the HELD was .770.

Table 3.

Definitions and Computation for Diagnostic Efficiency Indices

	Item Endorsement	
Diagnosis	**Present**	**Absent**
Present	a	b
Absent	c	d

Diagnostic Efficacy Index	**Definition**	**Computation**
Sensitivity	Probability of item endorsement if diagnosis	a / (a+b)
Specificity	Probability of item not endorsed if no diagnosis	d / (c+d)
Positive Predictive Power	Probability of diagnosis if item endorsed	a / (a+c)
Negative Predictive Power	Probability of no diagnosis if item not endorsed	d / (b+d)
Odds Ratio	Ratio of odds of diagnosis if item endorsed to odds of no diagnosis if item not endorsed	(a / c) / (b / d)

Note: a, b, c, and d refer to the number of cases within each cell of the 2x2 table of presence or absence of a symptom and diagnosis

Table 4.

Logistic Regression Results for Items with Significant Odds Ratios

Question	***B***	**S.E**	**Wald**	***df***	***p***	**Odds Ratio**
At any time during the hurricane, did you think you might die?	1.359	.364	13.913	1	.0001	3.893
Did you get hurt during the hurricane?	1.786	.634	7.926	1	.005	5.964
Did you see anyone else get hurt during the hurricane?	1.452	.374	15.107	1	.0001	4.272
Did you get hit by anything falling of flying during the hurricane?	1.373	.654	4.411	1	.036	3.948
Did your child witness violence or abuse during or after the storm?	1.100	.568	3.748	1	.053	3.003
Was your home badly damaged or destroyed by the hurricane?	1.007	.405	6.188	1	.013	2.738
Were your clothes or toys ruined by the hurricane?	.903	.383	5.567	1	.018	2.466
Did one of your parents lose his or her job because of the hurricane?	.768	.357	4.623	1	.032	2.155
Did you or your family have trouble getting enough food or water after the hurricane?	1.343	.375	12.797	1	.0001	3.829
Do you feel like you are behind in your classes?	1.467	.369	15.782	1	.0001	4.338
Do you feel alone in your new school?	1.370	.480	8.132	1	.004	3.936
Are kids at your new school nice to you?	1.163	.404	8.273	1	.004	3.200
How much are you bothered by the way things look in your neighborhood?	1.924	.397	23.489	1	.0001	6.851

$p > .05$

Table 4. Continued

Question	***B***	**S.E**	**Wald**	***df***	***p***	**Odds Ratio**
How much are you bothered by problems spending time with friends?	.834	.376	4.909	1	.027	2.302
How much are you bothered by family members not getting along?	2.058	.405	25.890	1	.000	7.833
How much are you bothered by the way things look at home?	1.990	.400	24.744	1	.000	7.318
How much are you bothered by problems at school?	1.807	.395	20.956	1	.000	6.094
How much are you bothered by living with too many people?	1.153	.467	6.095	1	.014	3.169
How scared or upset were you during the hurricane?	1.224	.393	9.711	1	.002	3.401
Overall, how upset about things have you been since the hurricane?	1.777	.407	19.071	1	.000	5.915

$p < .05$

PHASE 3: MEASURE PROPERTIES AND VALIDATION

The purpose of this phase was to identify the predictive accuracy of the HELD and the HURTE. A comparison of the two measures was conducted as well.

Method

Measures

Hurricane-Related Traumatic Experiences (HURTE; Vernberg et al., 1996). As described previously, the HURTE Time 1 will be used for comparative analyses. The items were totaled for the HURTE Total Score.

Hurricane Experiences and Life Disruption (HELD). The 20 items retained from Phase 2 for the HELD were totaled to yield a HELD Total Score.

UCLA PTSD Reaction Index (Pynoos et al., 1998). The Index Summary Score of the UCLA PTSD Reaction Index with a diagnostic cut-off of 38 was used for as an overall indicator of child-reported PTSD symptoms.

