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Journal of Clinical Child & Adolescent Psychology
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/hcap20

Social Support, Discrimination, and Coping as Predictors of Posttraumatic Stress Reactions in Youth Survivors of Hurricane Katrina

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Published online: 21 Jul 2008.

To cite this article: Armando A. Pina, Ian K. Villalta, Claudio D. Ortiz, Amanda C. Gottschall, Natalie M. Costa & Carl F. Weems (2008) Social Support, Discrimination, and Coping as Predictors of Posttraumatic Stress Reactions in Youth Survivors of Hurricane Katrina, Journal of Clinical Child & Adolescent Psychology, 37:3, 564-574, DOI: 10.1080/15374410802148228

To link to this article: http://dx.doi.org/10.1080/15374410802148228

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Journal of Clinical Child & Adolescent Psychology, *37*(3), 564–574, 2008
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ISSN: 1537-4416 print/1537-4424 online
DOI: 10.1080/15374410802148228

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This study examined the influence of aspects of the post–Hurricane Katrina recovery environment (i.e., discrimination, social support) and coping behaviors on children's posttraumatic stress reactions (symptoms of posttraumatic stress disorder [PTSD], anxiety, and depression). Data corresponding to 46 youth ($M = 11.43$ years; 39% girls; 33% African American, 67% European American) revealed that greater helpfulness from extrafamilial sources of social support predicted lower levels of child-rated symptoms of PTSD, anxiety, and depression. A positive predictive relation was found between helpfulness from professional support sources and PTSD, perhaps suggesting that parents whose children were experiencing higher PTSD symptom levels sought professional support and reported it to be helpful. Youths' avoidant coping behaviors predicted both PTSD and anxiety symptoms. Discrimination, active coping, and familial support did not predict any of the posttraumatic stress reactions assessed in this study.

Clinical child and adolescent research indicates that hurricane exposure often results in posttraumatic stress reactions, with symptoms of posttraumatic stress disorder (PTSD), anxiety, and depression being most prevalent (e.g., Caldera, Palma, Penayo, & Kullgren, 2001; Garrison et al., 1995; Goenjian et al., 2001; Jones, Frary, Cunningham, Weddle, & Kaiser, 2001). Although these symptoms may lessen over time for some children, accumulating evidence suggests that they persist for others (e.g., Silverman & La Greca, 2002). According to a framework first articulated by Korol (1990) and Green et al. (1991), and more recently refined by La Greca and colleagues (i.e., La Greca & Silverman, 2006; La Greca, Silverman, Vernberg, & Prinstein, 1996; Vernberg, La Greca, Silverman, & Prinstein, 1996), factors linked to posttraumatic stress reactions typically fall into one of the following categories: aspects of traumatic exposure, pre-existing characteristics of the child, characteristics of the postdisaster recovery environment, and child psychological resources. In the case of Hurricane Katrina, one of the deadliest storms ever to

This study was funded in part by grants from the National Institute of Mental Health and the Institute for Social Science Research awarded to Carl F. Weems and Armando A. Pina.

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strike the United States (U.S. Department of Commerce, 2007), unique factors associated with the postdisaster recovery environment may have contributed to poor mental health outcomes in youth survivors. Specifically, the devastation caused by Katrina in New Orleans was exacerbated by institutional dysfunction (e.g., poor preparedness and inadequate rescue response), which has been linked to a diaspora that likely disrupted social support networks and to the perception (and accusation) of racial bias toward survivors following the storm (Henkel, Dovidio, & Gaertner, 2006; U.S. House of Representatives, 2006).

