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DSM-IV, DSM-5, and ICD-11: Identification of Children with PTSD After Disasters

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DSM-IV, DSM-5, AND ICD-11: IDENTIFICATION OF CHILDREN WITH
PTSD AFTER DISASTERS

By

BreAnne Allen Danzi

A THESIS

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DSM-IV, DSM-5, AND ICD-11: IDENTIFICATION OF CHILDREN WITH
PTSD AFTER DISASTERS

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DSM-IV, DSM-5, and ICD-11:   (August 2015)
Identification of Children with PTSD
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Posttraumatic stress disorder (PTSD) is a frequently studied outcome in children after natural disasters. However, different criteria for diagnosing PTSD have been recommended by the 5th edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) and the proposed 11th edition of the *International Classification of Diseases* (ICD-11). DSM-5 advocates a broad approach to PTSD diagnosis, whereas ICD-11 proposes a narrow definition of PTSD. Although children are particularly vulnerable to PTSD following disasters, little is known about whether these revised criteria are appropriate for children, as diagnostic revisions were based mostly on adult research. The present study investigated rates of PTSD using DSM-IV, DSM-5, and ICD-11 criteria in two samples of children (ages 7 – 11) affected by a natural disaster. Children exposed to Hurricane Ike (n = 327) or Hurricane Charley (n = 383) completed self-report measures eight to nine months postdisaster. Diagnostic algorithms for DSM-IV, DSM-5, and ICD-11 (two versions) were used to calculate rates of "probable" PTSD. ICD-11 (Version 1) identified the most children with "probable" PTSD for Ike (18.3%) and Charley (10.7%). The omission of intrusive memories in ICD-11 criteria caused the Re-experiencing cluster to preclude the most children from meeting diagnosis, which differs markedly from DSM-IV and DSM-5 patterns of cluster endorsement. DSM-5

identified the fewest children for Ike (14.1%) and Charley (6.5%), indicating that a four-factor model of PTSD may be inappropriate for children. The DSM-5 Cognitions/Mood cluster was met by the fewest children, suggesting that these symptoms may not be developmentally sensitive. Of the children identified by any diagnostic system as having PTSD, only about a third were identified by all systems, indicating low agreement among systems. Children identified by all systems could be differentiated by age, perceived life threat, and actual life threat. Several risk factors identified by prior research (e.g., race/ethnicity, actual life threat, and immediate loss/disruption) were predictive of PTSD across diagnostic systems, although perceived life threat and negative life events were predictive of ICD-11 but not DSM-IV or DSM-5. These findings provide support for the ICD-11 proposal and question the suitability of DSM-5 criteria for preadolescent children, although additional research on developmentally-appropriate criteria is needed.

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Chapter 1: Introduction

Natural disasters are devastating and pervasive stressors estimated to affect 175 million children world-wide each year over the next decade (Seballos et al., 2011). Natural disasters have been shown to have a profound impact on the mental health of children, who are particularly vulnerable to psychological distress in the wake of disasters (La Greca & Silverman, 2009; Norris et al., 2002). One of the most frequently studied outcomes in youth mental health following disasters is PTSD. Numerous studies have reported high prevalence rates (e.g., 35%) of PTSD or its symptoms in youth after exposure to natural disasters (Goenjian et al., 2001; La Greca, Silverman, Lai, & Jaccard, 2010; Lai, La Greca, Auslander, & Short, 2013; Lonigan, Shannon, Finch, Daugherty, & Taylor, 1991; Vernberg, La Greca, Silverman, & Prinstein, 1996; Weems et al., 2010). PTSD is associated with substantial impairment in children, and has been used to identify individuals eligible for clinical interventions after a disaster (Jaycox et al., 2010).

Although PTSD is frequently studied in children and used to identify children in need of mental health services, experts disagree on diagnostic criteria for the disorder. Both of the major diagnostic systems used world-wide, the *Diagnostic and Statistical Manual of Mental Disorders* (DSM; American Psychiatric Association, 2013) and the *International Classification of Diseases* (ICD; World Health Organization, 2014a), have recently undergone or are currently undergoing substantial revisions. Specifically, DSM-5 was published in 2013 and ICD-11 is anticipated to be finalized in 2017 (American Psychiatric Association, 2013; World Health Organization, 2014b). Currently, the ICD-11 proposal for PTSD differs markedly from the DSM-5 criteria (Maercker et al., 2013),

as discussed below. It is not clear how well these new diagnostic systems capture the response of trauma-exposed preadolescent children (i.e., children ages 7 – 11 years).

The present study addressed the lack of data on the suitability of these new PTSD criteria for children by evaluating the implications of applying divergent PTSD definitions to samples of children who experienced devastating natural disasters. The overall goal of the study was to determine rates of "probable" PTSD using DSM-IV, DSM-5, and proposed ICD-11 definitions in children exposed to hurricanes. Additionally, overlap in the children meeting criteria using different diagnostic systems was examined and the relevance of variables predictive of PTSD was compared between diagnostic systems.

DSM-IV and the Shift to DSM-5

DSM-IV. DSM-IV, published in 1994, utilizes a three-factor model of PTSD reflected by 17 symptoms divided among three symptom clusters: Re-experiencing, Avoidance, and Arousal (American Psychiatric Association, 1994; see Figure 1). The Re-experiencing (B) cluster consists of five symptoms, namely intrusive memories (B1), nightmares (B2), flashbacks (B3), psychological distress (B4), and physiological distress (B5). The Avoidance (C) cluster contains seven symptoms: Avoidance of internal cues (C1), avoidance of external cues (C2), inability to recall trauma (C3), anhedonia (C4), detachment/estrangement (C5), restricted range of affect (C6), and sense of a foreshortened future (C7). Finally, the Arousal (D) cluster consists of insomnia (D1), irritability/anger (D2), difficulty concentrating (D3), hypervigilance (D4), and startle response (D5).

DSM-5 model of PTSD. A major change was the shift from the three-factor model of PTSD used in DSM-IV (Re-experiencing, Avoidance, and Arousal clusters) to a four-factor model adopted by DSM-5 (Friedman, Resick, Bryant, & Brewin, 2011). PTSD in DSM-5 includes four clusters, namely Re-experiencing, Avoidance, Cognitions/Mood, and Arousal (American Psychiatric Association, 2013; See Figure 1). The DSM-5 Re-experiencing cluster is analogous to the DSM-IV Re-experiencing cluster, with five symptoms. The Avoidance cluster was reduced from seven symptoms in DSM-IV to only two symptoms in DSM-5. The remaining symptoms from the DSM-IV Avoidance cluster were modified (in some cases) and moved to the DSM-5 Cognitions/Mood cluster, which contains a total of seven symptoms. The DSM-5 Arousal cluster consists of six symptoms (American Psychiatric Association, 2013). See Figure 1 for more detail.

New symptoms in DSM-5. DSM-5 retained elements of all 17 symptoms specified by DSM-IV and added new symptoms. One new symptom (D3) addresses distorted cognitions about self-blame or other-blame for the event, which has been observed in trauma victims and is typically targeted in cognitive-behavioral therapy for PTSD (Friedman et al., 2011). A related symptom (D2) specifies other maladaptive cognitions commonly observed in individuals with PTSD, including negative beliefs about oneself, other people, or the world. This symptom was intended to encompass the DSM-IV C7 symptom concerning a sense of foreshortened future (Friedman et al., 2011). The DSM-IV C6 symptom, restricted range of affect, was truncated to the inability to feel positive emotions and a new symptom about negative emotional state (DSM-5 C4) was added. The DSM-IV D2 symptom, irritability or outbursts of anger, was revised to

emphasize more aggressive behavior, based on violent and aggressive tendencies reported by multiple studies on veterans and one study on adult female flood victims (Friedman et al., 2011). Finally, a new symptom (E2) addressing reckless or self-destructive behavior was added, based on evidence of increased risk-taking behaviors, reckless driving, and risky sexual behaviors in adolescent and adult populations (Friedman et al., 2011).

ICD-10 and the Shift to ICD-11

ICD-10. ICD-10 was released in 1990, although its usage in the United States has been limited. Specifically, legislation has delayed the Department of Health and Human Services from transitioning from ICD-9 to ICD-10 codes until October of 2015 (Dimick, 2014). These delays have prompted many health care professionals in the United States to support skipping over ICD-10 altogether, as ICD-11 is expected to be presented to the World Health Assembly in May of 2017 (Fiegl, 2013; World Health Organization, 2014b). Furthermore, the ICD-11 committee did not feel compelled to use ICD-10 as a starting point in the same way that DSM-5 was explicitly derived from DSM-IV (Brewin, 2013; Friedman, 2013), making the comparison between ICD-10 and ICD-11 less relevant. The ICD-10 text also lacks a clear diagnostic algorithm. Thus, the present study focused on DSM-IV, DSM-5, and iterations of the proposed ICD-11 criteria.

ICD-11. The ICD-11 proposal uses a three-factor model of PTSD with Re-experiencing, Avoidance, and Arousal as symptom clusters (similar to DSM-IV), but includes fewer symptoms than DSM-IV or DSM-5 (World Health Organization, 2014a). The present study compared two versions of the ICD-11 proposal. In both versions, the Avoidance cluster consists of two symptoms (avoidance of internal and avoidance of

external cues) and the Arousal cluster also consists of two symptoms (hypervigilance and startle response). The Re-experiencing cluster differs between the two versions, as the role of intrusive memories has been a source of discussion (Brewin, 2014; Hafstad, Dyb, & Thoresen, 2014; Keeley, 2014). For the purposes of this study, Version 1 of the Re-experiencing cluster consists of intrusive memories, flashbacks, and nightmares. The Version 2 Re-experiencing cluster only includes flashbacks and nightmares. Thus, the inclusion of intrusive memories is the primary difference between Version 1 and Version 2. In summary, ICD-11 proposes six (Version 2) to seven (Version 1) symptoms in total, with at least one symptom from each of the three clusters required to meet for diagnosis (World Health Organization, 2014a; See Figure 1).

Which PTSD Definition Should Be Used?

Why are there different definitions? The DSM and ICD committees, which were both committed to developing evidenced-based and clinically useful criteria, arrived at different conclusions due to a number of factors (Friedman, 2013). Initially, many advocated harmonizing DSM-5 and ICD-11 definitions of PTSD, with the aim of fostering international collaboration and reducing unnecessary confusion (Bisson, 2013; First, 2009; Frances, 2009; Kupfer, Regier, & Kuhl, 2008). Substantial disparities in criteria were attributed to be partially due to different procedures used by the two committees and partially due to different conceptualization approaches (Brewin, 2013; Friedman, 2013). In considering procedures, the DSM-5 committee abided by a set of revision principles which specified that a high level of evidence was required to make any changes to DSM-IV (Kupfer et al., 2008). Conversely, the ICD committee "was

under no obligation to use the DSM-IV-TR or even the ICD-10 as a starting point" and were free to make more extreme changes (Brewin, 2013, p. 557).