Results

Receiver-Operator Characteristic Curves

Receiver-Operator Characteristic (ROC) Curves were utilized to examine the predictive accuracy of the HELD and the HURTE in predicting PTSD symptomatology. ROC curves provide a view of the ability of a test to make the distinction being examined. The curve is graphed by plotting True Positives (Sensitivity) on the y-axis and False Positives (1 – Specificity) on the x-axis. ROC curves are useful because they allow the user to determine the cost associated with any point on the curve. The curve shows where the cut-off or "threshold" is for finding a certain number of True Positives, and False Positives will be incurred when using a given threshold. The better the ROC curve, the closer it will get to the upper left corner of the graph, meaning the test is generating more True Positives and fewer False Positives. The more

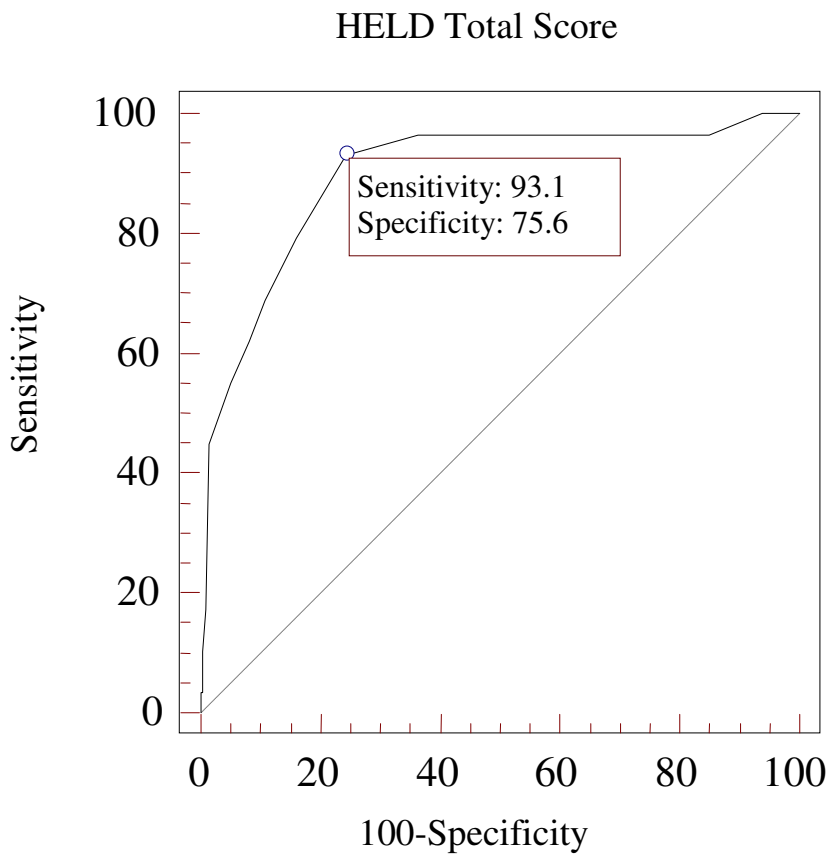
useless the curve, meaning the lower its classification ability, the more closely it will approximate a forty-five degree line from the lower left to the upper right of the graph. A curve that resembles this straight forty-five degree line means the test is as accurate as random guessing in classifying test results (Langdon, 2006; Schoonjans, 2009).

While there are several ways to classify a ROC curve, the current study used the Area Under the Curve (AUC) approach. This number gives the percentage of tests classified correctly. The AUC can range from 0.5, reflecting chance prediction, to 1.0, reflecting perfect prediction. Coordinates of the curve were used to select the optimal cutoff score for predicting PTSD symptom emergence. MEDCALC for Windows, Version 10.3.0 (MedCalc Software, Full Version, Mariakerke, Belgium) was used to calculate the ROC Curve for the HELD and the HURTE.

