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Research report

Children's symptoms of posttraumatic stress and depression after a natural disaster: Comorbidity and risk factors

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ABSTRACT

Background: The current study examined rates of comorbidity among children's symptoms of posttraumatic stress (PTS) and depression after a natural disaster, Hurricane Ike. We also compared children with comorbid symptoms to children without comorbid symptoms, examining recovery, severity of symptoms, and risk factors.
Method: Children ($n=277$; 52% girls; 38% Hispanic, 28% White, 19% Black; grades 2–4) were assessed at 8 and 15 months postdisaster. Children completed measures of PTS and depressive symptoms at both time points and measures of exposure and recovery stressors at 8 months postdisaster.
Results: At 8 months postdisaster, 13% of children reported elevated PTS-only, 11% depression-only, and 10% comorbid symptoms of PTS and depression. At 15 months postdisaster, 7% of children reported elevated PTS-only, 11% depression-only, and 7% comorbid symptoms of PTS and depression. Children with comorbid symptoms of PTS and depression had poorer recovery, more severe symptoms, and they reported greater exposure and recovery stressors.
Limitations: We lacked information on children's predisaster functioning and diagnostic interview of psychological distress symptoms.
Conclusions: Children with comorbid symptoms need to be identified early postdisaster. Levels of stressors should be monitored postdisaster, as highly stressed youth have difficulties recovering and may need help. Interventions should be tailored for children with comorbid symptoms of PTS and depression.

1. Introduction

Hurricanes and other disasters occur commonly around the world, affecting millions of youth annually (Seballos et al., 2011). Youth may be particularly vulnerable to the effects of disasters (Norris et al., 2010), and many children who are exposed to disasters report significant psychological distress symptoms, which can interfere with their functioning (Gurwitch et al., 2002; Kar and Bastia, 2006; La Greca et al., 2010; La Greca et al., 1996). In particular, symptoms of posttraumatic stress (PTS) have been widely reported in youth postdisaster (Furr et al., 2010). An increasing number of studies have begun to examine youths' postdisaster depressive symptoms (Pina et al., 2008; Scheeringa and Zeanah, 2008) and have found that symptoms of PTS and depression are often comorbid (Eksi and Braun, 2009; Fan et al., 2011; Goenjian et al., 2001; Roussos et al., 2005). However, this comorbidity remains poorly understood.

Understanding children's comorbid PTS and depressive symptoms is crucial for informing postdisaster mental health intervention efforts. Children with comorbid symptoms may be a high-risk group postdisaster, as the presence of comorbid disorders, even at subclinical levels, might influence recovery and recurrence of psychological distress (Richards, 2011). Identifying high-risk children is particularly important postdisaster, because resources available for postdisaster psychological interventions are limited (Jaycox et al., 2010). Further, information about comorbid symptoms can elucidate how psychopathology develops postdisaster (Angold et al., 1999). Thus, in the context of a destructive natural disaster, Hurricane Ike, we examined several issues including the occurrence and comorbidity of children's PTS and depressive symptoms, recovery and severity of symptoms over time, and disaster-related risk factors associated with comorbid symptoms.

As our **first aim,** we examined rates of comorbidity at two time points (8 and 15 months) after a destructive hurricane. Based on existing evidence, it is not clear whether symptoms of

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PTS and depression are comorbid among children (i.e., preadolescents) postdisaster; it is also unclear these symptoms are comorbid after a disaster that is highly destructive, but involves little loss of life. These issues were addressed in the present study.

The majority of studies examining comorbid PTS and depressive symptoms in youth have focused on adolescents (Fan et al., 2011; Goenjian et al., 2009), even though preadolescents may display more severe PTS reactions postdisaster than older youth (Weems et al., 2010; Yelland et al., 2010). Also, postdisaster studies examining PTS and depressive symptoms have focused on disasters that involved substantial loss of life, such as earthquakes (Ekşi et al., 2007; Fan et al., 2011; Goenjian et al., 1995), supercyclones (Kar and Bastia, 2006), or terrorist attacks (Brown and Goodman, 2005). In fact, in those studies, *loss of life* was associated with both PTS and depressive symptoms in youth (Dell'Osso et al., 2011; Ekşi et al., 2007; Furr et al., 2010).

In evaluating children's PTS and depressive symptoms (and their comorbidity), an important consideration was the postdisaster time frame. Our initial evaluation occurred eight months after Hurricane Ike, well into the disaster recovery period (Silverman and La Greca, 2002). Children's PTS symptoms decrease significantly over the first six to seven months postdisaster (La Greca et al., 1996, 1998; see Bonanno Brewin et al., 2010 for a review), but appear more chronic by seven to nine months postdisaster (La Greca et al., 2010). We also assessed children's symptoms at a second time-point, 15 months postdisaster. This prospective design enabled us to evaluate whether comorbid PTS and depressive symptoms were related to poorer recovery and more severe symptoms over time, and to evaluate the interplay of PTS and depressive symptoms over time.

