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Characteristics of Traumatized Children

Trauma Exposure and Mental Health Problems among School Children 15 Months Post-Hurricane Katrina

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The purpose of this study was to examine prevalence, correlates and predictors of mental health in children in New Orleans 15 months post-Hurricane Katrina. Analyses were conducted on 195 children who completed self-reports of hurricane and lifetime trauma exposure, social support, post-traumatic stress disorder (PTSD) symptoms, and depression. Teachers completed the Strengths and Difficulties Questionnaire. Children reported high incidence of PTSD symptoms: 36.9% moderate to severe and 23.6% mild. In multiple regression analyses, gender, social support, and lifetime trauma exposure, but not hurricane exposure, significantly predicted PTSD. Age, social support, and lifetime trauma exposure, but not hurricane exposure, significantly predicted child depressive symptoms. Teachers reported lower levels of problems and no significant predictors of teacher reports other than age and school. PTSD and depression were significant problems for children 15 months post-Hurricane Katrina. Lifetime trauma exposure was the strongest predictor of both PTSD and depression. Effective and accessible treatment is needed for such children.

Keywords children, disaster, schools, PTSD, depression

Disaster research has examined the mental health consequences of a variety of natural and manmade disasters. Disasters may expose families to multiple acute and ongoing personal and environmental challenges that impact adjustment (Norris, 2006). Symptoms of post-traumatic stress disorder (PTSD) are one of the most common psychological outcomes

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for children who experience disasters (LaGreca, Silverman, Vernberg, & Prinstein, 1996; Osofsky, Osofsky, Kronenberg, Brennan, & Hansel, 2009; Pfefferbaum, 1997; Thienkrua et al., 2006). Subdiagnostic PTSD is common and may be disabling even if full criteria are not met (Carrion, Weems, Ray, & Reiss, 2002). Furthermore, a lifetime diagnosis of PTSD by the age of 18 years significantly increases the risk of other lifetime problems such as depression, anxiety, and alcohol and drug dependence (Giaconia, Reinherz, Silverman, & Bilge, 1995). Thus, it is important to consider and address symptoms of psychological distress following disasters, especially in children, because they often have a chronic course that may disrupt development (Pfefferbaum, 1997). However, not everyone is equally affected by the stress of experiencing such an event, and understanding various risk and protective factors has become an important research issue.

Hurricane Katrina

Hurricane Katrina was one of the most serious natural disasters to ever occur in the United States. A very large Category 4 storm followed by flooding of New Orleans, the nation's 35th largest city, led to the evacuation of nearly everyone in the city, the temporary destruction of the living environment of half a million people, the loss of more than 1,000 lives, extensive home and personal property damage, widespread economic problems for the city and a change in the city's demographic makeup, and ongoing dislocation from homes and schools for a large proportion of the population.

Hurricane, flooding, and evacuation experiences varied, with some children from New Orleans escaping personal injury or property damage but with most experiencing at least some direct trauma exposure and others experiencing multiple serious traumatic events. For economically disadvantaged families or those who did not evacuate early, the evacuation experience was harrowing. Many had to be rescued from floodwaters, sometimes witnessing injury or death to loved ones or others in the process. Others were sheltered for several days at the city's Convention Center or the Superdome, neither of which provided adequate water, food, or public safety, and eventually evacuated to distant locales, sometimes separated from caregivers for several days or longer with no information about their whereabouts.

Mental Health Symptoms Following Hurricanes

Following Hurricane Hugo and Hurricane Andrew, which were far far less severe than Katrina in terms of loss of life and secondary adversity as described above, researchers found that between 33% and 50% of children exhibited significant symptoms of PTSD 3–6 months after the storm (LaGreca et al., 1996; Lonigan et al., 1991; Shaw et al., 1995; Vernberg, Silverman, LaGreca, & Prinstein, 1996). Estimates from previous studies suggest that one year after a hurricane, approximately 5% of all children in the hurricane impact area meet full diagnostic criteria for PTSD as a result of the hurricane (Garrison et al., 1995; Garrison, Weinrich, Hardin, Weinrich, & Wang, 1993; Shannon, Lonigan, Finch, & Taylor, 1994; Shaw et al., 1995). This estimate does not include the many more children who will suffer significant PTSD symptoms, including ongoing functional impairment, without meeting full diagnostic criteria. In addition to PTSD, these children are likely to have other psychological difficulties such as significantly elevated rates of major depression, anxiety and, for those whose loved ones died in the hurricane or flooding, childhood traumatic grief symptoms (Cohen & Mannarino, 2004; LaGreca & Prinstein, 2002).