In addition to procedural differences, divergent approaches of conceptualizing PTSD between the DSM and ICD committees was another reason for the discrepancies in criteria. DSM criteria take a "broad" approach to PTSD by providing a large number of potential symptoms that cover many clinical presentations. The broad approach allows for greater flexibility in making a diagnosis, but also includes many symptoms in the criteria that are common across multiple disorders (e.g., sleep disturbance, difficulty concentrating). In contrast, the ICD-11 proposal takes a "narrow" approach to PTSD by focusing on core features of the disorder. The narrow approach reduces the number of symptoms to evaluate and lessens potential overlap with other disorders, but may be less sensitive to variations in the manifestation of PTSD symptoms and to atypical presentations (Friedman, 2013).

Rationale for narrow versus broad approaches. Tension between the narrow approach (ICD-11) and broad approach (DSM-IV and DSM-5) to defining PTSD has been a source of controversy. Although the versatility of DSM-5 is lauded by broad-approach advocates as providing a "menu" of symptoms which covers the full range of clinically significant PTSD presentations (Friedman, 2013), proponents of the narrow approach criticize the complexity and variability of the broad DSM-5 criteria. Maercker and colleagues (2013) argue that the 20 symptom "menu" provided by DSM-5 is overly complex. For example, there are 636,120 symptom combinations that can meet criteria for PTSD (Galatzer-Levy & Bryant, 2013) and over one quintillion combinations when common comorbidities are taken into account (Young, Lareau, & Pierre, 2014). They

contend that a simpler approach to PTSD criteria would be easier for clinicians to use and more feasible to assess, particularly in countries which have few resources and where English is not the dominant language (Brewin, 2013; Maercker & Perkonigg, 2013). However, the DSM-5 field trials contradict the point that DSM-5 is too complicated for clinical use, as PTSD was among the disorders with the highest test-retest reliability (Friedman, 2013; Regier et al., 2013).

The utility of symptom overlap is another source of contention. Brewin and colleagues (2009) argued that under the broad DSM-IV conceptualization, individuals with mood and anxiety disorders could meet criteria for PTSD after experiencing an inadequately defined "traumatic event" without exhibiting the presentation typically associated with PTSD. For example, depressed individuals who exhibit rumination, anhedonia, social withdrawal, hopelessness about the future, insomnia, and concentration difficulties could be diagnosed with PTSD. Similarly, phobic individuals who show psychological or physiological distress in response to specific cues, avoidance of those cues, and arousal symptoms share many features of PTSD (Brewin, Lanius, Novac, Schnyder, & Galea, 2009). However, in an argument to retain co-occurring symptoms, Friedman (2013) notes that if this perspective was applied to medical diagnoses, key symptoms such as pain or fever would be removed due to their common co-occurrence in many illnesses.

Empirical Comparisons of PTSD Definitions

Comparison of DSM-IV and DSM-5 prevalence in adolescent and adult samples. Although little research has compared DSM-IV and DSM-5 prevalence specifically in preadolescent children, differences in prevalence rates have been noted for

older samples. In a sample of adolescent earthquake survivors, 39.8% met DSM-5 criteria and 37.5% met DSM-IV criteria for PTSD (Carmassi et al., 2013). Additionally, 19% of those who met DSM-5 criteria did not meet DSM-IV criteria and 14% of those who met DSM-IV criteria did not meet DSM-5 criteria (Carmassi et al., 2013). In a national sample of adults, lifetime prevalence for PTSD was 9.8% for DSM-IV and 8.3% for DSM-5 (Kilpatrick et al., 2013). Additionally, 12% of those who met DSM-5 criteria did not meet DSM-IV criteria and 25% of those who met DSM-IV criteria did not meet DSM-5 criteria (Kilpatrick et al., 2013).

Comparison of DSM and ICD prevalence in adolescent and adult samples. Although no studies to our knowledge have compared DSM and ICD criteria in children, prevalence rates have been identified in older samples. In a sample of hospital patients ages 16 – 70 years, the following prevalence rates of PTSD were identified using clinical interviews: DSM-IV = 5.9%, DSM-5 = 6.7%, ICD-10 = 9.0%, and ICD-11 = 3.3% (O'Donnell et al., 2014). The World Mental Health Surveys, which assess representative household samples across 13 countries (n=23,936), identified the following prevalence rates of PTSD: DSM-IV = 3.3%, DSM-5 = 3.0%, ICD-10 = 4.4%, ICD-11 = 3.2% (Stein et al., 2014). Of those individuals identified by at least one of the diagnostic systems, 33% met criteria for all four systems (Stein et al., 2014).

Which PTSD Definition Should Be Used for Children?

Although research which explicitly compares DSM-IV, DSM-5, and ICD-11 criteria in children is lacking, some evidence suggests that aspects of DSM-5 criteria may be inappropriate for children. The empirical support for the shift to a four-factor model of PTSD in DSM-5 was detailed by members of the DSM-5 Trauma, PTSD, and

Dissociative Disorders Sub-Work Group in a review of the literature supporting DSM-5 revisions (Friedman et al., 2011). Of the 22 studies noted when considering the change to four symptom clusters (Friedman et al., 2011), only two studies focused on youth samples (J L Anthony, Lonigan, & Hecht, 1999; Foy, Wood, King, King, & Resnick, 1997), and only one of those examined preadolescent youth (J L Anthony et al., 1999). Notably, both of these studies supported a three-factor model of PTSD. All of the studies that provided support for the four-factor model adopted in DSM-5 used adult populations.

The three-factor model of PTSD was deemed more appropriate for very young children in DSM-5, as separate criteria were created for preschool children (age six and younger) which utilizes a three-factor model (American Psychiatric Association, 2013). The preschool criteria specify that young children exposed to a trauma need to meet a minimum of four symptoms across three clusters, which is more similar to the ICD-11 clinical thresholds (minimum of three symptoms) than DSM-IV or DSM-5 (both require six symptoms). The preschool criteria places less emphasis on negative cognitions and avoidance, as children's developmental level may preclude them from experiencing or reporting these highly internalized and cognitively sophisticated symptoms (Scheeringa, Zeanah, & Cohen, 2011). DSM-5 revision principles, in which a high threshold of evidence was required to change any DSM-IV criteria, likely prevented these more developmentally sensitive criteria from being extended to school-age children (Kupfer et al., 2008). Whereas a number of studies investigated alternative diagnostic algorithms in preschool age children (Levendosky, Huth-Bocks, Semel, & Shapiro, 2002; Scheeringa, Peebles, Cook, & Zeanah, 2001; Scheeringa, Zeanah, Drell, & Larrieu, 1995; Scheeringa, Zeanah, Myers, & Putnam, 2003), less research explored adjusting diagnostic criteria in

older children. Therefore, in the case of children older than six years, there was insufficient evidence to meet the DSM-5 requirement of high levels of support needed for a deviation from DSM-IV criteria (Scheeringa et al., 2011). Thus, the four-factor model is intended for use with children above age six in DSM-5, even though it is not known how well this model fits preadolescent children.

Extending DSM-5 and ICD-11 Research to Preadolescent Children

A significant gap in the literature on DSM-5 and ICD-11 diagnostic categories for PTSD is that very few studies have examined children seven to eleven years of age. Research has primarily focused on adult populations, although some studies have looked at preschool-age children and adolescents (Scheeringa et al., 2011). Given the paucity of research focusing on preadolescent children, the current study examined rates of children's "probable" PTSD using the DSM-IV, DSM-5, and ICD-11 definitions of PTSD, and compared characteristics of children identified by different diagnostic systems. Rates of DSM-IV, DSM-5, and ICD-11 PTSD were identified in two separate samples of children exposed to devastating natural disasters in order to identify patterns of PTSD prevalence across different samples. This study used data from two large samples of children exposed to Hurricanes Ike (2008) and Charley (2004), which have been published in prior research (La Greca, Lai, Joormann, Auslander, & Short, 2013; La Greca et al., 2010; Lai et al., 2013).

This study also investigated whether key variables that have been found to predict children's symptoms of PTSD in prior child disaster work were also predictive of children who "met criteria" for each of the diagnostic systems. Specifically, the study examined demographic variables (e.g., gender, ethnicity), hurricane-related stressors

(e.g., life threat, loss and disruption), and risk factors (e.g., stressful life events). In previous disaster research, girls have been found to be more at risk for developing PTSD than boys (Shannon, Lonigan, Finch, & Taylor, 1994; Terranova, Boxer, & Morris, 2009; Weems et al., 2010). Ethnicity has also been identified as a predictor, with minority children more likely to develop PTSD than non-minority children (La Greca, Silverman, Vernberg, & Prinstein, 1996; Terranova et al., 2009). Higher levels of hurricane exposure have been found to be related to higher levels of PTSD (Terranova et al., 2009). Specifically, actual life threat, perceived life threat, immediate loss/disruption, and ongoing loss/disruption have been shown to be related to PTSD symptom severity (La Greca et al., 1996; Vernberg et al., 1996; Yelland et al., 2010). Finally, children who experienced more stressful life events (e.g., divorce) also reported higher levels of PTSD (La Greca et al., 1996). This study explored how the use of different diagnostic systems affected the relationship between PTSD and these key risk factors established from previous research.

Summary of Specific Aims and Hypotheses

The present study investigated PTSD symptoms reported by children after two natural disasters (Hurricanes Ike and Charley) and compared prevalence rates using DSM-IV, DSM-5, and proposed ICD-11 diagnostic criteria. Diagnostic algorithms were created for the three diagnostic systems and used to identify children who met criteria for "probable" PTSD according to each system. The specific aims of the study are summarized below:

Aim 1: Rates of "Probable" PTSD

      Aim 1a. The rates or percentages of children who would likely "meet criteria" for PTSD using DSM-IV, DSM-5, and two versions of ICD-11 diagnostic criteria were investigated in both the Hurricane Ike and Hurricane Charley samples. It was hypothesized that diagnostic systems using a three-factor model (DSM-IV, both versions of ICD-11) would have higher percentages than DSM-5, which uses a four-factor model.

      Aim 1b. Overlap in PTSD identification was examined to determine the extent to which different diagnostic systems identified the same children.

Aim 2: PTSD Symptom Clusters

      Aim 2a. The rates or percentages of children who would likely meet criteria for each of the PTSD symptom clusters as defined by DSM-IV, DSM-5, and ICD-11 criteria were obtained and any specific clusters that precluded children from meeting criteria for PTSD were identified. It was hypothesized that the DSM-5 Cognitions/Mood cluster would be met by the lowest percentage of children.

      Aim 2b. The effect of eliminating the symptom of intrusive memories from the ICD-11 Re-experiencing cluster was evaluated, as this is the primary difference between Version 1 and Version 2 of the ICD-11 proposal. It was hypothesized that the Version 1 Re-experiencing cluster (with intrusive memories) would be met by more children than the Version 2 Re-experiencing cluster (without intrusive memories).