Prospective studies of youths' postdisaster reactions are rare (Furr et al., 2010); we could identify only two studies that evaluated youth's PTS and depressive symptoms at multiple time points within the first year and a half postdisaster (Felix et al., 2011; Thienkrua et al., 2006). Neither of these studies evaluated the comorbidity of children's PTS and depressive symptoms. Specifically, Thienkrua et al., 2006 assessed 371 Thai children (7–14 years), two months after the 2004 Asian Tsunami. Children affected by the tsunami and displaced from their homes ($n=167$) were compared to those who were affected but not displaced ($n=99$), and those who were neither affected nor displaced ($n=105$). The prevalence of clinically significant PTS was higher for the affected/displaced children (13%) than for those from unaffected villages (6%), although rates of depression did not differ across the groups (11% for affected/displaced, 5% for affected, and 8% for unaffected children). Most of the affected/displaced children were reassessed 9 months postdisaster and their rates of clinically significant PTS and depressive symptoms (10% and 12%, respectively) did not decline over time. Felix et al. (2011) followed a large sample of Puerto Rican youth 18 and 30 months after Hurricane Georges (1998). At 18 months, disaster exposure was associated with the prevalence of internalizing disorders among children (4–10 years) and depression among youth (4–17 years), although rates of disorder were low overall ($<1\%$ for PTSD, $<4\%$ for depression). While important, these studies did not evaluate the comorbidity of PTS and depressive symptoms, nor did they track comorbidity over time.

Thus, to extend the above work, our **second study aim** was to evaluate the comorbidity of children's PTS and depressive symptoms during the first year and a half postdisaster. We examined whether comorbid elevations in PTS and depressive symptoms were associated with poorer recovery and more severe psychological symptoms over time than when either occurred alone. We also evaluated whether initial PTS contributed to subsequent depressive symptoms. These issues have not been examined prospectively in children postdisaster. However, based on work with adolescents (Fan et al., 2011; Fernando et al., 2010; Goenjian et al., 2011) and adults (North et al., 2004), one might expect poorer outcomes for children with comorbid PTS and depression. One might also expect that clinically significant PTS symptoms precede and lead to significant *secondary depressive symptoms*; this has been proposed by a number of researchers (Bolton et al., 2000; Karakaya et al., 2006), as the presence of PTS may interfere with youths' engagement in activities, which could lead to depression over time (Goenjian et al., 2011).

Our third aim was to identify risk factors associated with comorbid symptoms. This information is needed for early identification of children at risk for developing comorbid symptoms. As noted above, postdisaster prospective studies have not examined comorbidity between PTS and depression. Therefore, it is unknown whether levels of risk factors may differ among children with comorbid symptoms and children with symptoms of PTS-only or depression-only. In this study, we examined several risk factors: disaster *exposure* (e.g., actual and perceived life threat), and stressors occurring during the disaster recovery period, which included immediate and ongoing loss/disruption (e.g., loss of home or possessions), and other *stressful life events* (e.g., parental separation, death in the family; see La Greca et al., 1996, 2010 and Vernberg et al., 1996 for the conceptual model underlying the risk factors).

Research evaluating risk factors for children's postdisaster reactions has predominantly focused on PTS symptoms. Consistent with conceptual models, these studies generally demonstrate that disaster exposure variables, and especially perceived life threat, are important predictors of children's PTS reactions (Blaze and Shwalb, 2009; La Greca et al., 2010; Weems et al., 2007; see Furr et al., 2010). In addition, stressors occurring during the disaster recovery period also have been identified as important risk factors for children's persistent PTS symptoms (Comer et al., 2010; Fernando et al., 2010; La Greca et al., 2010). Despite the importance of these studies, the relationship between risk factors and comorbid PTS and depressive symptoms has not been considered.

Considerably less research has examined risk factors associated with children's depressive symptoms postdisaster. Studies, conducted almost exclusively with adolescents, suggest that recovery stressors such as loss of family members, restrictions on travel, property damage, and financial difficulties, are associated with youths' depressive symptoms postdisaster (Ekşi et al., 2007; Fernando et al., 2010; Giannopoulou et al., 2006; Goenjian et al., 2011; Kolaitis et al., 2003; Wickrama and Kaspar, 2007). Outside the context of natural disasters, evidence links both stressful life events and personal loss with depressive symptoms in youth (Brent et al., 2009; Rudolph and Flynn, 2007).

None of the above studies examined the relationship between various stressors and comorbid PTS and depressive symptoms, which was our third study aim. Overall, we expected that children with comorbid symptoms at Time 1 (8 months postdisaster) would report the highest levels of risk factors, when compared with children with symptoms of PTS-only, depression-only, or no elevated symptoms. Based on the literature reviewed above, we also expected that children with elevated PTS would report higher perceptions of life threat than children with no elevated PTS. Further, we expected that children with elevated depressive symptoms would report more stressors occurring during the postdisaster recovery period reflecting loss (of people, possessions) than children without elevated depressive symptoms.

The current study focused on children from Galveston, Texas. Galveston was in the direct path of Hurricane Ike, which hit Galveston in September 2008, taking 103 lives (Berg, 2008). Ike, a category 2 hurricane, is considered to be one of the most costly hurricanes in U.S. history (Blake, Landsea, & Gibney, 2011).