Data from children evaluated 10 months after Hurricane Katrina suggest that more than half of these children had significant mental health symptoms, with 33% having significant symptoms of PTSD or depression (Osofsky, Osofsky, & Harris, 2007). In addition to the ongoing displacement that these children had been subjected to, many children had experienced separation from caretakers, caretaker mental illness, urban poverty, previous traumas, and/or multiple family stressors either from the storms or unrelated to the storms.

Factors Predicting PTSD and Depression Post-Disaster

Demographics

Individual characteristics have emerged as important factors to consider in post-hurricane research, with several studies finding that girls report more distress following disasters than do boys (Bokszczanin, 2007; Burke, Moccia, Borus, & Burns, 1986; Lonigan et al., 1991; Russoniello et al., 2002; Shannon et al., 1994; Vernberg et al., 1996). However, these gender effects do not always appear to persist over time (LaGreca et al., 1996). Studies with children after disasters have also shown differences in symptoms based on age, with younger children reporting more PTSD symptoms than older children and adolescents (Bokszczanin, 2007; Giannopoulou et al., 2006; Shannon et al., 1994). Some results also suggest differences in outcome measures based on ethnicity, although findings have been inconsistent. For example, African American youth reported more PTSD symptoms than either Caucasian or other minority youth following Hurricane Hugo (Lonigan et al., 1991; Shannon et al., 1994) and during the school year following exposure to Hurricane Andrew, LaGreca et al. (1996), found that Latino and African American children were less likely to evidence declines in PTSD symptoms over time (LaGreca et al., 1996). No differences were reported across ethnicity in studies following Hurricane Floyd (Russoniello et al., 2002) nor three months after Hurricane Andrew (Vernberg et al., 1996).

Exposure

Exposure is considered to be a primary factor in the emergence of post-traumatic symptoms in most disaster-response models with greater disaster exposure increasing risk for subsequent negative mental health problems (Freedy, Resnick, & Kilpatrick, 1992; Goenjian et al., 1995; March, Amaya-Jackson, Terry, & Costanzo, 1997; Osofsky et al., 2009; Pynoos et al., 1987; Vernberg et al., 1996). Following Hurricane Andrew, Vernberg et al. (1996) found that children's exposure and loss accounted for 35% of the variance in children's symptoms (Vernberg et al., 1996). Children with greater personal exposure to life threat or danger, those who witnessed others in life-threatening situations or whose family members' lives were in danger are at greater risk than children who did not experience or witness such things (Pine & Cohen, 2002). Similarly, having a family member die in the disaster is a risk for greater symptoms post-disaster (American Academy of Child & Adolescent Psychiatry, 2010). After the Asian tsunami, delayed evacuation was found to predict the development of PTSD in children nine months later (Thienkrua et al., 2006).

Social Support

The level of support that a child receives from peers, family, and other caregivers is another factor that may serve to protect children from negative outcomes following a hurricane.

Vernberg and colleagues (1996) found that social support was associated with decreased risk for PTSD in a group of 1,086 elementary school-age children who experienced Hurricane Andrew (Vernberg et al., 1996).

Previous Trauma Exposure

Results from the majority of research with children and adolescents who have experienced a disaster suggest that previous exposure to traumatic events may increase risk for post-disaster symptoms and impairment. For example, among 264 tsunami survivors in Sri Lanka ranging in age from 8 to 14 years old, previous traumas, including war, domestic violence, community violence, medical treatment, physical abuse, and prior exposure to natural disaster, demonstrated a positive relationship to increased post-traumatic stress symptoms (Neuner, Schauer, Catani, Ruf, & Elbert, 2006). Similarly, in a sample of 1,264 children affected by Hurricane Hugo ranging in age from 11 to 17 years old, research revealed that previous exposure to traumatic events was associated with increased likelihood of post-traumatic symptoms (Garrison et al., 1993).