Aim 3: Characteristics of Children Identified by All Three Diagnostic Systems

      Children identified by all three diagnostic systems were compared to children identified by only one or two diagnostic systems in order to identify potential characteristics of children who would be identified as having PTSD regardless of which

diagnostic system was used. This aim was addressed separately for Version 1 and Version 2 of ICD-11. Demographic and hurricane exposure variables were used to determine whether children identified by all three systems could be differentiated from those who were not. It was hypothesized that children identified by all three diagnostic systems would have reported more severe hurricane exposure than children identified by one or two systems. Significant differences were not expected to be found for demographic variables.

Aim 4: Predictors of PTSD

The most recent hurricane sample (Hurricane Ike) was used to examine whether demographic (e.g., gender, ethnicity), hurricane exposure (e.g., actual life threat, perceived life threat, immediate loss/disruption, and ongoing loss/disruption), and other risk factors (e.g., stressful life events) that predict children's risk for developing PTSD in the aftermath of natural disasters would be similarly predictive of PTSD, as defined by DSM-IV, DSM-5, and both versions of ICD-11. It was hypothesized that these key risk factors identified in prior research would be significantly related to PTSD across diagnostic systems.

Chapter 2: Methods

Participants

The data used for this study was drawn from a sample of children from six schools in Galveston, Texas that were directly in the path of Hurricane Ike (Lai et al., 2013) and a sample of children from four schools in Charlotte County, Florida (La Greca et al., 2010) that were directly in the path of Hurricane Charley. For both the Ike and Charley samples, children in the second through fourth grades were assessed eight to nine months post-disaster. Due to the focus on preadolescent children, one 12-year-old participant from the Ike sample and one 12-year-old participant from the Charley sample were excluded from analyses. Thus, the Ike sample consisted of 327 children and the Charley sample consisted of 383 children, all of whom were between the ages of seven and eleven years. Demographic information for both samples is summarized in Table 1.

The children from the two samples were exposed to hurricanes that differed in severity and impact. Hurricane Ike was at the upper end of Category 2 intensity when it made landfall in Texas in September 2008. Hurricane Charley was a Category 4 hurricane that hit Charlotte County, Florida in August 2004. Ike was responsible for 103 deaths (Berg, 2008) and Charley was responsible for 35 deaths (National Weather Service, 2009). Both hurricanes are considered to be among the most costly in U.S. history, with Ike costing $29.5 billion and Charley costing $15.1 billion in damages (Blake, Landsea, & Gibney, 2011).

Procedures

Protocols for both studies were approved by university Internal Review Boards, as well as the Galveston Independent School District for the Ike sample and the Charlotte

County Public Schools for the Charley sample. For both samples, participants were recruited via consent forms distributed in classrooms. Consent forms were in English or Spanish. Forms indicating parental consent were returned by 21% of students for the Ike sample and 33% for the Charley sample. After obtaining child assent, questionnaires were administered to groups of 20 to 40 students, with study personnel available to answer questions. In both samples, all questions were read aloud to the children.

Measures

Demographics (Appendices A and B). In both samples, children reported age, gender, ethnicity, country of origin, birthdate, school, language(s) spoken, who lived in their house before the hurricane, and who currently lives with them.

Posttraumatic Stress Disorder Reaction Index (Appendices C and D). The *Posttraumatic Stress Disorder – Reaction Index, Revision 1* (PTSD-RI-R; Pynoos, Steinberg, Stuber, & Frederick, 1998; Steinberg, Brymer, Decker, & Pynoos, 2004) was administered to both samples to assess symptoms of PTSD. The PTSD-RI-R is one of the most widely used instruments for assessing symptoms of PTSD in children and adolescents who have experienced trauma, including natural disasters (La Greca et al., 2010; Lai et al., 2013; Lonigan et al., 1991; Weems et al., 2010). It has good convergent validity, internal consistency, and test-retest reliability (Steinberg et al., 2013; Steinberg et al., 2004). The PTSD-RI-R utilizes a 3-point scale (0 = *None of the time*, 2 = *Some of the time*, 4 = *Most of the time*) and has a range of 0 to 68.

For this study, the PTSD-RI-R was used for two purposes. First, the PTSD-RI-R was used to provide a general description of the severity level of PTSD reported by the samples, which can be compared to other samples (La Greca, Silverman, & Wasserstein,

1998; Lonigan et al., 1991; Weems et al., 2010). Secondly, items from the PTSD-RI-R were used to indicate the presence of symptoms which are part of DSM-IV, DSM-5, and ICD-11 diagnostic algorithms. Symptoms were counted as present if the child endorsed experiencing the symptom "*most of the time.*"

PTSD symptoms measured by the PTSD-RI-R. PTSD-RI-R items were used to assess all of the DSM-IV and ICD-11 symptoms, and most of the DSM-5 symptoms. The PTSD-RI-R includes 18 items which were designed to correspond to the 17 PTSD symptoms in DSM-IV. The symptom of restricted range of affect (DSM-IV Criterion C6) was assessed by two items, so the more elevated of the two items was used to determine the presence of that symptom. The PTSD-RI-R also includes an additional item initially created to assess the associated feature of trauma-related guilt, but which is now being used in the DSM-5 version of the PTSD-RI to correspond to the symptom of distorted cognitions that lead the individual to blame himself/herself (DSM-5 Criterion D3). Thus, 19 of the 22 symptoms used by various diagnostic systems were assessed by items designed and validated for the purpose of measuring these symptoms (Pynoos et al., 1998; Steinberg et al., 2004).

Additional items used to assess DSM-5 PTSD symptoms. Three other symptoms added by DSM-5 were not represented by the PTSD-RI-R: reckless/self-destructive behavior, negative beliefs, and negative emotional state. Thus, a group of four independent coders, which consisted of advanced graduate students in clinical psychology, rated items from other administered measures for clinical representativeness of these symptoms. No item was deemed to have adequate face validity to represent the new DSM-5 criterion of reckless or self-destructive behavior (DSM-5 Criterion E2).

Thus, this criterion was not able to be assessed. However, as the E2 criterion was designed to assess behaviors such as reckless driving and risky sexual behaviors observed in adolescent and adult populations, prevalence of this symptom in child samples may be low (Friedman et al., 2011). Items from other measures were determined to adequately represent the other two new DSM-5 symptoms. However, these items were only administered to the Ike sample; therefore, these two symptoms were not assessed in the Charley sample.

One item from the *Children's Depression Inventory* (CDI; Kovacs, 1981; see Appendix E) was used to assess DSM-5 Criterion D2: "Persistent and exaggerated negative beliefs or expectations about oneself, others, or the world (e.g., 'I am bad,' 'No one can be trusted,' 'The world is completely dangerous,' 'My whole nervous system is permanently ruined')." The CDI item selected uses similar language: "*I am bad all the time*." Notably, the D2 symptom is assessed in the PTSD Reaction Index for DSM-5 by an item reading "*I have thoughts like 'I am bad.'*" The CDI is a widely used measure of depressive symptoms, with three levels of severity for each item. In order to parallel the use of the most severe rating for the 3-point scale PTSD-RI-R items, only children who endorsed the most severe form of the item were considered to meet the DSM D2 criterion.

One item from the *Revised Children's Manifest Anxiety Scale* (RCMAS; Reynolds & Richmond, 1985; see Appendix F) was used to approximate DSM-5 Criterion D4: "Persistent negative emotional state (e.g., fear, horror, anger, guilt, or shame)." The RCMAS item reads, "*I am afraid of a lot of things*." The RCMAS is a measure of children's general anxiety levels with extensive psychometric support and

utilizes *Yes/No* response options (Reynolds & Richmond, 1985). Children who endorsed

"*Yes*" for this item were considered to meet the DSM-5 D4 criterion.

Hurricane exposure and stressors (Appendix G). The *Hurricane Related*

Traumatic Experiences – Revised (HURTE-R; La Greca, Silverman, Lai, & Jaccard,

2010; Vernberg, La Greca, Silverman, & Prinstein, 1996) assessed exposure during the

hurricane and postdisaster stressors. The measure contains three sections assessing

stressors during the hurricane, after the hurricane, and since the hurricane. Perceived life

threat (e.g., thinking you might die) was measured by one item (*Yes*/*No*). Actual life

threat (e.g., hit by flying object) was measured by six items (*Yes/No*), which were

summed to yield possible scores ranging from zero to six. Additionally, immediate loss

and disruption (e.g., home destroyed; parent losing job) was assessed by ten items

(*Yes/No*), which were summed to yield possible scores ranging from zero to ten. Ongoing

loss and disruption (e.g. changing homes; parent still out of work) was assessed by six

items (*Yes/No*), which also were summed together (possible scores ranged from zero to

six). The HURTE-R has been used in multiple samples of children exposed to hurricanes

(La Greca et al., 2010; Weems et al., 2010).

Life events (Appendix H). A short version of the *Life Events Checklist* (LEC;

Johnson & McCutcheon, 1980) assessed major life events that happened since the

hurricane (e.g., divorce, death of family member) using 14 items with *Yes*/*No* response

options. Items were summed to yield possible scores ranging from 0 to 14. The LEC has

been used in samples of youth in prior disaster research (La Greca, Silverman, Vernberg,

& Prinstein, 1996; La Greca et al., 2010; Weems et al., 2010) and has been shown to have

test-retest reliability of .72 over a two week period (Greenberg et al., 1983).

Chapter 3: Results

Preliminary Analysis

Data were examined for outliers and missingness. Missing data for variables used in the study ranged from 0.3% to 2.7% for the Ike sample and 0.3% to 3.1% for the Charley sample. Missing data were assumed to be missing at random and were handled using multiple imputation, specifically an iterative Markov chain Monte Carlo method with 20 imputations and 100 burn-in iterations (Graham, Olchowski, & Gilreath, 2007). No substantial outliers, skewness, or kurtosis were noted. Means and standard deviations were obtained for all variables, as well as percentages of variable categories when appropriate. Differences between the Ike sample and the Charley sample were analyzed by conducting t-tests and chi-square analyses on demographic variables as well as mean levels of PTSD, hurricane exposure, and life events. See Table 1 for means and standard deviations of study variables, as well as differences between the samples.

The Ike and Charley samples differed on a number of variables. Although age, grade, and gender were similar between samples, the Ike sample had greater ethnic diversity than the Charley sample. Specifically, the Ike sample included higher percentages of Hispanic, Black, and Other/Mixed ethnicity children, whereas the Charley sample contained a higher percentage of White children. There were more ethnic minority youth in the Ike sample (73%) than the Charley sample (17%). The Ike sample reported higher levels of actual life threat, immediate loss/disruption, ongoing loss/disruption, and life events, whereas the Charley sample reported higher levels of perceived life threat. PTSD Reaction Index scores were higher in the Ike sample than the Charley sample.