Consistent with the theme of this special section of the *Journal of Clinical Child and Adolescent Psychology* and the growing realization that Hurricane Katrina presented unique opportunities to advance understanding of children's response to trauma (e.g., Hensley & Varela, this issue; Spell et al., this issue; Weems, Pina, et al., 2007), the objective of this study was to try to learn from this natural disaster. Using the framework of La Greca and colleagues, our study sought to examine whether social support, discrimination, and coping predicted postdisaster mental health outcomes (i.e., symptoms of PTSD, anxiety, and depression) among youth survivors of Katrina. Specifically, it was of interest to investigate whether youths' symptoms of PTSD, anxiety, and depression were predicted by perceived "helpfulness" of various social support sources (i.e., familial, extrafamilial, professional) and by youths' coping behaviors (i.e., avoidant, active) in the aftermath of the storm. Also of interest was to explore whether youths' symptoms were predicted by perceived discrimination toward the family in the aftermath of Hurricane Katrina. To examine these relations, secondary analyses of data from Weems, Pina, et al. (2007) were conducted.[1]

Our interest in social support in the aftermath of Hurricane Katrina in particular emerged as a result of the diaspora after the storm, which resulted in more than one million evacuees and more than 270,000 permanently relocated survivors (U.S. House of Representatives, 2006). This migration likely resulted in unprecedented disruptions of social support networks, which potentially placed Katrina survivors at increased risk for poor mental health outcomes (e.g., Jeney-Gammon, Daugherty, Finch, Betler, & Foster, 1993; La Greca et al., 1996; Warheit, Zimmerman, Koury, Vega, & Gil, 1996; Weems, Watts, et al., 2007; Weisler, Barbee, & Townsend, 2006). The impact of discrimination in the aftermath of Hurricane Katrina was of interest because after the storm, questions were raised by numerous observers (e.g., reporters, politicians, religious leaders) concerning racism in the treatment of survivors (see Henkel et al., 2006). In past research with adults, discrimination has been found to predict poor mental health outcomes (e.g., Brody et al., 2006; Taylor & Turner, 2002). In the case of Hurricane Katrina, perceived discrimination was relatively elevated in New Orleans and potentially placed survivors at increased risk for poor mental health outcomes (Weems, Watts, et al., 2007); however, our examination of discrimination was exploratory given the paucity of discrimination research in the context of disaster exposure.

With respect to youths' coping behaviors (i.e., active coping, avoidant coping), there seems to be consistent evidence that certain coping behaviors predict posttraumatic stress reactions among youth exposed to hurricanes. For example, among children exposed to hurricanes, avoidant coping strategies such as blame/anger and social withdrawal have been shown to predict greater self-rated PTSD symptoms (e.g., La Greca et al., 1996; Russoniello et al., 2002; Vernberg et al., 1996). Moreover, active coping strategies (such as cognitive restructuring and problem-focused coping) have been shown to predict lower levels of self-rated depression symptoms in youth hurricane survivors (e.g., Jeney-Gammon et al., 1993). Given the unique circumstances of Katrina youth survivors, our study explored the predictive relation between coping behaviors (i.e., avoidant, active) and traumatic reactions. This was of interest because it is possible that disruptions of social support networks hampered youths' ability to use active coping strategies (e.g., seeking support), whereas perceptions of discrimination promoted youths' use of avoidant coping strategies (e.g., isolation, repression). Although examination of these mediated relations was beyond the scope of this investigation, we hoped this study's findings would inform future research in this area.

Because of the distinct circumstances of this disaster (e.g., perceived racial bias, Katrina diaspora), and drawing on the framework articulated by La Greca and colleagues (La Greca et al., 1996; La Greca & Silverman, 2006; Silverman & La Greca, 2002; Vernberg et al., 1996), we hypothesized that higher levels of discrimination and greater use of avoidant coping strategies would predict greater severity of posttraumatic stress reactions, whereas higher levels of perceived social support "helpfulness" and greater use of active coping strategies would predict less severe reactions.