Current Study

The aims of the current study were to describe symptom levels observed among children 15 months after Hurricane Katrina, and to examine the correlates and predictors of mental health outcomes. Toward these aims, we examined the relationships between self-reported symptoms of PTSD and depression and student demographic factors, hurricane exposure, lifetime trauma history, social support, and teacher-reported behavioral problems. We expected that younger students, girls, those reporting higher levels of hurricane exposure and previous traumatic experiences, and those with lower social support would report higher levels of post-traumatic and depressive symptoms and have higher rates of teacher-reported behavioral problems.

Method

Participants

The project was conducted within Project Fleur-de-lis (PFDL; Cohen et al., 2009), a program run by Mercy Family Center in Metairie, LA and established to provide a "stepped care" approach to triage and treat children experiencing trauma symptoms after Hurricane Katrina. PFDL provides screening in schools in New Orleans and three tiers of evidence-based treatment to disaster-exposed children.

Schools

Three schools participating in PFDL were selected based on their representativeness of schools participating in PFDL (e.g., diverse size, ethnicity, and socioeconomic status, and diversity of hurricane, evacuation, and post-hurricane experiences) and their willingness to participate. The first school was located in New Orleans and was one of the first to reopen after the hurricane. This school, consisting of 158 students total and 85 fourth through eighth graders, took in all children in need of a school, which included the student populations of several schools that were completely destroyed by Hurricane Katrina. Many of the students attending this parochial school were in New Orleans when Hurricane Katrina made

landfall. Immediately after the storm, these students were living in trailers, in hotels and on cruise ships. The students attending this school were predominately African American (74%), having a 75% participation rate in the free/reduced lunch program. The school sustained moderate damage to its roof and top floor, and a portion of the school could not be used during the 2005–2006 school year.

The second school is located in Metairie, LA, a suburb of New Orleans. The students attending this school were predominately Caucasian (90%), with 11% participation rate in the free/reduced lunch program. Seven hundred ninety six students attend this school (397 fourth through eighth graders). The school sustained no damage by Hurricane Katrina. The third school is located in an area of New Orleans that experienced four to six feet of flooding, and sustained water damage to their first floor, having to replace all of their library books and their first floor furniture. This school serves 261 students (127 fourth through eighth graders) and was the first of the three schools to reopen, in January 2006. The students attending this school were predominately African American (97%), with an 80% participation rate in the free/reduced lunch program. Many students attending this school travel nearly an hour to get to school, having relocated to other towns outside New Orleans after the storm.

Recruitment and Consent Rates

This assessment was part of a larger treatment project described elsewhere (Jaycox et al., 2010). We sent home an introductory letter explaining the project as well as consent form packets to 609 fourth through eighth grade children. We requested that parents return consent forms to their respective schools, indicating whether or not they gave permission for their children to participate, in the survey, and if appropriate, two interventions that followed the assessment. We received 438 consent forms (72%); 202 (33%) of which gave permission for participation. At the time of the initial assessment, child assent was also requested. At this stage, six students declined to participate and one student moved before the assessments began. This resulted in 195 students who participated, a 32% participation rate among all those eligible to participate.

Participants

Participants were 195 children attending Grades 4 through 8 in three parochial schools in New Orleans and Metairie, LA during the 2006–2007 academic year who assented to participate and whose parents consented to participate in the project. Demographic information about the sample was obtained in two ways. Parents provided information for 90 children; and information was accessed from school records regarding ethnicity and age with parents' permission for the remaining children. The sample consisted of slightly more girls than boys (girls 55.9%; boys 44.1%), with an average age of 11.6 years ($SD = 1.4$). Forty-eight percent of children were Caucasian, 46% were African American/Black, 5% were Hispanic, and 2% were from other racial/ethnic backgrounds.

Measures

Participating students completed the self-report baseline measures in small groups with research staff available to answer questions. Students were offered to have the questions read aloud if preferred.

Hurricane Exposure. We adapted the Disaster Experiences Questionnaire (Scheeringa, 2005) for use with students via self-report. For an overall exposure to hurricane experiences measure, we tallied (simple sum of the number of items) the following experiences for a total number of experiences per student: trapped in a flooded house, walked or swam through floodwater to escape, got out by boat, got out by helicopter, stayed in the Superdome or Convention Center, slept overnight on a street (including the I-10), saw something really upsetting like dead bodies, separated from parents or usual adult caretaker.