Aim 1: Rates of "Probable" PTSD

  Aim 1a. Diagnostic algorithms were created based on DSM-IV, DSM-5, and two versions of ICD-11 criteria (see Figure 1 for depiction of algorithms). The algorithms were used to identify children with "probable" PTSD in both the Ike and Charley samples according to each of the diagnostic systems. The number and percentage of children in each sample identified as having PTSD using each diagnostic system were obtained.

  See Table 2 for rates of "probable" PTSD and symptom cluster endorsement. In the Ike sample, 15.3% were identified by DSM-IV, 14.1% by DSM-5, 18.3% by ICD-11 Version 1, and 14.9% by ICD-11 Version 2. In the Charley sample, 9.9% were identified by DSM-IV, 6.5% by DSM-5, 10.7% by ICD-11 Version 1, and 8.9% by ICD-11 Version 2. As hypothesized, diagnostic systems using a three-factor model (e.g., DSM-IV and ICD-11 versions) had higher rates of PTSD than DSM-5, which uses a four-factor model. Both samples showed similar patterns: ICD-11 Version 1 identified the most children, followed by DSM-IV, then ICD-11 Version 2, and DSM-5 identified the fewest children.

  Aim 1b. In order to evaluate overlap in PTSD identification among diagnostic systems, the percentage of children identified by one diagnostic system, two diagnostic systems, and all three diagnostic systems were obtained. These analyses were conducted separately for each version of ICD-11 (because only one version of ICD-11 will eventually be selected) and replicated across both samples.

  Of the children in the Ike sample identified by at least one diagnostic system (DSM-IV, DSM-5, or ICD-11 Version 1), 41% were identified by all three diagnostic systems, 22% were identified by two systems, and 37% were identified by only one

system. When ICD-11 Version 2 was substituted for Version 1, 31% were identified by all three diagnostic systems, 34% were identified by two systems, and 35% were identified by only one system.

Of the children in the Charley sample identified by at least one diagnostic system (using ICD-11 Version 1), 30% were identified by all three diagnostic systems, 26% were identified by two systems, and 44% were identified by only one system. When ICD-11 Version 2 was used, 28% were identified by all three diagnostic systems, 27% were identified by two systems, and 45% were identified by only one system. Thus, across samples and across versions of ICD-11, roughly one third of children identified by any one system were identified by all three systems, indicating that there is only about a third agreement or overlap between systems.

Aim 2: PTSD Symptom Clusters

Aim 2a. See Table 2 for the numbers and percentages of children who meet criteria for each of the symptom clusters for each of the diagnostic systems. Figure 2 provides a graph of the data. Symptom clusters with the lowest prevalence rates were identified, as these clusters precluded the most children from meeting PTSD criteria. As hypothesized for DSM-5, the Cognitions/Mood cluster was met by the fewest children for Ike (31%) and Charley (13%). For DSM-IV, the Avoidance cluster was met by the fewest children for Ike (22%) and Charley (14%). These results are congruent because the DSM-5 Cognitions/Mood cluster and the DSM-IV Avoidance cluster share many of the same symptoms. Of the ICD-11 symptom clusters, the Version 2 Re-experiencing cluster was met by the fewest children for Ike (31%) and Charley (19%). Notably, both samples showed consistent patterns in the relative percentages who met symptom cluster criteria.

Aim 2b. In order to compare versions of ICD-11, the difference between the number of children who met criteria for the Re-experiencing cluster in Version 1 of ICD-11 versus the number of children who met criteria for the Re-experiencing cluster in Version 2 was obtained. In the Ike sample, 29 (9%) children met criteria for the Version 1 Re-experiencing cluster who did not meet criteria for the Version 2 Re-experiencing cluster. In the Charley sample, 21 (5%) children met criteria for the Version 1 Re-experiencing cluster who did not meet criteria for the Version 2 Re-experiencing cluster. As expected, the Version 1 Re-experiencing cluster was met by more children than the Version 2 Re-experiencing cluster.

Aim 3: Characteristics of Children Identified by All Three Diagnostic Systems

Children identified by all three diagnostic systems were compared to children identified by one or two diagnostic systems using binary logistic regression analyses. Using Version 1 and Version 2 of ICD-11 separately, two outcome variables were created where 1 = identified by all three systems and 0 = identified by one or two systems. Separate logistic regression analyses were conducted with each outcome variable and the following predictors: gender, age, ethnicity, actual life threat, perceived life threat, immediate loss/disruption, and ongoing loss/disruption. These analyses were conducted for both the Ike and Charley samples.

See Table 3 for odds ratios and 95% confidence intervals for all variables. In the Ike sample, children identified by all three systems did not differ from children identified by only one or two systems for gender, ethnicity, immediate loss/disruption, and ongoing loss/disruption. Differences emerged for age, perceived life threat, and actual life threat, although only when ICD-11 Version 1 was used. Specifically, as age increased by one

year, the odds of being identified by all three systems decreased by a factor of .59 (β = -.53, $p < .05$), indicating that younger children were more likely to be identified by all three systems than older children. Children who thought they might die during the hurricane (perceived life threat) were 3.18 times more likely to be identified by all three systems ($\beta = 1.16$, $p < .05$). Additionally, for every one unit increase in actual life threat, the odds of being identified by all three systems increased by 1.73 ($\beta = .55$, $p < .05$). No differences emerged when Version 2 was used. Additionally, no differences between children identified by all three systems versus one or two systems emerged in the Charley sample, although ethnicity was unable to be analyzed due to the low number of ethnic minority children identified as having PTSD in the Charley sample.

Aim 4: Predictors of PTSD

For the Hurricane Ike sample only, hierarchical logistic regression analyses were used to evaluate whether key variables identified by prior research were predictive of children's PTSD across diagnostic systems. Four outcome variables were created for DSM-IV, DSM-5, ICD-11 Version 1, and ICD-11 Version 2 (where 0 = no PTSD, 1 = PTSD). Binary logistic regression analyses were conducted separately for each outcome variable. For each of the outcome variables, gender and ethnicity were entered as predictors on step 1. Actual life threat and perceived life threat were entered as predictors on step 2. Immediate loss/disruption and ongoing loss/disruption were entered as predictors on step 3. Finally, life events was entered as a predictor on step 4. In addition to qualitatively comparing the magnitude of odds ratios between the four PTSD definitions, 95% confidence intervals were used to determine whether odds ratios were significantly different between diagnostic systems (i.e., confidence intervals for the same

predictor that do not overlap were considered significantly different). Chi-square tests were also used to analyze categorical predictors for children identified as having PTSD versus those not identified using each diagnostic system.

Table 4 presents the odds ratios and 95% confidence intervals for all predictors in the Ike sample. No significant gender differences were found across diagnostic systems, although ICD-11 Version 1 showed a trend for girls being more likely to be identified than boys ($OR = 1.77$, $p = .058$). Across all diagnostic systems, Hispanic children were more likely to be identified than White children (ORs ranged from 2.50 to 3.60) and Black children were also more likely to be identified than White children (ORs ranged from 2.70 to 4.51). Additionally, across all diagnostic systems, children were more likely to be identified who reported greater actual life threat (ORs ranged from 1.46 to 1.87) and greater immediate loss/disruption (ORs ranged from 1.22 to 1.39).

Some predictors were significantly related to PTSD for the ICD systems, but not DSM systems. Children who thought they might die (perceived life threat) were more likely to be identified by ICD-11 Version 1 ($OR = 2.25$, $p < .05$) and ICD-11 Version 2 ($OR = 2.05$, $p < .05$). Additionally, children who experienced a greater number of life events were more likely to be identified by ICD-11 Version 1 ($OR = 1.26$, $p < .05$) and ICD-11 Version 2 ($OR = 1.33$, $p < .05$). There was overlap between 95% confidence intervals across diagnostic systems for all predictors, so evidence was not found that odds ratios were significantly different between diagnostic systems.

Chi-square analyses showed similar patterns as logistic regression analyses for demographic variables. A greater proportion of Hispanic children (43% to 48% across diagnostic systems) and Black children (22% to 28% across diagnostic systems) were

identified as compared to White children (11% to 14% across diagnostic systems).

However, in contrast to the logistic regression analyses, children who thought they might

die (perceived life threat) were more likely to be identified across diagnostic systems:

DSM-IV ($\chi^2(1) = 12.03$, $p < .01$), DSM-5 ($\chi^2(1) = 12.63$, $p < .01$), ICD-11 Version 1

($\chi^2(1) = 14.91$, $p < .001$), and Version 2 ($\chi^2(1) = 10.55$, $p < .01$). Follow-up exploratory

analyses revealed that when perceived life threat and actual life threat were entered on

step 1, both predictors were significant across all diagnostic systems (*OR*s ranged from

1.47 to 2.25). With demographic variables entered on step 2, gender differences became

significant for ICD-11 Version 1 (*OR* = 1.99, $p < .05$), but differences between Hispanic

and White children became non-significant for ICD-11 Version 2 and differences

between Black and White children became non-significant for all diagnostic systems

except DSM-IV. Thus, demographic variables and life threat appear to be confounded.

Chapter 4: Discussion

The present study addresses a gap in the literature pertaining to whether new criteria for PTSD are appropriate for children. To our knowledge, no other study has compared DSM-IV, DSM-5, and ICD-11 criteria for PTSD in this age range of children (7 – 11 years). As children have been found to be particularly distressed after disasters (La Greca & Silverman, 2009) and are especially challenging to diagnose accurately due to developmental differences (Frances, 2012), it is important to understand how well revised diagnostic criteria fit children. This issue is particularly relevant because prior research used to support PTSD diagnostic revisions has primarily utilized adult populations (Friedman et al., 2011).

This study assessed rates of "probable" PTSD using the different definitions in two samples of children affected by Hurricane Ike or Hurricane Charley. The two samples differed on a number of characteristics, including ethnic diversity, hurricane exposure, and postdisaster stressors. Despite these differences, findings were remarkably consistent across the two samples. Although levels of PTSD in the Ike sample were generally higher than in the Charley sample, patterns of PTSD symptomology (e.g., relative numbers of children identified by different diagnostic systems and rates of symptom cluster endorsement) were very similar between the two samples. The consistency in results between samples strengthens study findings by suggesting that the results were not specific to the characteristics of one particular sample.

Across samples, differences were found in rates of "probable" PTSD, with ICD-11 Version 1 identifying the most children and DSM-5 identifying the fewest children. Additionally, diagnostic systems were not identifying the same children, as evidenced by

the low overlap or agreement between systems. However, children with greater hurricane exposure were more likely to be identified by all three diagnostic systems. The study also examined the extent to which key variables identified by prior disaster research were predictive of PTSD across diagnostic systems. PTSD defined by DSM-IV and DSM-5 was predicted by the same risk factors. Additionally, PTSD defined by ICD-11 Version 1 and Version 2 was predicted by the same risk factors. ICD-11 Version 1 and Version 2 were predicted by more variables than DSM-IV and DSM-5.