According to the ROC curve analysis, the HELD predicted the presence or absence of PTSD at levels significantly greater than chance, AUC = .898, $p < .0001$ (see Figure 1). According to the ROC curve analysis, the HURTE also predicted the presence or absence of PTSD at levels significantly greater than chance, AUC = .794, $p < .0001$ (see Figure 2).

Comparison of Predictive Accuracy

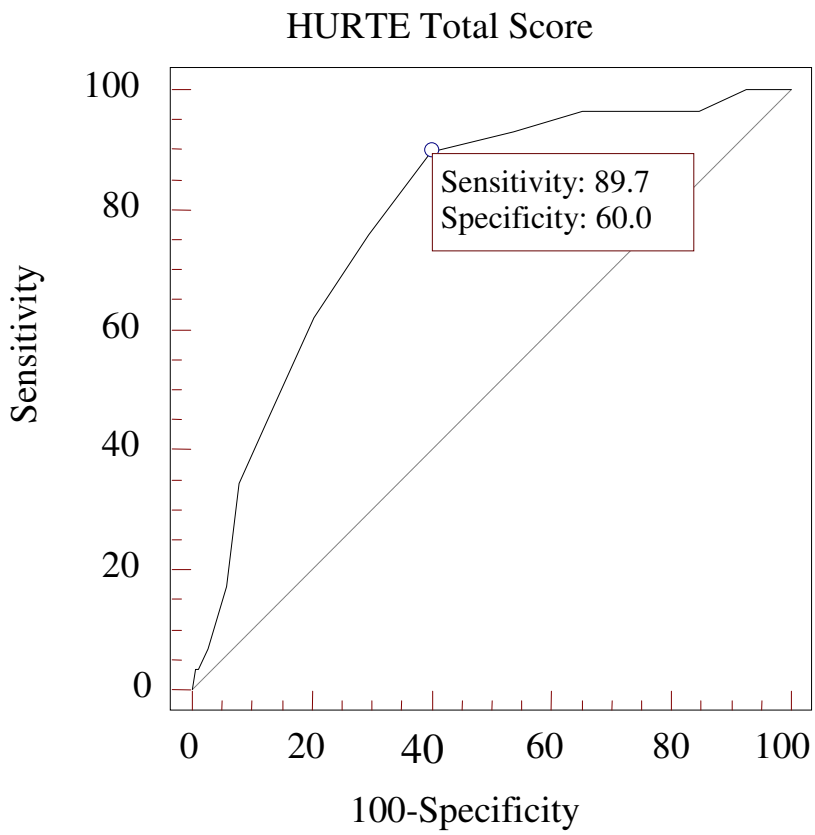
The HELD and the HURTE were compared for differences in predictive accuracy. Pairwise comparison of the area under the ROC curves revealed the difference between the areas to be 0.103 (standard error = 0.0361, CI 0.0321 to 0.174), resulting in a z-score = 2.848, p = 0.004 indicating that the predictive accuracy of the two measures is significantly different (see Figure 3).



Area Under Curve (AUC) = .898, p < .0001

Figure 1.

Receiver-Operator Characteristic (ROC) Curve Analysis for the HELD



Area Under Curve (AUC) = .794, p < .0001

Figure 2.