In our study, we also conducted exploratory analyses by ethnicity (i.e., European American vs. African American). We felt that even though our sample size of 46 youth precludes firm conclusions about these relations, these data might provide useful clues for future research. In addition, no directional hypotheses were

[1]In Weems, Pina et al. (2007), it was found that number of hurricane exposure events and sex (being female) predicted PTSD symptoms. Pre-Katrina trait anxiety and negative affect predicted postdisaster PTSD symptoms and worry symptoms. Predisaster trait anxiety also predicted postdisaster depression symptoms.

made about this study's analyses by ethnicity for the following reasons. First, as indicated by the few hurricane exposure studies that included minority participants, these youth are more likely influenced by proximal (e.g., change in community resources) and distal (e.g., health care disparities) secondary stressors that possibly complicate future efforts to adjust to disaster exposure (e.g., La Greca, Silverman, & Wasserstein, 1998; Lonigan, Shannon, Finch, Daugherty, & Taylor, 1991; Pynoos, Steinberg, & Piancentini, 1999; Rabalais, Ruggiero, & Scotti, 2002). Second, it is important to note that of the six child studies reporting on ethnicity, two showed that minority youth fared better than majority youth (i.e., Garrison, Weinrich, Hardin, Weinrich, & Wang, 1993; Jones et al., 2001), whereas four showed minority youth fared worse than majority youth (i.e., Garrison et al., 1993; La Greca et al., 1998; March, Amaya-Jackson, Terry, & Contanzo, 1997; Shannon et al., 1994). Because none of the studies supporting ethnic differences report whether ethnicity and socioeconomic status were confounded, it is unclear which of these is the critical risk factor. It is important to highlight, however, that because Hurricane Katrina impacted a relatively large number of African American families (especially in New Orleans, because of the city's demographic composition), this catastrophe offers a unique opportunity for addressing these issues.

METHOD

Participants

Data corresponding to a sample of 46 youth ($M = 11.43$ years, $SD = 3.69$) 28 boys (61%) and 18 girls (39%) who completed a pre- and post-Katrina assessment were used in our study. About 67% were European American ($n = 31$) and 33% were African American ($n = 15$). In terms of income, 28.26% ($n = 13$) of youth came from families with annual incomes of less than $21,000, for 28.26% ($n = 13$) incomes ranged from $21,000 to $51,000, and for 43.48% ($n = 20$) incomes were above $51,000. All youth had participated in a series of studies at the University of New Orleans (e.g., Weems & Costa, 2005; Weems, Zakem, Costa, Cannon, & Watts, 2005) on average 17 months before the storm and all were residing in the greater New Orleans area at the time of the storm. Data on an additional 173 youth were collected before the hurricane, but because of the extensive devastation caused by the disaster it was impossible to recontact these participants for the post-Katrina assessment (6 to 7 months after the disaster). Comparisons of youth who completed both the pre- and post-Katrina assessment versus the 173 youth who completed only the pre-Katrina assessment revealed no statistically significant differences on most pre-Katrina variables with one exception; this study's sample had higher family income. Also, in this sample of 46 youth, European Americans had higher family income than African Americans, $\chi^2(4) = 18.69$, $p < .001$.

Measures

Hurricane-related experiences. Similar to past published hurricane research (e.g., La Greca et al., 1998; Weems, Watts, et al., 2007), a survey was administered to youth to assess hurricane-related experiences. Comparable items as those administered in past research (La Greca et al., 1998) were used as well as additional items specific to events that arose in the aftermath of hurricane Katrina (e.g., lack of food or water). Table 1 contains a brief listing of sample items. Youth responded *yes* or *no* to each item and responses were summed to obtain a total number of events score. For

TABLE 1
Percentage of Youth Endorsing Exposure to Hurricane-Related Traumatic Experiences