Lifetime Trauma Exposure. The UCLA PTSD Reaction Index for DSM-IV (Pynoos, Rodriguez, Steinberg, Stuber, & Frederick, 1998) contains a 12-item exposure questionnaire used in this study, which asks the child to identify types of trauma experienced. Reliability (.90) and validity (.87) of this instrument are high (Pynoos et al., 1998). At baseline, participants were asked about lifetime experiences; at follow-up they were asked about experiences since the prior assessment. Total scores are arrived at by summing the number of items endorsed. Because of school concerns, we modified the wording on one item about experience of sexual abuse. Items from this questionnaire are included in Table 1.

Peer and Family Support. Support was assessed via eight items from the Social Support Scale for Children (Harter, 1989). Four items evaluated peer support (Cronbach's $\alpha = .68$) and four items evaluated family support (Cronbach's $\alpha = .80$). The potential range of scores for this study was 0–28. This scale has demonstrated construct validity as it correlates positively with scores from the Self-Perception Profile for Children, with correlations ranging from .28 to .49 (Harter, 1989).

PTSD Symptoms. The Child PTSD Symptom Scale (CPSS; Foa, Treadwell, Johnson, & Feeny, 2001) is a 17-item self-report instrument with a potential range of scores from 0–51. This measure has shown good convergent and discriminant validity and high reliability compared to a structured interview (Foa et al., 2001). In the present study, scale internal consistency was high (Cronbach's $\alpha = 0.90$). For the current study, as in previous school-based work with similar populations (Jaycox et al., 2009), we defined cutoff scores for categories of symptom levels where CPSS total score of 12–18 was considered to be mild post-traumatic stress symptomatology and a total score of more than 18 was considered moderate to severe post-traumatic stress symptomatology. These categories were based on how they map onto the frequencies of item responses (i.e., a score of 17 would be indicative of endorsing "a little bit" on all of the 17 items).

Depressive Symptoms. The Children's Depression Inventory (Kovacs, 1981) was used to assess depressive symptoms at each assessment point. This 27-item measure assesses children's cognitive, affective, and behavioral depressive symptoms. The scale has high internal consistency, moderate test–retest reliability, and correlates in the expected direction with measures of related constructs (e.g., self-esteem, negative attributions, and hopelessness (Kendall, Cantwell, & Kazdin, 1989). Internal consistency reliability ratings for the present study were high ($\alpha = 0.90$).

Behavior Problems at School. Teacher-reported behavior problems were assessed using the Strengths and Difficulties Questionnaire (Goodman, 1997; Goodman, Meltzer, & Bailey, 1998). This questionnaire contains 25 items, 20 assessing problem areas (emotional symptoms, conduct problems, hyperactivity/inattention, and peer relationship problems), five

assessing prosocial behavior (Goodman, 1999). The scale distinguishes well between clinical and nonclinical samples. For the present study, internal consistency was high ($\alpha = 0.89$).

Data Analyses

We imputed missing items five times separately using Proc MI in SAS (Version 9.2; SAS Institute, 2002–2008). We conducted descriptive statistics to characterize the degree to which students and teachers reported emotional and behavioral problems, and the extent to which students reported exposure to hurricane trauma and other lifetime traumas. We examined the relative relationship of each to the child outcomes using regression analyses as described below.

Results

Descriptives

Students in this sample reported on both their exposures to hurricane traumas and about other traumatic life events (Table 1). Students' hurricane experiences centered on seeing very upsetting things, like seeing a dead body (69%) or being separated from parents (24%), but there was also a small minority of students who reported being trapped in the floodwaters and requiring evacuation. Other traumatic life events were common. Students reported relatively high levels of exposure to loss and to violence. The most common event was traumatic loss (56%), but about a quarter to a third of students reported exposure to community violence, accidents, and severe illnesses or injuries.