Receiver-Operator Characteristic (ROC) Curve Analysis for the HURTE

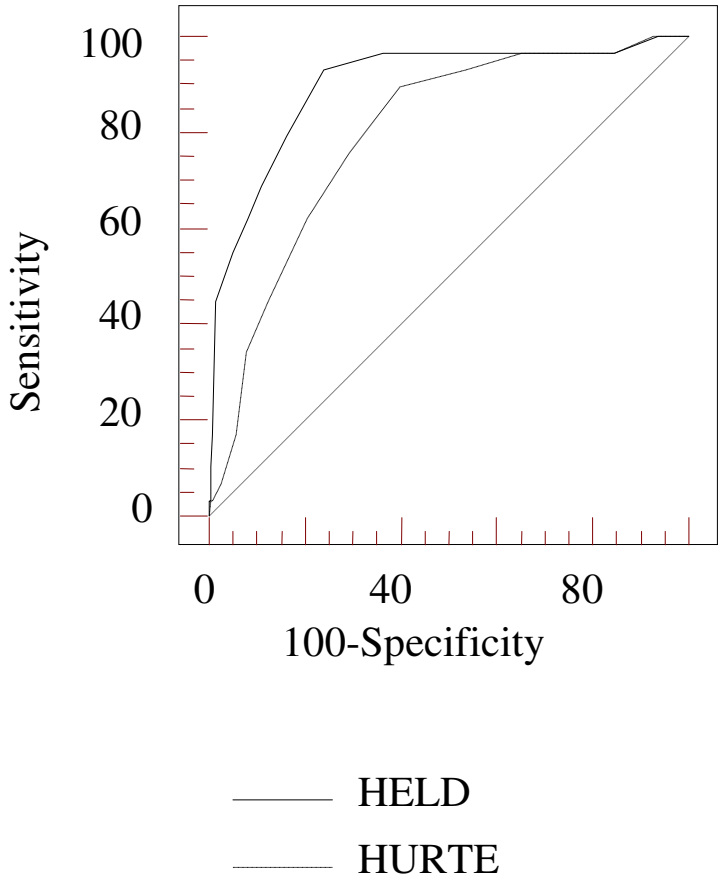


Figure 3.

Comparison of Receiver-Operator Characteristic (ROC) Curves

Predictive Threshold for the HELD

The coordinates of the curve were then used to determine an appropriate cutoff score for the HELD. This will be the cutoff score used for screening children who may be at-risk for PTSD. By balancing the need for sensitivity and specificity, the cutoff score selected for the HELD was 6. Table 5 displays the sensitivity and specificity reflected in each potential scoring block.

Table 5.

Criterion values and coordinates for the HELD

Criterion	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
>=0	100.00	0.00	13.1	
>0	100.00	6.22	13.8	100.0
>1	96.55	15.03	14.6	96.7
>2	96.55	30.05	17.2	98.3
>3	96.55	41.97	20.0	98.8
>4	96.55	50.78	22.8	99.0
>5	96.55	63.73	28.6	99.2
>6 *	93.10	75.65	36.5	98.6
>7	79.31	83.94	42.6	96.4
>8	68.97	89.12	48.8	95.0
>9	62.07	91.71	52.9	94.1
>10	55.17	94.82	61.5	93.4
>11	44.83	98.45	81.2	92.2
>12	17.24	98.96	71.4	88.8
>13	10.34	99.48	75.0	88.1
>14	3.45	99.48	50.0	87.3
>15	3.45	100.00	100.0	87.3
>18	0.00	100.00		86.9

* Optimal cut-off score

DISCUSSION

This study aimed to identify hurricane related experiences and disruption in the lives of school-aged children following Hurricane Katrina. In the field of hurricane-trauma research, there is a lack of assessment approaches for investigating hurricane-related experiences founded on psychometric properties. The current study is unique because it intended to examine a pool of life-threatening events and post-hurricane life disruption and identify specific events predictive of post-traumatic stress symptomatology in children. The items identified as significantly predictive of post-traumatic stress symptomatology were retained for the creation of a screening instrument, the Hurricane Experiences and Life Disruption (HELD) questionnaire.

The pool of 43 items administered to subjects reflected a wide-range of hurricane and post-hurricane events, including perceived life-threat, life-threatening experiences, loss of possessions, disruption from social support, disruption from home environment, and disruption from school environment. It also contained items reflecting a child's overall satisfaction with his or her surrounding environments since the hurricane.