Experience	*Total Sample*	*European American*	*African American*
Lost track of relatives or friends	87.0	83.9	93.3
Perceived threat (*thought I might die or be badly hurt*)	73.9	77.4	66.7
Witnessed or heard of others hurt, sick, or die	69.6	64.5	80.0
Taken to a different city or state	60.9	54.8	73.3
Doors or windows breaking, damaged trees	54.3	54.8	53.3
People fighting each other on the street	47.8	58.1	26.7
Tornadoes near home	43.5	45.2	40.0
Home damaged or destroyed	34.8	19.4_a	66.7_a
Pet hurt or die	23.9	25.8	20.0
Separated from parents	17.4	12.9	26.7
Got hurt or sick	15.2	12.9	20.0
Trapped in your home, car, or shelter	15.2	16.1	13.3
No food or water	13.0	12.9	13.3

Note: Percentages sharing the same subscript are significantly different ($p < .01$).

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our study, total number of events was used as a covariate in the analyses.

Posttraumatic stress reactions. Youth completed the PTSD Checklist (Amaya-Jackson, McCarthy, Newman, & Cherney, 1995), which comprises 28 items about PTSD symptoms corresponding to the re-experiencing, avoidance, and hypervigilance criteria specified in the *Diagnostic Statistical Manual of Mental Disorders* (4th ed. [*DSM–IV*]; American Psychiatric Association [APA], 1994). Respondents used a 4-point scale ranging from 0 (*did not have the feelings at all*) to 3 (*had the feelings all the time*). The PTSD Checklist yields a symptom severity score by adding participant's responses. Amaya-Jackson, Socolar, Hunter, Runyan, and Colindres (2000) reported reliability coefficients ranging from .72 to .91. In our study, reliabilities for the pre- and post-Katrina administrations were .95 and .87, respectively.

Youth also completed the Revised Child Anxiety and Depression Scale (RCADS; Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000), which assesses anxiety and depression symptoms using 47 items based on *DSM–IV* criteria (APA, 1994). Respondents used a 4-point scale ranging from 0 (*never*) to 3 (*always*). The RCADS was used to assess pre- and post-Katrina symptoms of anxiety and depression. The reliability estimates for the pre- and post-Katrina administrations of the anxiety scale were .70 and .78, and for the depression scale, the estimates were .78 and .83, respectively.

Coping. Youth completed the Children's Coping Strategies Checklist's (CCSC; Program for Prevention Research, 1999), which assesses active coping and avoidant coping behaviors. Youth responded to 24 items using a 4-point scale from 1 (*never*) to 4 (*most of the time*). The active coping items assessed positive cognitive restructuring (e.g., positivity, optimism) and problem-focused coping (e.g., seeking understanding), whereas the avoidance coping items assessed avoidance coping (e.g., repression, avoidant actions). Reliabilities of .88 and .76 have been reported for the Active and Avoidant Coping subscales, respectively (Program for Prevention Research, 1999). In terms of validity, active coping has been found to be marginally and negatively related to anxiety ($\beta = -.14$) and depression ($\beta = -.15$), and avoidant coping has been found to be significantly and positively related to anxiety ($\beta = .27$) and depression ($\beta = .26$; see Sandler, Tein, & West, 1994). The CCSC has supported measurement equivalence across African American and European American youth (Prelow, Michaels, Reyes, Knight, & Barrera, 2002). In our study, reliability estimates were .87 and .68 for the Active and Avoidant Coping dimensions.

Discrimination. Parents completed a nine-item scale developed by Taylor and Turner (2002), based on the work of Williams, Yu, Jackson, and Anderson (1997), Essed (1991), and Feagin (1991), to assess discrimination toward family members. In this study, the parent was asked to respond *yes* or *no* to whether each event had occurred in the aftermath of Hurricane Katrina. Similar to Taylor and Turner (2002), a discrimination score was derived by summing *yes* responses to assess racially driven character assaults (e.g., treated with less courtesy, treated with less respect, received worse service, treated as less smart, felt threatened or harassed). This scale had an internal consistency estimate of .85 in our sample.