Rates of "Probable" PTSD

Across both samples, DSM-5 identified the fewest children as having PTSD and ICD-11 Version 1 identified the most children as having PTSD. Although consistent with our expectation that the four-factor model (DSM-5) would be met by fewer children than three-factor models (ICD-11 and DSM-IV), these findings deviated from theoretical literature on the different diagnostic systems. Specifically, the results indicated that the narrow approach to PTSD (ICD-11) identified more children, whereas the broad approach (DSM-5) identified fewer children. This finding is in sharp contrast to expectations voiced by a DSM-5 Work Group member: "Clearly, more people will meet the DSM-5 than the ICD-11 criteria" (Friedman, 2013, p. 555). The discrepancy between our findings and theoretical expectations highlights an important issue: Children are different from adults. Our findings lend support to the notion that children may experience and report symptoms in a different way.

In comparison to empirical research, our findings differed from a study of older adolescent and adult hospital patients, which found that the percentage who met DSM-5 criteria was twice the percentage of those who met ICD-11 (O'Donnell et al., 2014).

However, a much larger study using the World Mental Health Surveys had findings similar to our study, specifically that DSM-5 identified fewer individuals than ICD-11 (Stein et al., 2014). As little research has been conducted comparing DSM-5 and ICD-11 and findings from prior studies are mixed, it is unclear whether our results may be specific to preadolescent children or representative of patterns in the overall population. Future research which compares the diagnostic systems and differentiates between children, adolescents, and adults is needed to elucidate this issue.

In interpreting our findings, an important question to consider is whether it is preferable for a diagnostic system to identify more individuals or fewer. This is a contentious issue, with valid perspectives on both sides of the argument. We would contend that fewer children being identified is problematic if there is evidence of misfit between criteria and children's developmental level. Study findings supported the hypothesis that aspects of the DSM-5 criteria may not be developmentally suitable for children.

Most children were precluded from DSM-5 PTSD diagnosis by not meeting the Mood/Cognitions cluster criteria. For DSM-IV, most children were precluded from PTSD diagnosis by not meeting the Avoidance cluster criteria. The DSM-5 Mood/Cognitions cluster and DSM-IV Avoidance cluster share many similar symptoms. These findings support the hypothesis that preadolescent children may be less likely to experience or may have difficulty reporting some of the cognitively sophisticated and highly internalized symptoms included in these two clusters. This issue may be particularly relevant when parent report is used for PTSD diagnosis, as these types of symptoms are not very observable and difficult to detect by others. The low endorsement rates for

DSM-IV Avoidance and DSM-5 Mood/Cognition symptoms found in our samples reflected findings from other studies of same-aged children. In a sample of children hospitalized with injuries (ages 7 – 11 years), only 9.1% met criteria for the DSM-IV Avoidance cluster, whereas 54.5% met criteria for the Re-experiencing cluster and 36.4% met criteria for the Arousal cluster (Scheeringa, Wright, Hunt, & Zeanah, 2006). Similarly, in a sample of preadolescent children exposed to Hurricane Andrew, 24.2% met the Avoidance cluster, whereas 78.3% met the Re-experiencing cluster and 49.3% met the Arousal cluster (La Greca et al., 1996). Furthermore, an article commissioned by the DSM-5 Work Groups to review developmental considerations for diagnosing PTSD in youth made the recommendation that clinical thresholds for DSM-IV Avoidance symptoms be reduced for school age children and adolescents (Scheeringa et al., 2011). Results of this study provide support for the hypothesis that the current DSM-5 Mood/Cognition diagnostic requirement may be developmentally inappropriate for preadolescent children.

As DSM-5 was the only diagnostic system to utilize four symptom clusters, the smaller number of children identified by DSM-5 suggests that a four-factor model of PTSD may be inappropriate for preadolescent children. This is consistent with prior research, as studies of youth have most commonly found a three-factor model to be best-fitting (Anthony, Lonigan, & Hecht, 1999; Anthony et al., 2005; Foy et al., 1997; Scheeringa, Zeanah, & Cohen, 2011). The DSM-5 requirement of meeting four symptom clusters may be too stringent for preadolescent children. Notably, ICD-11 and the DSM-5 Preschool criteria share the same clinical threshold of three symptoms, as opposed to the six symptoms required for diagnosis by DSM-IV and DSM-5. In their recommendations

for DSM-5, Scheeringa and colleagues argue that "school age children may be more like preschool children than adolescents with regard to diagnostic thresholds" (Scheeringa et al., 2011, p. 779). Based on our findings that ICD-11 may be more developmentally sensitive than the DSM-5 adult criteria, and the similarities between ICD-11 and the DSM-5 Preschool criteria, investigation of how well the DSM-5 Preschool criteria fit preadolescent children will be an important direction for future research.

Comparison of ICD-11 Version 1 and Version 2. This study also compared two versions of the ICD-11 proposal. The only difference between the two versions was the Re-Experiencing cluster; Version 1 included the symptom of intrusive memories, whereas Version 2 did not. Of all the ICD-11 symptom clusters, the Version 2 Re-experiencing cluster was met by the lowest percentage of children by a relatively large margin. In contrast, the Re-experiencing cluster was met by the most children for DSM-IV and DSM-5, also by a relatively large margin.

Thus, the pattern of findings suggests that if Version 2 were to be adopted, there may be very different patterns of PTSD symptom endorsement (as compared to DSM-IV and DSM-5). Using Version 2 may result in the most children being precluded from PTSD diagnosis due to not meeting the Re-experiencing cluster, whereas Re-experiencing symptoms are the most commonly endorsed using DSM-IV and DSM-5. Thus, in terms of symptom patterns, ICD-11 Version 2 is most divergent from the DSM diagnostic systems. However, for Version 1, all clusters (Re-experiencing, Avoidance, and Arousal) were met by relatively similar percentages of children.

Overlap between Diagnostic Systems

In addition to marked variability in the percentages of children identified as having PTSD between diagnostic systems, findings indicated that the different diagnostic systems were not identifying the same children. Of the children identified by at least one diagnostic system as having PTSD, only about a third were identified by all three systems. When ICD-11 Version 1 was used, 41% of children were identified by all three systems in the Ike sample and 30% in the Charley sample. When ICD-11 Version 2 was used, 31% of children were identified by all three systems in the Ike sample and 28% in the Charley sample. The low percentages of overlap between the three diagnostic systems suggest that different children are being identified by different diagnostic systems.

Characteristics of the children identified by all three diagnostic systems were compared to those identified by only one or two diagnostic systems. Although there were no differences in gender or ethnicity for children identified by all systems, findings indicated that younger children were more likely to be identified by all systems than older children, which is consistent with findings from a meta-analysis that younger children are at greater risk for PTSD (Trickey et al., 2012). Consistent with hypotheses, children with greater hurricane exposure (perceived life threat and actual life threat) were more likely to be identified by all three diagnostic systems (using ICD-11 Version 1) for the Ike sample. Perceived life threat is thought to be necessary for the emergence of PTSD (La Greca & Prinstein, 2002; Silverman & La Greca, 2002), so it seems reasonable that children with greater perceived life threat would be identified by all systems. As children with greater hurricane exposure may have more severe PTSD (Terranova et al., 2009), it is possible that the most severe cases are being identified by all three diagnostic systems.

Predictors of PTSD

The study also examined the extent to which previously identified risk factors for PTSD were predictive of PTSD across diagnosis systems. As research suggests that these variables are important for the emergence of PTSD, diagnostic systems with more significant predictors could be theoretically considered closer to a "true" definition of PTSD. Notably, DSM-IV and DSM-5 shared the same predictors, and the two ICD-11 versions shared the same predictors. DSM-IV and DSM-5 were predicted by ethnicity, actual life threat, and immediate loss/disruption. Both versions of ICD-11 were predicted by these variables, as well as two additional variables: perceived life threat and stressful life events. Perceived life threat is thought to be a particularly important factor in the development of PTSD, and has been found to be more strongly associated with PTSD that actual life threat (Lack & Sullivan, 2007). Perceived life threat has been identified as a risk factor in many studies of PTSD (La Greca et al., 1996; La Greca et al., 1998; McDermott, Lee, Judd, & Gibbon, 2005; Udwin, Boyle, & Yule, 2000; Vernberg et al., 1996) and has been found to have a large effect size across studies (Trickey et al., 2012). Similarly, stressful life events have been predictive of PTSD in a number of studies (Hardin et al., 1994; La Greca et al., 1996; Lai et al., 2013; Moore & Varela, 2010) and have been found to have a small to medium effect size (Trickey et al., 2012). Considering that these two key variables were predictive of PTSD as defined by ICD-11 (both versions), but not DSM-IV or DSM-5, these analyses provide some support for ICD-11 over DSM-IV and DSM-5. However, these findings should be interpreted with caution, as perceived life threat was significant across diagnostic systems when not controlling for demographic variables.

Limitations

Although there were a number of strengths to the study, including replicating findings across samples and examining diagnostic differences in both an under-studied age range and in the context of natural disasters, several limitations should be noted. One limitation was the inability to measure one DSM-5 symptom in the Hurricane Ike sample (reckless/self-destructive behavior) and three DSM-5 symptoms in the Hurricane Charley sample (reckless/self-destructive behavior, negative beliefs, and negative emotional state). We would expect reckless/self-destructive behavior to have little effect on rates of PTSD, as this symptom as initially conceptualized (e.g., reckless driving and risky sexual behaviors) may not be relevant for preadolescent children. However, rates of PTSD in the Hurricane Charley sample may have been underestimated due to the absence of an assessment of negative beliefs and negative emotional state.

A second limitation is the use of self-report measures, which may be less accurate than clinician-administered clinical interviews. However, in the chaotic aftermath of particularly widespread and debilitating disasters, children may need to be identified for mental health services using cursory screening methods. Given the disruptive nature of disasters, being able to accurately identify children with PTSD based on measures which can efficiently screen large numbers of children at a time may be paramount to providing timely intervention. By evaluating which symptoms of PTSD children report, this study provides insight into the identification of children with PTSD after disasters using these types of measures. However, future research should compare diagnostic criteria using clinical interviews specifically designed to assess DSM-IV, DSM-5, and ICD-11 criteria in preadolescent children.

A third limitation was that both samples only assessed children exposed to hurricanes. Patterns of PTSD across diagnostic systems may differ for children exposed to other types of trauma or multiple traumas, such as childhood sexual abuse or domestic violence. Other types of traumatic experiences are particularly important to study in children, as 25% to 43% of youth are estimated to be exposed to sexual abuse and 39% to 85% are estimated to be exposed to community violence (American Psychological Association, 2008). Children who experience other types of traumatic events may report different symptoms to different degrees as compared to children exposed to hurricanes.

Additionally, although this study included a measure of major life events, co-occurring traumas such as child abuse were not assessed. Future research should compare rates of PTSD in samples of children exposed to other types of trauma and children experiencing multiple traumas.