With regard to PTSD symptoms, 23.6% reported symptoms in the mild range (12–18 on the CPSS) and 36.9% reported symptoms above 18, or in the moderate to severe range. For depression, 36.9% of students reported depressive symptoms at or above a cut-off of 13, indicating mild or more severe symptoms. For teacher-reported behavior problems, teachers reported behavior problems indicative of the "borderline" range (a score of 12–15) for 10.3% of students and problems in the "abnormal" range (a score of 16 or above) for 14.9% of students. Girls and boys reported similar levels of exposure to trauma and to the hurricane, and their teachers reported comparable levels of behavior problems across gender (see Table 1). Girls reported significantly more PTSD symptoms, and there was also a nonsignificant trend for girls to report more depressive symptoms (Table 2).

Regression Analyses

In regression analyses, we entered the two social support variables, the hurricane and lifetime trauma exposure variables as predictors of current PTSD and depressive symptoms and teacher-reported behavior problems in three separate regressions (see Table 3), along with covariates (school, age, ethnicity, gender). Girls were more likely to report PTSD symptoms and younger children reported more depressive symptoms. No ethnic/racial differences were found. Social support from friends and family were strong predictors of both PTSD and depressive symptoms. We found lifetime trauma exposures to be a significant predictor of both PTSD and depressive symptoms, while hurricane-related exposure did not predict PTSD or depressive symptoms.

Table 1
Exposure to hurricane and lifetime trauma

Exposures	Percent endorsed	Mean (SD)
Hurricane		
Did you feel that your own life or a family members was in danger?	56.41	
Did you feel you could not escape?	30.26	
Did you feel extreme panic or fear?	60.51	
Were you trapped in a flooded house?	4.62	
Did you have to walk or swim through floodwater to escape?	5.64	
Did you get out by boat?	4.10	
Did you get out by helicopter?	2.05	
Did you stay in the Superdome or Convention Center?	2.05	
Did you sleep overnight on a street (including Interstate 10)?	4.10	
Did you see anything really upsetting, like dead bodies, people drowning, being attacked?	68.72	
Were you separated from your parents or usual adult caretakers?	24.10	
Losses experienced due to the hurricanes: close family member	10.26	
Losses experienced due to the hurricanes: distant family member	5.64	
Losses experienced due to the hurricanes: friend or neighbor	9.74	
Losses experienced due to the hurricanes: dead or missing pet	23.59	
Losses experienced due to the hurricanes: ruined or lost toys	34.87	
Losses experienced due to the hurricanes: loss of other belongings	44.10	
How many new schools have you attended after the hurricanes?		1.32 (1.23)
Months between hurricanes and return to your original home		6.29 (5.97)
Lifetime Trauma		
Have you ever been in a big earthquake that badly damaged the building you were in?	0.51	
Have you ever been in another kind of disaster, like a fire, tornado, flood, or hurricane?	49.74	
Have you ever been in a bad accident, like a very serious car accident?	29.74	
Have you ever been in a place where a war was going on around you?	3.59	
Have you ever been hit, punched, or kicked very hard at home?	21.03	
Have you ever seen a family member being hit, punched, or kicked very hard at home?	21.54	
Have you ever been beaten up, shot at, or threatened to be hurt badly?	23.08	
Have you ever seen someone in your town being beaten up, shot at, or killed?	37.44	

(Continued)

Table 1
(Continued)

Exposures	Percent endorsed	Mean (SD)
Have you ever seen a dead body in your town?	33.85	
Have you ever had an adult or someone much older touch or treat you in a way that made you feel uncomfortable?	10.77	
Have you ever heard about the violent death or serious injury of a loved one?	56.41	
Have you ever had a painful and scary medical treatment in a hospital when you were very sick or badly injured?	35.90	
Have you ever had something else traumatic happen to you?	22.56	

In terms of behavior problems, teachers reported more behavioral problems among older children and among children at one of the schools. Hurricane exposure, previous trauma history, and social support were not significant predictors of teacher-reported behavior problems.

Discussion

This study evaluated the prevalence and correlates of PTSD, depressive symptoms, and teacher-reported behavioral problems in 195 children in three New Orleans schools 15 months after Hurricane Katrina. The participants in the study had parental consent to participate in a subsequent intervention project, and thus may represent those children who are more symptomatic than the general student body, and therefore perhaps more interested in intervention. Results indicated that these children had significant levels of mental health symptoms. More than 60% of children self-reported significant PTSD symptoms, though it is not known how many would meet criteria for a diagnosis of PTSD.