Social support. Parents completed the 18-item Family Support Scale (FSS; Dunst, Jenkins, & Trivette, 1984), which measures the helpfulness of 18 different sources of support. Respondents indicated the extent to which each source was helpful to the family in the aftermath of Hurricane Katrina using a 5-point scale from 1 (*not at all helpful*) to 5 (*extremely helpful*). The FSS also includes an N/A response choice (not applicable). Similar to past research (e.g., Ahmeduzzaman & Roopnarine, 1992; Anderson, Kohler, & Letiecq, 2005), the Familial Support (e.g., relatives, own parents), Extrafamilial Support (e.g., friends, coworkers, church members/minister), and Professional Support (e.g., public health and social services, teachers, physician) subscales were used. Dunst et al. (1984) found retest reliability estimates for FSS of .91 and .47 over 1-month and 18-month intervals, respectively, and alpha coefficients in the .70s. In terms of validity, subscale scores have been found to correlate with personal and family problems in the theoretically expected direction (i.e., higher social support, lower levels of personal and family problems Dunst, Trivette, & Hamby, 1994). In our study, reliability estimates were .59, .75, and .68 for the Familial Support, Extrafamilial Support, and Professional Support subscales, respectively.

Procedures

Prior to initiating the study, approval was obtained through the Institutional Review Board of the University of New Orleans. After consent (assent for child) was obtained (pre- and post-Katrina), participants were administered a battery of questionnaires. The pre-Katrina battery included the PTSD checklist and the RCADS. Youth were assisted, as necessary, by a trained research assistant who either read aloud the questions to younger children or monitored completion of the questionnaires. After Hurricane Katrina, trained research assistants attempted to recontact families

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who completed the pre-Katrina assessment for a phone interview, and 52 participant families were located. Phone interviews for both the child and the parent each lasted approximately 30 min. The phone interview started with the survey of hurricane events (e.g., lost track of friends, fear of injury or death). Once exposure to the storm was ascertained via the survey (and confirmed by parent report), the PTSD checklist, the RCADS, and the CCSC were administered to youth; parents were administered the FSS and Discrimination scales. All questions to youth and parents were asked in terms of the hurricane (e.g., "When something reminds you of Hurricane Katrina do you get tense or upset?" and "How helpful were church members or a religious group to your family after Hurricane Katrina?"). For our study, only data corresponding to European American or African American youth were used because of our interest in conducting exploratory comparative analyses. The resulting sample was composed of 46 families of the 52 located and contacted.

RESULTS

Preliminary Analyses

Outlier analyses were conducted to identify influential cases that might have masked basic trends in the data. A leverage score was calculated for each case based on its multivariate profile for the variables in a given regression model. An outlier was defined as any case having a leverage score four times the value of the mean leverage value (Jaccard & Wan, 1995). In addition, standardized dfBetas were examined using limited information estimation approaches. In this framework, an outlier was defined as an individual case with a dfBeta larger than 3.0. No meaningful outliers were evident using either of the two approaches. Missing data were found in 3% of the cases assessed pre- and post-Katrina. Missingness was tested for bias at the post-Katrina data point by creating a "dummy variable" for each initially enrolled case (1 = completed the post-Katrina assessment; 0 = did not complete the post-Katrina assessment). This dummy variable was then correlated with sociodemographic and child clinical characteristics assessed pre-Katrina. No statistically significant effects were observed. This also was the case for comparable analyses focusing on participants not located after Hurricane Katrina with one exception: Those located post-Katrina had significantly higher family income.

Because analyses suggested that missingness occurred at random (see King, Honaker, Joseph, & Scheve, 2001), missing data were treated using multiple imputation (MI; Rubin, 1987; Rubin & Schenker, 1991). For our study, SAS PROC MI (version 9.1.3; SAS Institute, Inc., Cary, NC) was used to produce 20 data sets of imputed data. Each of the imputed data sets was analyzed using the same method, and the results from these analyses were pooled using PROC MIANALYZE to produce an estimate that incorporates the proper variability. In our study, means and standard deviations, correlation coefficients, and regression results are based on this multiple imputation procedure.