Another limitation is that socioeconomic status was not assessed or controlled for in study analyses. Socioeconomic status is likely to be confounded with minority status and influences hurricane exposure variables, as children from disadvantaged socioeconomic backgrounds may be more likely to live in vulnerable housing or in geographical regions at greater risk from hurricanes. Future research should control for socioeconomic status.

A final limitation is that the study only examined PTSD symptoms at a single time point. Examining symptoms over time would allow for a better understanding of whether diagnoses provided by particular diagnostic systems remain more stable over time. Future research on the different diagnostic systems should compare rates and continuity of PTSD diagnosis across time points.

Conclusions

The study has important implications for divergent conceptualizations of PTSD. The findings call into question the suitability of DSM-5 PTSD criteria for preadolescent children after disasters, but provide some support for the current ICD-11 proposal. Specifically, results contribute to prior findings that a three-factor model of PTSD may be more suitable for children than a four-factor model. Furthermore, the low endorsement rates for the DSM-5 Cognitions/Mood symptoms indicate that these symptoms may not fit the developmental level of preadolescent children. Findings also suggest that the final decision about the inclusion or omission of intrusive memories in the ICD-11 Re-experiencing cluster could have marked implications for the number of children identified as having PTSD. Omitting intrusive memories from criteria resulted in fewer children being identified and the Re-experiencing cluster being met by the fewest children, which differed from DSM-IV and DSM-5 patterns in which the Re-experiencing cluster was met by the most children. These findings support the inclusion of the intrusive memories symptom.

Importantly, our results suggest that it may not be appropriate to use the same diagnostic thresholds and criteria for preadolescent children as used for adults. Similarly to preschool children, preadolescent children may also need developmentally-sensitive criteria which are distinct from adult criteria. Given the substantial differences in which children are identified as having PTSD based on which diagnostic system is used, caution is warranted in diagnosing PTSD in preadolescent children after disasters. Additional research is needed to better identify diagnostic criteria that are optimal specifically for preadolescent children.

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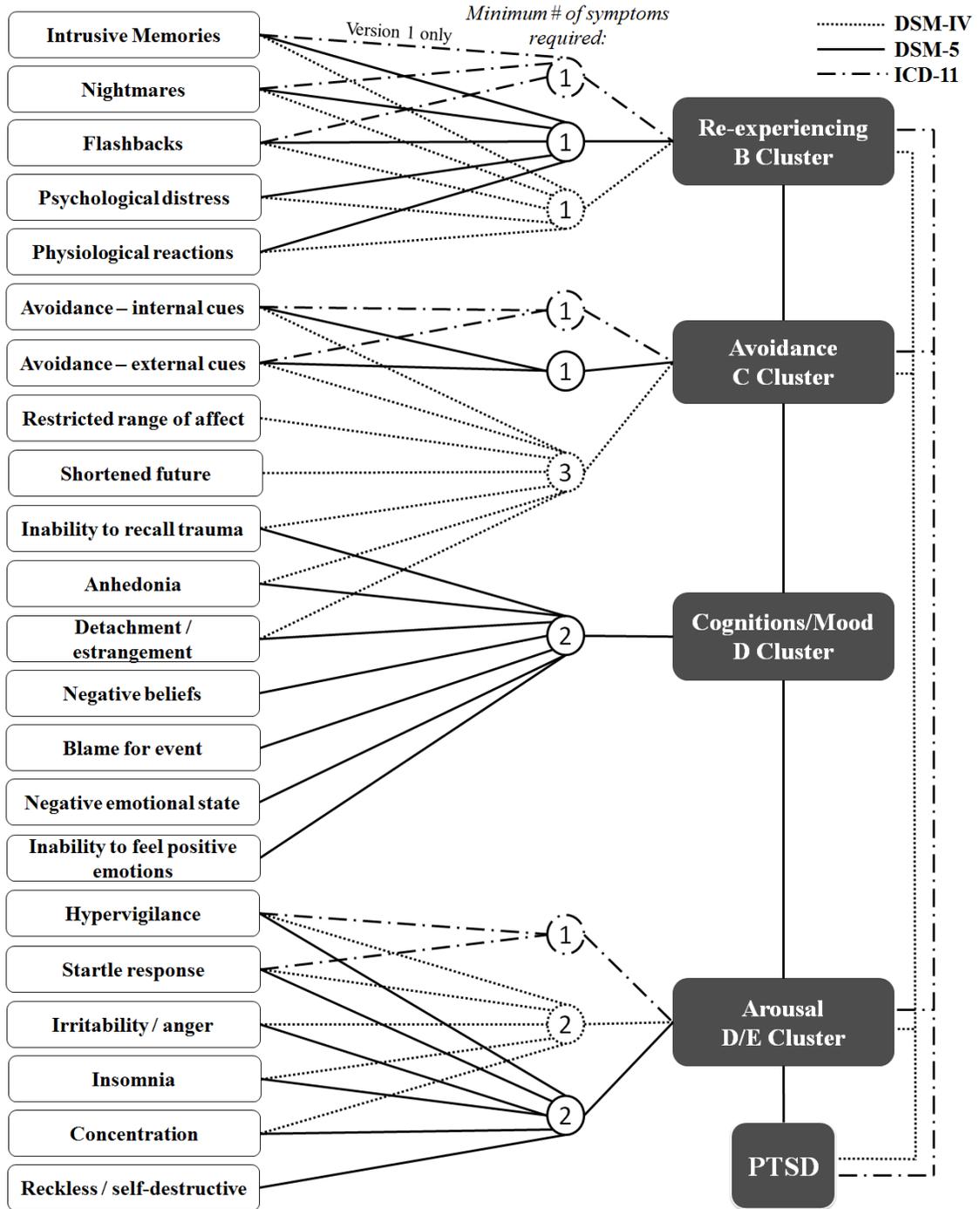
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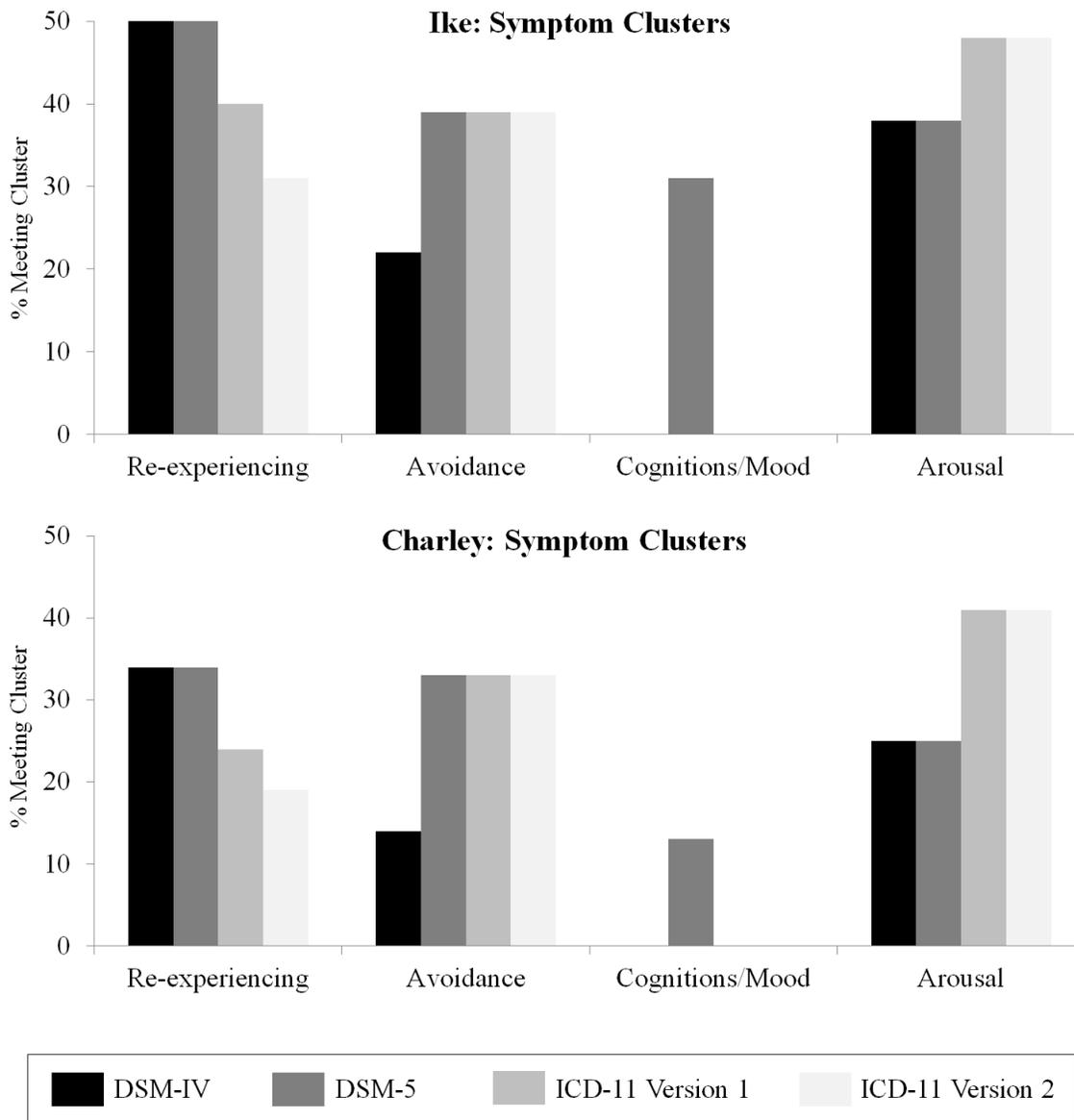
Table 1

Comparison of Key Variables between Ike and Charley Samples

	Ike Sample	Charley Sample	Comparison
Sample size	327	383	
Grade	$2^{nd} - 4^{th}$	$2^{nd} - 4^{th}$	
Age			
Range	7 – 11	7 – 11	
Mean (*SD*)	8.73 (*.98*)	8.73 (*.92*)	
Sex			$\chi^2(1) = 2.32$
Female	52%	54%	
Male	48%	46%	
Ethnicity			
Hispanic	36%***	6%***	$\chi^2(1) = 101.94$***
White	27%***	83%***	$\chi^2(1) = 223.86$***
Black	19%***	4%***	$\chi^2(1) = 38.90$***
Other/Mixed	18%***	7%***	$\chi^2(1) = 19.68$***
Minority	73%***	17%***	$\chi^2(1) = 223.86$***
Reaction Index Mean (*SD*)	24.79 (*14.64*)***	20.17 (*14.29*)***	$t(708) = 4.25$***
Actual Life Threat	.84 (*1.00*)*	.69 (*.86*)*	$t(708) = 2.02$*
Perceived Life Threat	.37 (*.48*)***	.59 (*.49*)***	$\chi^2(1) = 34.08$***
Immediate Loss/Disruption	3.51 (*2.10*)***	2.58 (*1.95*)***	$t(708) = 6.09$***
Ongoing Loss/Disruption	1.57 (*1.29*)***	1.01 (*1.18*)***	$t(708) = 6.03$***
Life Events	1.72 (*1.79*)**	1.36 (*1.60*)**	$t(708) = 2.76$**