Of the 43 items in the potential pool, 20 were strongly and significantly predictive of post-traumatic stress symptomatology. Those items were retained for the HELD. Identified receiver-operator characteristics (ROC) curves for the HURTE and the HELD found both measures to be significant predictors of PTSD. Pairwise comparison of the ROC Curves found the HELD to be a significantly stronger predictor of PTSD. Using the ROC Curve and balancing the need for sensitivity and specificity, the optimal number of endorsed items on the HELD in predicting PTSD was six.

The 20 items retained for the HELD strongly and significantly predicted PTSD symptomatology. As a screening instrument, endorsement of six items indicates that a child may be experiencing PTSD symptomatology. The low number needed for endorsement reflects the

strength and predictive power of the retained items. Of the 20 retained items, 10 were items derived from the HURTE Time 1; 4 items were derived from the HURTE Time 2. The remaining 6 were items created as part of the current study.

While this study makes several important contributions to the existing literature, some caveats should be noted. The data collected for this study comes from a larger Hurricane Katrina grant project. The population sampled was from the New Orleans area, the geographic area that experienced the largest displacement. Due to the scale of displacement as a result of Hurricane Katrina, it is possible that the HELD may not be as useful for assessment following smaller hurricanes that do not result in displacement.

Other limitations of the current study reflect what is feasible and realistic in natural disaster research such as a large research project conducted following Hurricane Katrina. In the pool of potential items, there are some questions that in retrospect should be alternatively worded for clarity. Such instances include questions like "How satisfied are you with your new school since the hurricane?" would be better worded as "How satisfied or happy have you been with your school since the hurricane?" since some of the students completing the questionnaire had returned to their original school and therefore left the item blank.

Another item pool limitation is that five questions from the initial 43 question item pool were asked to the parents instead of the child (for example "Did your child evacuate for the hurricane?"). Ultimately, they were included in this study with the intention that it was better to assess the role of the event with regards to PTSD symptomatology rather than to exclude it and leave a potential void. In future studies to validate the HELD, these items should be reworded to reflect the perspective of the child. The one item of this nature retained for the HELD, "Did your child witness violence or abuse during or after the hurricane?" should in future research and screening be worded "Did you witness violence or abuse during or after the hurricane?"

While child-focused disaster research has made great advances in understanding the conceptualization of child and adolescent disaster reactions, there has been far less focus on what variables are important in identifying those children who develop pathological reactions versus normal reactions (La Greca Silverman, Vernberg, & Roberts, 2002). The role of traumatic experiences during hurricanes in the emergence of PTSD symptoms in children has consistently been evidenced in research. This study adds new light to the potential role of life-disruption as important and significant events in predicting PTSD symptomatology. Whereas past research has divided these events into life-threat and loss-disruption, the results from this study reveal that these constructs may not adequately reflect the important variables involved. Additionally, this study highlights the important role of child perception in conjunction with specific events as at-risk predictors for PTSD symptomatology. The role of school adjustment following hurricanes is an important variable also warranting further investigation.

The need for assessment to identify individuals in need of services must consider the constraints of purpose, practicality, and population size. In post-disaster recovery stages, neither the clinicians, care providers (e.g. teachers, community resources), nor the families whose children are being assessed have the ability to endure long assessments (Saylor & DeRoma, 2002). Finch and Daugherty (1993) provide a framework for selecting assessment methods in post-disaster child populations: if the purpose for the assessment being conducted is for clinical decision making, then appropriate method selection is crucial as to preserve precious time, energy, and resources. Saylor and DeRoma (2002) explain that at a broad level, screening via rating scales can be utilized with minimal clinician time. Problems detected from screenings should be followed by further diagnostic investigation.

The 20 items identified for the HELD provide a strong basis for the further development and refinement of a single method assessment with psychometric foundations to aid in

identifying vulnerable children and adolescents in need of services. Future research should focus on confirming the role of these events and further investigate the role of subjective perspective, as well as school adjustment, as predictors of PTSD symptomatology in children.