Consistent with previous research, girls reported higher levels of PTSD symptoms, but contrary to expectation, there was no gender difference in self-reported symptoms of depression in this group of fourth through eighth graders. Although younger children reported higher rates of depression in the current sample, contrary to previous research they did not report higher levels of PTSD symptoms. These results call attention to the fact that the need for mental health intervention may differ for boys and girls and that age may need to be a consideration when specifying treatment components relevant to specific problems. Consistent with previous hurricane research, social support from family and peers emerged as a protective factor for children following Hurricane Katrina. Thus, it is clear that a core component of intervention should center around ways to enhance the social support that children receive post-disaster and ways in which schools and communities can augment such support in difficult post-disaster settings. For example, during widespread disaster children may not only be separated from their families and associated support, but many children are displaced from schools, faith-based organizations, and neighborhoods where they may typically receive support via interaction with peers, teachers, after-school coaches and instructors, and religious leaders.

The most striking finding was that children's previous trauma exposure, rather than hurricane exposure, significantly predicted both PTSD and depressive symptoms. This finding has both clinical and policy implications. Clinically, mental health clinicians who serve

Table 2
Exposures and symptoms 15 months post-Hurricane Katrina

	Overall		Male		Female		t-	
	Mean	SD	Mean	SD	Mean	SD	statistic	p-value
Exposure to hurricane-related trauma	1.15	1.08	1.20	1.23	1.12	0.94	−0.41	0.68
Exposure to lifetime traumatic events	3.24	2.17	3.41	2.13	3.10	2.20	−1.08	0.28
Self-reported PTSD symptoms	15.77	10.43	14.33	9.74	16.91	10.86	1.72	<.001
Re-experiencing symptoms	4.71	3.51	3.79	3.29	5.44	3.53	3.28	0.001
Avoidance symptoms	4.74	4.07	4.52	3.90	4.92	4.21	0.68	0.50
Arousal symptoms	6.31	4.24	6.01	4.08	6.55	4.36	0.91	0.36
Self-reported depressive symptoms	10.56	7.84	9.53	6.81	11.38	8.52	1.72	0.09
Teacher-reported behavior problems	7.49	6.98	8.37	6.56	6.79	7.24	−1.38	0.17
Social support from family	12.58	3.36	13.15	3.33	12.13	3.32	−2.06	0.04
Social support from friends	10.71	3.76	10.57	3.81	10.82	3.73	0.41	0.68

Note. PTSD = post-traumatic stress disorder.

children impacted by disasters should be aware of the effect of previous trauma on children's mental health functioning. It may be that disaster exposure can trigger past trauma memories which for individual children may have been much more traumatic than the disaster itself (Pine & Cohen, 2002) or that this response is related to an accumulation of traumatic events and environments. A similar response was reported by children after the September 11th terrorist attacks (Hoven et al., 2005) and was again seen after Hurricane Katrina (Osofsky et al., 2009).

Children who live in urban environments and are affected by chronic trauma (e.g., community violence and loss) may be particularly impacted by disasters. In the case of New Orleans, impoverished families were less likely than others to have cars enabling them to flee before the storm, or to have financial resources to rebuild after the storm, and thus were particularly at risk for disaster exposure and related adversities. However, our study shows that children were also affected by the prior exposures to trauma that they had endured, and that this was even more important than their hurricane exposure in terms of PTSD and depressive symptoms. Clinicians should therefore assess both previous traumas as well as the specific exposures related to the disaster in order to fully evaluate PTSD and related mental health issues as a result of the impact of trauma in children's lives. Children who have been exposed to disasters will likely possess previous exposure to trauma and therefore possess mental health needs that are complex, and require substantial investment in intermediate and long-term treatment. The current study calls into question the value of restricting disaster services to only the short-term, adult focused, and nonclinical services, as seen in the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 100–207) and restrictions in the use of Substance Abuse Mental Health Services Administration and Federal Emergency Management Agency services.