*p < .05, **p < .01, ***p < .001

Table 2

Rates of "Probable" PTSD and Symptom Clusters

	Ike Sample		Charley Sample	
	n	*%*	*n*	*%*
DSM-IV	**50**	**15.3**	**38**	**9.9**
Re-experiencing	168	51	130	34
Avoidance	71	22	53	14
Arousal	125	38	96	25
DSM-5	**46**	**14.1**	**25**	**6.5**
Re-experiencing	168	51	130	34
Avoidance	129	39	127	33
Cognitions/Mood	103	31	50	13
Arousal	125	38	96	25
ICD-11				
Version 1	**60**	**18.3**	**41**	**10.7**
Version 2	**49**	**14.9**	**34**	**8.9**
Re-experiencing Version 1	132	40	92	24
Re-experiencing Version 2	103	31	71	19
Avoidance	129	39	127	33
Arousal	157	48	158	41
Children identified by at least one system (DSM-IV, DSM-5, or ICD-11 *Version 1*)	**77**	**100**	**56**	**100**
Identified by 3 systems	31	41	17	30
Identified by 2 systems	17	22	14	26
Identified by 1 system	29	37	25	44
Children identified by at least one system (DSM-IV, DSM-5, or ICD-11 *Version 2*)	**74**	**100**	**53**	**100**
Identified by 3 systems	23	31	15	28
Identified by 2 systems	25	34	14	27
Identified by 1 system	26	35	24	45

Table 3

Characteristics of Children Identified by All Three Diagnostic Systems

	Ike Sample		Charley Sample	
	OR	*95% CI*	*OR*	*95% CI*
Using Version 1 of ICD-11				
Girls / Boys	.93	.37 – 2.34	.87	.23 – 3.30
Hispanic / White	2.65	.59 – 12.03	--	--
Black / White	.95	.18 – 5.16	--	--
Other / White	2.56	.43 – 15.25	--	--
Minority / White	1.05	.46 – 8.21	--	--
Age	.59*	.36 – .97	.47†	.21 – 1.06
Perceived Life Threat	3.18*	1.18 – 8.54	5.06	.58 – 43.83
Actual Life Threat	1.73*	1.08 – 2.77	.75	.41 – 1.37
Immediate Loss & Disruption	1.21	.96 – 1.53	1.06	.80 – 1.41
Ongoing Loss & Disruption	.82	.57 – 1.19	.87	.56 – 1.35
Using Version 2 of ICD-11				
Girls / Boys	.65	.24 – 1.76	.62	.15 – 2.64
Hispanic / White	2.83	.51 – 15.66	--	--
Black / White	1.25	.19 – 8.31	--	--
Other / White	3.12	.45 – 21.80	--	--
Minority / White	2.27	.44 – 11.63	--	--
Age	.77	.47 – 1.25	.48†	.20 – 1.12
Perceived Life Threat	1.63	.58 – 4.56	4.05	.46 – 35.72
Actual Life Threat	1.35	.88 – 2.07	.72	.38 – 1.35
Immediate Loss & Disruption	1.18	.93 – 1.51	.97	.72 – 1.30
Ongoing Loss & Disruption	.91	.61 – 1.37	.83	.53 – 1.31

$^\dagger p < .09, p < .05, p < .01, p < .001$

Table 4

Predictors of PTSD in Ike Sample

	DSM-IV		DSM-5		ICD-11 Version 1		ICD-11 Version 2	
	OR	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*
Step 1								
Girls / Boys	.96	.51 – 1.80	1.05	.55 – 1.99	1.77†	.98 – 3.19	1.53	.81 – 2.87
Hispanic / White	3.60*	1.32 – 9.82	3.26*	1.18 – 8.97	3.30**	1.42 – 7.68	2.50*	1.01 – 6.22
Black / White	4.51**	1.54 – 13.20	3.89*	1.28 –11.79	2.70*	1.04 – 7.06	2.86*	1.05 – 7.81
Other / White	2.17	.67 – 7.08	2.59	.81 – 8.26	2.11	.77 – 5.82	2.15	.74 – 6.25
Step 2								
Perceived Life Threat	1.80	.90 – 3.59	1.89	.92 – 3.89	2.25*	1.19 – 4.28	2.05*	1.03 – 4.05
Actual Life Threat	1.83***	1.34 – 2.49	1.87***	1.36 – 2.57	1.65***	1.23 – 2.22	1.46*	1.08 – 1.98
Step 3								
Immediate Loss & Disruption	1.39**	1.13 – 1.71	1.36**	1.09 – 1.69	1.27*	1.01 – 1.52	1.22*	1.01 – 1.47
Ongoing Loss & Disruption	.99	.73 – 1.33	1.01	.74 – 1.38	.97	.73 – 1.28	1.16	.87 – 1.54
Step 4								
Life Events	1.09	.90 – 1.33	1.18	.97 – 1.45	1.26*	1.05 – 1.52	1.33**	1.10 – 1.61

$^{\dagger}p < .06, *p < .05, p < .01, p < .001$

Appendix A: Demographics – Hurricane Ike

Are you a boy or girl?	BOY GIRL

Grade :	2 3 4

School: L.A.Morgan   Oppe   Parker   Rosenberg   Scott

Is this the same school you were in last year?
☐Yes   ☐No

Teacher: _____

Birthdate: Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec

      Day: _____   **Year**: 1999 2000 2001 2002 Other_____

Age: _____

Who <u>currently</u> lives with you at home?

_____ Mother   _____Brother/Sister (Age: _____)

_____Father   _____Brother/Sister (Age: _____)

_____Stepmother   _____Brother/Sister (Age: _____)

_____Stepfather   _____Other (Specify: _____)

Who did you live with at home <u>before the hurricane</u>?

_____ Mother   _____Brother/Sister (Age: _____)

_____Father   _____Brother/Sister (Age: _____)

_____Stepmother   _____Brother/Sister (Age: _____)

_____Stepfather   _____Other (Specify: _____)

Were you born in the United States? ☐Yes ☐No → I was born in _____

What is/are your ethnicity (race)?

    ☐ White (Not Hispanic)

    ☐ Hispanic (Cuban, Colombian, Nicaraguan, Mexican, other)

    ☐ African-American or Black (Not Hispanic)

    ☐ Caribbean-American (Haitian, Jamaican, other)

    ☐ Asian

    ☐ Mixed Ethnicity / Other (Please describe) _____

What was the <u>first language</u> you learned to speak?	☐ English	☐ Spanish	☐ Other: _____
What language do you <u>use the most</u> now?	☐ English	☐ Spanish	☐ Other: _____
What language do your <u>parents speak at home</u>?	☐ English	☐ Spanish	☐ Other: _____

What is your current: Weight (in pounds)_____   Height: _____feet ____ inches

Appendix B: Demographics – Hurricane Charley

Are you a boy or girl?   BOY   GIRL

Grade :   2   3   4

School: E   MP   PR   SJ

Birthdate: Jan   Feb   Mar   Apr   May   Jun   Jul   Aug   Sept   Oct

         Nov   Dec   **Day**: _____   **Year**: 1993   1994   1995   1996

         1997   1998

Age: _____

Teacher: _____

Is this the same school you were in last year? ☐Yes   ☐No

Who lives at home with you now?

_____Mother   _____Stepmother   _____Father   _____Stepfather

_____Brother/Sister (Age: ___)   _____Brother/Sister (Age: ___)

_____Brother/Sister (Age: ___)   _____Other (Specify: _____)

Who lived at home with you before the hurricane?

_____Mother   _____Stepmother   _____Father   _____Stepfather

_____Brother/Sister (Age: ___)   _____Brother/Sister (Age: ___)

_____Brother/Sister (Age: ___)   _____Other (Specify: _____)

Were you born in the United States? ☐Yes ☐No → I was born in _____

What is your race / ethnicity?

    ☐ White (Not Hispanic)
    ☐ Hispanic (Cuban, Colombian, Nicaraguan, Mexican, other)
    ☐ African-American or Black (Not Hispanic)
    ☐ Caribbean-American (Haitian, Jamaican, other)
    ☐ Asian
    ☐ Mixed Ethnicity / Other (Please describe)_____

What is the first language you learned to speak?

    ☐ English   ☐ Spanish   ☐ Other: _____

What language do you use the most now?

    ☐ English   ☐ Spanish   ☐ Other: _____

Appendix C: PTSD Reaction Index – Hurricane Ike

The following is a list of things that kids sometimes do after a hurricane. Please THINK about Hurricane Ike and then READ the list carefully. CIRCLE ONE of the numbers (0, 1, 2) that tells how often something has happened to you in the past month. Use the Rating Sheet to help you decide how often the problem has happened in the <u>past month</u>. **PLEASE BE SURE TO ANSWER ALL QUESTIONS.**

PLEASE THINK ABOUT THE <u>PAST MONTH</u>:	None of the time	Some of the time	Most of the time
1. I watch out for danger or things that I am afraid of.	0	1	2
2. When something reminds me of what happened, I get very upset, afraid or sad.	0	1	2
3. I have upsetting thoughts, pictures, or sounds of what happened come into my mind when I do not want them to.	0	1	2
4. I feel grouchy, angry or mad.	0	1	2
5. I have dreams about the hurricane or other bad dreams.	0	1	2
6. I feel like I am back at the time when the bad thing happened, living through it again.	0	1	2
7. I feel like staying by myself and not being with my friends.	0	1	2
8. I feel alone inside and not close to other people.	0	1	2
9. I try not to talk about, think about, or have feelings about the hurricane.	0	1	2
10. I have trouble feeling happiness or love.	0	1	2
11. I have trouble feeling sadness or anger.	0	1	2
12. I feel jumpy or startle easily, like when I hear a loud noise or when something surprises me.	0	1	2
13. I have trouble going to sleep or I wake up often during the night.	0	1	2
14. I think that some part of the hurricane is my fault.	0	1	2
15. I have trouble remembering important parts of the hurricane.	0	1	2
16. I have trouble concentrating or paying attention.	0	1	2
17. I try to stay away from people, places, or things that make me remember the hurricane.	0	1	2
18. When something reminds me of the hurricane, I have strong feelings in my body, like my heart beats fast, my head aches, or my stomach aches.	0	1	2
19. I think that I will not live a long life.	0	1	2
20. I have arguments or physical fights.	0	1	2
21. I feel negative about my future.	0	1	2
22. I am afraid that a hurricane will happen again.	0	1	2

Appendix D: PTSD Reaction Index – Hurricane Charley

Here is a list of things that kids sometimes do after a hurricane. Please THINK about the Hurricane and then READ the list carefully. Choose the answer that <u>best</u> describes how often you do these things.