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APPENDIX A

VARIABLES FOR THE HURRICANE EVENTS AND LIFE DISTRUPTION SCALE

Variable/Item	Original Item or HURTE Item	Possible Reponses	Scoring
1. At any time during the hurricane, did you think you might die?	HURTE	Yes/No	No = 0 pt. Yes = 1 pt.
2. Did windows of doors break in the place you stayed during the hurricane?	HURTE	Yes/No	No = 0 pt. Yes = 1 pt.
3. Did you get hurt during the hurricane?	HURTE	Yes/No	No = 0 pt. Yes = 1 pt.
4. Did you see anyone else get hurt during the hurricane?	HURTE	Yes/No	No = 0 pt. Yes = 1 pt.
5. Did a pet you liked get badly hurt during the hurricane?	HURTE	Yes/No	No = 0 pt. Yes = 1 pt.
6. Did you get hit by anything falling of flying during the hurricane?	HURTE	Yes/No	No = 0 pt. Yes = 1 pt.
7. Did you have to go outside during the hurricane because the building you were staying in was badly damaged?	HURTE	Yes/No	No = 0 pt. Yes = 1 pt.
8. Did you have to be rescued from the place you were staying in during or after the hurricane?	Original	Yes/No	No = 0 pt. Yes = 1 pt.
9. Did your child evacuate for the hurricane?	Original	Yes/No	No = 1 pt. Yes = 0 pt.
10. Did the housing/shelter your child in during or after the storm flood while your child was still in it?	Original	Yes/No	No = 0 pt. Yes = 1 pt.
11. Was your mother or father with you during the hurricane?	HURTE	Yes/No	No = 1 Yes = 0

Variable/Item	Original Item or HURTE Item	Possible Reponses	Scoring
12. After the hurricane was your child the victim of violence or abuse?	Original	Yes/No	No = 0 pt. Yes = 1 pt.
13. Did your child witness violence or abuse during or after the storm?	Original	Yes/No	No = 0 pt. Yes = 1 pt.
14. Was your home badly damaged or destroyed by the hurricane?	HURTE	Yes/No	No = 0 pt. Yes = 1 pt.
15. Were your clothes or toys ruined by the hurricane?	HURTE	Yes/No	No = 0 pt. Yes = 1 pt.
16. Did one of your parents lose his or her job because of the hurricane?	HURTE	Yes/No	No = 0 pt. Yes = 1 pt.
17. Did you pet run away or have to be given away because of the hurricane?	HURTE	Yes/No	No = 0 pt. Yes = 1 pt.
18. Has anyone stolen anything from you or your home since the hurricane?	HURTE	Yes/No	No = 0 pt. Yes = 1 pt.
19. Did your family lose your car or vehicle as a result of the hurricane?	Original	Yes/No	No = 0 pt. Yes = 1 pt.
20. Has it been hard to see your friends since the hurricane because they moved or you moved?	HURTE	Yes/No	No = 0 pt. Yes = 1 pt.
21. Did you or your family have trouble getting enough food or water after the hurricane?	HURTE	Yes/No	No = 0 pt. Yes = 1 pt.
22. Did you move to a new place because of the hurricane?	HURTE	Yes/No	No = 0 pt. Yes = 1 pt.
23. Did you have to live away from your parents for a week or more because of the hurricane?	HURTE	Yes/No	No = 0 pt. Yes = 1 pt.
24. Has your family had to move in with friends or relatives since the hurricane?	Original	Yes/No	No = 0 pt. Yes = 1 pt.
25. Did you have to go to a new school because of the hurricane?	HURTE	Yes/No	No = 0 pt. Yes = 1 pt.
26. Do any of your friends from your old school go to school with you now?	Original	Yes/No	No = 1 pt. Yes = 0 pt.