Exposure to Hurricane-Related Events

Data corresponding to youths' endorsement of exposure to hurricane events showed that 10.8% were exposed to one to four events, 54.3% were exposed to five to seven events, and 34.9% were exposed to eight or more events. The average number of hurricane events experienced was 6.41 ($SD = 1.71$). As shown in Table 1, the most frequently experienced hurricane event was "losing track of relatives or friends during the storm and/or its aftermath" (endorsed by 87% of youth). About 73.9% of youth reported "being afraid of getting hurt or dying because of the hurricane," although few reported injury or illness because of the storm (15.2%). About one third (34.8%) of youth reported "losing a home (or part of it)," and almost two thirds (60.9%) reported "having been taken to another city" because of the hurricane. When these data were examined by ethnicity (i.e., European American vs. African American), there were no statistically significant differences in average number of hurricane events experienced, proportion of events experienced (e.g., one to four events vs. five to seven events), or proportion of each event experienced, with one exception. A higher percentage of African American youth (66.7%) reported "losing a home (or part of it)" compared to European American youth (19.4%), $\chi^2(1) = 11.41$, $p = .001$.

Youths' Posttraumatic Stress Reactions

Table 2 shows means and standard deviations of this study's focal variables for the total sample and by ethnicity. All youth reported symptoms of PTSD. Using *DSM–IV* PTSD symptom criteria (i.e., at least one symptom from Criterion B, three symptoms from Criterion C, and two symptoms from Criterion D), as done in past research to determine psychiatric "caseness" (e.g., Erwin, Newman, McMackin, Morrissey, & Kaloupek, 2000), 23.9% of youth were in the clinical range using a conservative threshold (rated as "most of the time"). As shown in Table 2, the average PTSD symptom severity score was 19.78 ($SD = 10.70$). The average severity of DSM-IV avoidance symptoms was 7.35 ($SD = 4.49$), for hypervigilance symptoms it was 6.93 ($SD = 3.92$), and for re-experiencing symptoms it

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TABLE 2
Means and Standard Deviations Corresponding to Youth Reported Exposure to Hurricane Events and Post-Katrina Posttraumatic Stress Reactions, Coping, and Parent Reported Social Support and Discrimination

Variable	*Total Sample M(SD)*	*European American M(SD)*	*African American M(SD)*
Age (years)	11.43 (3.69)	12.52 (3.72)$_a$	9.20 (2.46)$_a$
Sex (% female)	39.1	38.7	40.0
Hurricane events	6.41 (1.70)	6.13 (1.75)	7.07 (1.49)
PTSD	19.78 (10.70)	18.29 (6.12)	22.87 (7.18)
Anxiety	50.52 (11.67)	50.23 (11.86)	51.13 (11.65)
Depression	16.57 (4.88)	16.26 (4.81)	17.20 (5.13)
Discrimination	1.02 (1.93)	0.25 (0.65)$_b$	2.54 (2.60)$_b$
Familial SS	13.64 (6.28)	14.52 (5.39)	12.15 (6.66)
Extrafamilial SS	12.83 (9.92)	11.85 (6.07)$_c$	16.62 (7.32)$_c$
Professional SS	7.56 (6.40)	7.56 (4.27)	8.77 (7.33)
Avoidant Coping	17.65 (5.48)	17.06 (5.89)	18.87 (4.47)
Active Coping	29.54 (6.08)	29.84 (6.72)	28.93 (4.64)

Note: Means sharing the same subscripts are statistically significantly different from each other. $t_a(44) = 3.13$, $p < .01$; $t_b(39) = 4.43$, $p < .001$; $t_c(38) = 2.17$, $p < .05$. PTSD = posttraumatic stress disorder; SS = social support.