HOW MUCH OF THE TIME DURING THE <u>PAST MONTH</u>	None of the time	Some of the time	Most of the time
1. I watch out for danger or things that I am afraid of.			
2. When something reminds me of the hurricane, I get very upset, afraid or sad.			
3. I have upsetting thoughts, pictures, or sounds of the hurricane come into my mind when I do not want them to.			
4. I feel grouchy, angry or mad.			
5. I have dreams about the hurricane or other bad dreams.			
6. I feel like I am back at the time when the hurricane happened, living through it again.			
7. I feel like staying by myself and not being with my friends.			
8. I feel alone inside and not close to other people.			
9. I try not to talk about, think about, or have feelings about the hurricane.			
10. I have trouble feeling happiness or love.			
11. I have trouble feeling sadness or anger.			
12. I feel jumpy or startle easily, like when I hear a loud noise or when something surprises me.			
13. I have trouble going to sleep or I wake up often during the night.			
14. I think that some part of the hurricane is my fault.			
15. I have trouble remembering important parts of the hurricane.			
16. I have trouble concentrating or paying attention.			
17. I try to stay away from people, places, or things that make me remember the hurricane.			
18. When something reminds me of the hurricane, I have strong feelings in my body, like my heart beats fast, my head aches, or my stomach aches.			
19. I think that I will not live a long life.			
20. I am afraid that the hurricane will happen again.			

Appendix E: Children's Depression Inventory – Hurricane Ike

For each question below, read the sentences and then choose the **one sentence in each group** that best describes how you have been feeling about something in the **past two weeks**.

Circle the letter beside the statement you have picked.

1. a. I am sad once in a while.
   b. I am sad many times.
   c. I am sad all the time.

2. a. Nothing ever works out for me.
   b. I am not sure if things will work out for me.
   c. Things will work out for me OK.

3. a. I do most things OK.
   b. I do many things wrong.
   c. I do everything wrong.

4. a. I have fun in many things.
   b. I have fun in some things.
   c. Nothing is fun at all.

5. a. I am bad all the time.
   b. I am bad many times.
   c. I am bad once in a while.

6. a. I think about bad things happening to me once in a while.
   b. I worry about bad things that will happen to me.
   c. I am sure that terrible things will happen to me.

7. a. I hate myself.
   b. I do not like myself.
   c. I like myself.

8. a. All bad things are my fault.
   b. Many bad things are my fault.
   c. Bad things are not usually my fault.

9. a. I feel like crying every day.
   b. I feel like crying many days.
   c. I feel like crying once in a while.

10. a. Things bother me all of the time.
    b. Things bother me many times.
    c. Things bother me once in a while.

11. a. I like being with people.
    b. I do not like being with people many times.
    c. I do not want to be with people at all.

12. a. I cannot make up my mind about things.
    b. It is hard for me to make my mind up about things.

     c. I make my mind up easily about things.

13. a. I look OK.
    b. There are some things that are bad about my looks.
    c. I look ugly.

14. a. I have to push myself all of the time to do my schoolwork.
    b. I have to push myself many times to do my schoolwork.
    c. Doing my schoolwork is not a big problem.

15. a. I have trouble sleeping every night.
    b. I have trouble sleeping many nights.
    c. I sleep pretty well.

16. a. I am tired once in a while.
    b. I am tired many days.
    c. I am tired all of the time.

17. a. Most days I do not feel like eating.
    b. Many days I do not feel like eating.
    c. I eat pretty well.

18. a. I do not worry about aches and pains.
    b. I worry about aches and pains many times.
    c. I worry about aches and pains all of the time.

19. a. I do not feel alone.
    b. I feel alone many times.
    c. I feel alone all of the time.

20. a. I never have fun at school.
    b. I have fun at school only once in a while.
    c. I have fun at school many times.

21. a. I have plenty of friends.
    b. I have some friends but I wish I had more.
    c. I do not have many friends.

22. a. My schoolwork is alright.
    b. My schoolwork is not as good as before.
    c. I do very badly in subjects in which I used to do well.

23. a. I can never be as good as other kids.
    b. I can be as good as other kids if I want to.
    c. I am just as good as other kids.

24. a. Nobody loves me.
    b. I am not sure if anybody loves me.
    c. I am sure that somebody loves me.

25. a. I usually do what I am told.
    b. I do not do what I am told most times.
    c. I never do what I am told.

26. a. I get along with people.
    b. I get in fights many times.
    c. I get into fights all of the time.

Appendix F: Revised Children's Manifest Anxiety Scale – Hurricane Ike

Instructions: Read each question carefully. Put a circle around the word YES if you think it is true about you. Put a circle around the word NO if you think it is not true about you.

1.	I have trouble making up my mind.	Yes	No
2.	I get nervous when things do not go the right way.	Yes	No
3.	Others seem to do things easier than I can.	Yes	No
4.	I like everyone I know.	Yes	No
5.	Often I have trouble getting my breath.	Yes	No
6.	I worry a lot of the time.	Yes	No
7.	I am afraid of a lot of things.	Yes	No
8.	I am always kind.	Yes	No
9.	I get mad easily.	Yes	No
10.	I worry about what my parents will say to me.	Yes	No
11.	I feel that others do not like the way I do things.	Yes	No
12.	I always have good manners.	Yes	No
13.	It is hard for me to get to sleep at night.	Yes	No
14.	I worry about what other people think about me.	Yes	No
15.	I feel alone even when there are people with me.	Yes	No
16.	I am always good.	Yes	No
17.	Often I feel sick in my stomach.	Yes	No
18.	My feelings get hurt easily.	Yes	No
19.	My hands feel sweaty.	Yes	No
20.	I am always nice to everyone.	Yes	No
21.	I am tired a lot.	Yes	No
22.	I worry about what is going to happen.	Yes	No
23.	Other children are happier than I.	Yes	No
24.	I tell the truth every single time.	Yes	No
25.	I have bad dreams.	Yes	No
26.	My feelings get hurt easily when I am fussed at.	Yes	No
27.	I feel someone will tell me I do things the wrong way.	Yes	No
28.	I never get angry.	Yes	No
29.	I wake up scared some of the time.	Yes	No
30.	I worry when I go to bed at night.	Yes	No
31.	It is hard for me to keep my mind on my schoolwork.	Yes	No
32.	I never say things I shouldn't.	Yes	No
33.	I wiggle in my seat a lot.	Yes	No
34.	I am nervous.	Yes	No
35.	A lot of people are against me.	Yes	No
36.	I never lie.	Yes	No
37.	I often worry about something bad happening to me.	Yes	No

Appendix G: Hurricane Related Traumatic Experiences – Hurricanes Ike and Charley

HURTE-R: What Happened To You D*uring* the Hurricane?

1.	Where were you during the Hurricane? (you can check more than one)

✓

_____ in my home	_____ in a bathroom
_____ in a friend's or relative's home	_____ in a hallway
_____ in a shelter	_____ in a car
_____ out of town	_____ other
_____ in a closet	(describe)_____

Please circle one answer for each question.

2.	Did windows or doors break in the place you stayed during the Hurricane?	Yes	No
3.	Did you get hurt during the Hurricane?	Yes	No
4.	At any time during the Hurricane, did you think you might die?	Yes	No
5.	Did you see anyone else get hurt badly during the Hurricane?	Yes	No
6.	Did you have to go outside during the Hurricane because the building you were in was badly damaged?	Yes	No
7.	Did a pet you liked get hurt or die during the Hurricane?	Yes	No
8.	Did you get hit by anything falling or flying during the Hurricane?	Yes	No
9.	Was your mother or father with you during the Hurricane?	Yes	No
10.	Did you think someone might die during the Hurricane?	Yes	No
11.	Did you think you might be hurt badly during the Hurricane?	Yes	No
12.	Did you think someone might be hurt badly during the Hurricane?	Yes	No
13.	Overall, how scared or upset were you *during* the Hurricane?	Not at all A little A lot A whole lot	

HURTE- *After*
What Happened to you *after* the Hurricane?

Instructions: *Think about how many of the things listed were present and/or happened in the first month or two after the Hurricane.*

1.	Was your home damaged badly or destroyed by the Hurricane?	Yes	No
2.	Did you have to go to a new school because of the Hurricane?	Yes	No
3.	Did you move to a new place because of the Hurricane?	Yes	No
4.	Did one of your parents lose his or her job because of the Hurricane?	Yes	No
5.	Has it been hard to see your friends since the Hurricane because they moved or you moved?	Yes	No
6.	Did you or your family have trouble getting enough food and water after the Hurricane?	Yes	No
7.	Were your clothes or toys ruined by the Hurricane?	Yes	No
8.	Did your pet run away or have to be given away because of the Hurricane?	Yes	No
9.	Has anyone stolen anything from your home since the Hurricane?	Yes	No
10.	Did you have to live away from your parents for a week or more because of the Hurricane?	Yes	No
11.	Overall, how upset about things have you been since the Hurricane? *Not at all A little A lot A whole lot*		

What Has Happened To You Since The Hurricane?

Since the Hurricane: How are things now? Please circle your answers.

1.	Has almost all the damage to your house from the Hurricane now been fixed?	Yes		No	
2.	Are you now living in the house you lived in before the Hurricane?	Yes		No	
3.	Are you living in a house that still has damage because of the Hurricane?	Yes		No	
4.	Do you have to travel a lot longer to get to your school now than you did before the Hurricane?	Yes		No	
5.	Is one of your parents now out of a job because of the Hurricane?	Yes		No	
6.	How many times have you moved since the Hurricane?	None	Once	Twice	3 or more
7.	How much are you bothered by:				
	a. The way things look in your neighborhood	Not at all	A little	A lot	A whole lot
	b. Problems spending time with friends	Not at all	A little	A lot	A whole lot
	c. Family members not getting along	Not at all	A little	A lot	A whole lot
	d. The way things look at home	Not at all	A little	A lot	A whole lot

Appendix H: Life Events Scale – Hurricanes Ike and Charley

Instructions: Please circle "yes" if these events have happened to you *since the Hurricane*.

	Life Event	Happened since the Hurricane	
1.	The death of a parent	Yes	No
2.	The death of a brother or sister	Yes	No
3.	Divorce of your parents	Yes	No
4.	Marital separation of your parents	Yes	No
5.	The death of a grandparent	Yes	No
6.	Hospitalization of a parent	Yes	No
7.	Birth of a brother or sister	Yes	No
8.	Hospitalization of a brother or sister	Yes	No
9.	Loss of a job by your father or mother	Yes	No
10.	Change in job by your father or mother	Yes	No
11.	Death of a pet	Yes	No
12.	Being hospitalized for illness or injury	Yes	No
13.	Death of a close friend	Yes	No
14.	New stepmother or stepfather	Yes	No