Variable/Item	Original Item or HURTE Item	Possible Reponses	Scoring
27. Do you feel like you are behind in your classes?	Original	Yes/No	No = 0 pt. Yes = 1 pt.
28. Is your new school harder than your old school?	Original	Yes/No	No = 0 pt. Yes = 1 pt.
29. Do you feel alone in your new school?	Original	Yes/No	No = 0 pt. Yes = 1 pt.
30. Are kids at your new school nice to you?	Original	Yes/No	No = 1 pt. Yes = 0 pt.
31. Have your teachers at school tried to talk to you about your hurricane experience?	Original	Yes/No	No = 1 pt. Yes = 0 pt.
32. Have teachers or adults at school tried to offer you or your family help since the hurricane?	Original	Yes/No	No = 1 pt. Yes = 0 pt.
33. How happy are you at your new school?	Original	1 – Very Unhappy 2 – Unhappy 3 – It's okay 4 – Happy 5 – Very Happy	Answer of 1, 2, or 3 = 1 pt. Answer of 4 or 5 = 0 pts.
34. How happy are you with your friends at your new school?	Original	1 – Very Unhappy 2 – Unhappy 3 – It's okay 4 – Happy 5 – Very Happy	Answer of 1, 2, or 3 = 1 pt. Answer of 4 or 5 = 0 pts.
35. How happy are you with your teachers at your new school?	Original	1 – Very Unhappy 2 – Unhappy 3 – It's okay 4 – Happy 5 – Very Happy	Answer of 1, 2, or 3 = 1 pt. Answer of 4 or 5 = 0 pts.
36. How much are you bothered by the way things look in your neighborhood	Original	1 – Not at All 2 – A Little 3 – A Lot 4 – A Whole Lot	Answer of 1 or 2 = 0 pts. Answer of 3 or 4 = 1 pt.

Variable/Item	Original Item or HURTE Item	Possible Reponses	Scoring
37. How much are you bothered by problems spending time with friends?	Original	1 – Not at All 2 – A Little 3 – A Lot 4 – A Whole Lot	Answer of 1 or 2 = 0 pts. Answer of 3 or 4 = 1 pt.
38. How much are you bothered by family members not getting along?	Original	1 – Not at All 2 – A Little 3 – A Lot 4 – A Whole Lot	Answer of 1 or 2 = 0 pts. Answer of 3 or 4 = 1 pt.
39. How much are you bothered by the way things look at home?	Original	1 – Not at All 2 – A Little 3 – A Lot 4 – A Whole Lot	Answer of 1 or 2 = 0 pts. Answer of 3 or 4 = 1 pt.
40. How much are you bothered by problems at school?	Original	1 – Not at All 2 – A Little 3 – A Lot 4 – A Whole Lot	Answer of 1 or 2 = 0 pts. Answer of 3 or 4 = 1 pt.
41. How much are you bothered by living with too many people?	Original	1 – Not at All 2 – A Little 3 – A Lot 4 – A Whole Lot	Answer of 1 or 2 = 0 pts. Answer of 3 or 4 = 1 pt.
42. How scared or upset were you during the hurricane?	Original	1 – Not at All 2 – A Little 3 – A Lot 4 – A Whole Lot	Answer of 1 or 2 = 0 pts. Answer of 3 or 4 = 1 pt.
43. Overall, how upset about things have you been since the hurricane?	Original	1 – Not at All 2 – A Little 3 – A Lot 4 – A Whole Lot	Answer of 1 or 2 = 0 pts. Answer of 3 or 4 = 1 pt.