Table 3
Predictors of baseline symptoms

	Estimate	Standard Error	t-statistic	p-value
Self-reported PTSD symptoms				
School: 1 versus 3	−1.66	1.82	−0.91	0.36
2 versus 3	−9.44	5.21	−1.81	0.07
Female gender	2.56	1.17	2.18	0.03
Ethnicity: Black versus White	−8.77	5.17	−1.7	0.09
Other versus White	−0.97	2.97	−0.32	0.75
Age	0.15	0.42	0.37	0.71
Social support from family	−0.72	0.19	−3.75	<.001
Social support from friends	−0.71	0.17	−4.29	<.0001
Hurricane trauma exposures	0.30	0.61	0.49	0.62
Lifetime trauma exposures	1.98	0.31	6.34	<.0001
R^2	.47			
Self-reported depressive symptoms				
School: 1 versus 3	0.93	1.33	0.70	0.49
2 versus 3	−5.13	3.71	−1.38	0.17
Female gender	1.10	0.84	1.31	0.19
Ethnicity: Black versus White	−5.85	3.67	−1.59	0.11
Other versus White	1.60	2.11	0.76	0.45
Age	0.59	0.30	1.99	0.05
Social support from family	−1.06	0.14	−7.77	<.0001
Social support from friends	−0.52	0.12	−4.47	<.0001
Hurricane trauma exposures	0.73	0.44	1.67	0.09
Lifetime trauma exposures	0.82	0.22	3.69	<.001
R^2	.52			
Teacher-reported behavior problems				
School: 1 versus 3	5.63	1.54	3.65	<.001
2 versus 3	0.24	4.41	0.06	0.96
Female gender	−1.55	1.00	−1.55	0.12
Ethnicity: Black versus White	−1.22	4.36	−0.28	0.78
Other versus White	0.87	2.52	0.358	0.73
Age	1.04	0.36	2.95	0.003
Social support from family	−0.11	0.17	−0.65	0.52
Social support from friends	−0.17	0.14	−1.20	0.23
Hurricane trauma exposures	0.88	.62	1.56	0.17
Lifetime trauma exposures	0.19	0.27	0.69	0.49
R^2	.14			

Note. PTSD = post-traumatic stress disorder.

A final finding of this study was that teachers reported fewer difficulties among children than children themselves reported, with only about 15% of children in the abnormal range, as compared to about 37% in the clinical range on self-reports of PTSD or depression. In addition, teacher reports were unrelated to the other constructs we measured, whereas the self-report measures were more significantly related to prior lifetime trauma

exposure and social support. Of course, teacher reports of behavior problems encompass a wider array of problems than just depressive symptoms or anxiety symptoms, including hyperactivity/inattention, peer difficulties and the like. Still, not dissimilar from other studies of child anxiety (Collishaw, Goodman, Ford, Rabe-Hesketh, & Pickles, 2009), the high degree of internal distress that children are reporting on the surveys does not appear to be captured well by the teacher reports.

It is important to note the limitations of the current study. First, consent rates to participate in the study were much lower than anticipated. Although these consent rates are in line with previous school-based research for trauma, largely in urban areas (i.e., Jaycox, Langley, Stein,Wong, Sharma, Scott, & Schonlau, 2009; Stein et al., 2003), expectations were for higher consent rates given that the study took place following the acute awareness of this major disaster impacting students. Future studies may focus on ways of facilitating the parent consent for school-based trauma services and concrete ways of increasing parent buy-in. Secondly, the study included only self-report data, an issue common to many studies conducted in the school setting due to sensitivity to the time burden placed on participants. Although the study did include student, parent, and teacher report, future studies could explore innovative ways of improving multimethod data collection. Finally, the current study did not measure all of the chronic stressors and secondary adversities related to life following the hurricane that may have had explanatory value in this context. Future studies should include variables related to resource loss, ongoing triggers during the long recovery and rebuilding process, and other ongoing adversity caused by the impact of the disaster and potential longer-term toxic environment.

Despite these limitations, the current study highlights the fact that for many of the children and adolescents who endured Hurricane Katrina, it was previous trauma and loss that was most related to their distress. Future responses to natural disasters should possess not only child-focused, long-term and traditional mental health services, but take on an even broader vision by taking into account previous trauma and pre-existing mental health disorders. Hurricane Katrina for many children living in the New Orleans area was just another layer of trauma in their already difficult lives. However, Hurricane Katrina has also had its positive effects on the mental health and school communities of New Orleans, allowing better access to evidence-based trauma focused interventions and general mental health services for many children and adolescents than prior to Hurricane Katrina. This is a clear example of the potential positive effects that communities may experience in the aftermath of disaster.

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