APPENDIX B

CHILD DEMOGRAPHIC VARIABLES: MEANS, STANDARD DEVIATIONS, AND FREQUENCIES

Child Variables	Frequency	Mean (Standard Deviation)
Child Age		*M* = 11.63 (1.54)
Gender		
Male	112	
Female	143	
No Answer	3	
Race		
African American	171	
Asian	12	
Caucasian	58	
Hispanic	6	
Native American	2	
Other	1	
No Answer	8	
Grade		
4th	33	
5th	56	
6th	56	
7th	57	
8th	45	
No Answer	9	

APPENDIX C

MOTHER DEMOGRAPHIC VARIABLES: MEANS, STANDARD DEVIATIONS, AND FREQUENCIES

Mother Variables	Frequency	Mean (Standard Deviation)
Mother Age		*M* = 38.93 (7.58)
Marital Status		
Never Married	72	
Married	112	
Separated	17	
Divorced	37	
Widowed	3	
No Answer	17	
Education Level		
6th grade or less	2	
Junior High	5	
Partial High School	30	
High School Grad	76	
Some College	81	
College Grad	38	
Graduate Degree	12	
No Answer	14	
Income Before Hurricane		
$0-4,999	40	
$5,000-9,999	23	
$10,000-14,999	26	
$15,000-24,999	35	
$25,000-34,999	39	
$35,000-49,999	24	
$50,000-74,999	30	
$75,000-99,999	10	
$100,00 +	5	
No Answer	25	

APPENDIX D

DEMOGRAPHIC QUESTIONNAIRE

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:

Child's current grade: _____

School your child attended BEFORE the hurricane? _____
(circle one: Public or Private)

School your child attended 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 you have completed?

_____ 6th grade or less
_____ Junior High School (7th, 8th, 9th grade)
_____ Partial High School (10th, 11th grade)
_____ High School Graduate
_____ Partial College (at least one year) Or Specialized Training
_____ Standard College or University Graduate
_____ Graduate Professional Degree (Master's, Doctorate)

INCOME:

Past income: What was the total annual income of your household **BEFORE** the hurricane? (Combine the income of all 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 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?
$ _____

APPENDIX E

PURPOSE OF STUDY AND CONSENT FORM

1. Study Title: Psychological Functioning of Children in the Aftermath of Hurricane Katrina

2. Performance Sites: Schools in Louisiana

3. Names and Telephone Numbers of Investigators: The following investigator is available for questions about this study, M-F, 8:00 am – 4:30 pm

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

4. Purpose of Study: The purpose is to study the effects of Hurricane Katrina on the adjustment of children and their parents and identify factors that aid in adjustment.

5. Participant Inclusion: Mothers and their children ages 7 – 14

6. Number of Participants: 400

7. Study Procedure: You and your child will spend approximately 1.5 hours completing several questionnaires and return them to the researchers. You and your child will be asked to complete the questionnaire packet at seven weeks, 7 months, 13 months, and 19 months post-hurricane. Your child's teacher will also be asked to complete one questionnaire 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 also 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 who complete a packet of questionnaires may be compensated with a monetary reward.

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 any additional questions regarding study specifics to the investigators. If I have any questions about participant's rights or concerns, I can contact Robert C. Matthews, Chairman, LSU Institutional Review Board, (225) 578k-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 completed the signature line above, the participant has agreed to participate.

_____ _____

Signature of Reader Date

VITA

Angie Pellegrin was born in Houma, Louisiana. A graduate of Vandebilt Catholic High School in 1998, she graduated from Louisiana State University Agricultural and Mechanical College in Baton Rouge in 2002, where she was a member of Mortar Board, Order of Omega, and Omicron Delta Kappa Honor Societies, a recipient of the Skip Bertman Leadership Scholarship, and named Greek Woman of the Year. In 2004, Ms. Pellegrin earned her Master of Arts degree in the field of psychology from Louisiana State University. A student of Dr. Mary Lou Kelley, Ms. Pellegrin is in the child clinical psychology program at Louisiana State University and is a candidate for the degree of Doctor of Philosophy. She completed her pre-doctoral internship at Florida State University in Tallahassee, Florida. Ms. Pellegrin's primary clinical focus is in the areas of learning disorders, behavioral disorders, assessment, and intervention design. Her post-doctoral plans include fulfilling her goal of returning to her hometown of Houma, Louisiana to practice child psychology. She has accepted a position with the Jefferson Neurobehavioral Group and Family Behavioral Health Center.