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was 5.50 ($SD = 4.14$). When these data were examined by ethnicity (i.e., European American vs. African American), no statistically significant differences were found in average PTSD symptom severity scores and average severity of re-experiencing, avoidance, and hypervigilance symptoms. Furthermore, there were no significant differences in mean RCADS anxiety and depression scores between European Americans and African Americans.

Coping, Social Support, and Discrimination

A correlation matrix was calculated to examine the associations among the study's focal variables and is presented in Table 3. Of specific interest are the correlation coefficients corresponding to the relations between youths' posttraumatic stress reactions and the three predictors (i.e., coping, social support, discrimination). As shown in Table 3, the relations between the indices of youths' posttraumatic stress reactions ranged from .59 to .68 ($p < .01$). Significant correlations between coping behaviors and youths' posttraumatic stress reactions ranged from .31 to .58 ($p < .05$; the active coping-depression correlation coefficient was .27, *ns*). The familial support–posttraumatic stress reactions correlations ranged from −.31 to −.41 and only the familial support–PTSD correlation was significant ($p < .05$). The correlation coefficients for the extrafamilial and professional support–posttraumatic stress reactions relations did not reach statistical significance (*r*s ranged −.26 to .14). The discrimination–posttraumatic stress reactions correlations did not reach statistical significance (*r*s ranged .08 to .22). Furthermore, when the correlation matrix was computed for European Americans and African Americans separately, the pattern was more similar than different. Using Guilford's (1965) procedure, the only two statistically significant differences between the correlation matrices corresponded to the familial support–depression correlation (African American: $r = -.75$, $p < .01$; European American: $r = -.02$, *ns*; diff. $z = 2.76$, $p < .01$) and the extrafamilial support–depression correlation (African

TABLE 3
Intercorrelations Among the Study's Focal Variables

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1. PTSD (total)	—								
2. Anxiety	.68**	—							
3. Depression	.59**	.67**	—						
4. Discrimination	.22	.08	.17	—					
5. Familial SS	−.41**	−.32	−.31	−.36*	—				
6. Extrafamilial SS	−.09	−.25	−.26	−.06	.35	—			
7. Professional SS	.14	−.15	−.17	−.17	.22	.56**	—		
8. Avoidant Coping	.58**	.50**	.31*	.22	−.37*	.02	.08	—	
9. Active Coping	.55**	.40**	.27	−.01	−.32*	−.05	.15	.58**	—

Note: $N = 46$. PTSD = posttraumatic stress disorder; SS = social support.
*$p < .05$; **$p < .01$.

TABLE 4
Predicting Youth Posttraumatic Stress Reactions to Hurricane Katrina

	Predicting Post-Katrina								
	PTSD Symptoms[a]			*Anxiety Symptoms*[b]			*Depression Symptoms*[c]		
Predictors	*β*	*t Value*	*p Value*	*β*	*t Value*	*p Value*	*β*	*t Value*	*p Value*
Discrimination	1.23	1.53	.13	−.54	.52	.60	−.01	.01	.99
Familial SS	−.16	.61	.54	−.26	.76	.44	.02	.12	.90
Extrafamilial SS	−.98	3.57	<.01	−1.08	2.99	<.01	−.43	2.96	<.01
Professional SS	1.63	3.69	<.01	1.03	1.95	.06	.41	1.85	.07
Avoidant Coping	.80	3.06	<.01	1.05	2.90	<.01	.23	1.45	.14
Active Coping	–.07	.27	.79	−.45	1.24	.21	−.13	.86	.39

Note: In Weems, Pina et al. (2007), we reported regression coefficients corresponding to the pre-Katrina variables conceptualized in this study's analyses as covariates. PTSD = posttraumatic stress disorder; SS = social support.
[a]Model Adj. $R^2 = .71$.
[b]Model Adj. $R^2 = .47$.
[c]Model Adj. $R^2 = .44$.

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American: $r = -.62$, $p < .01$; European American: $r = .20$, *ns*; diff. $z = 2.69$, $p < .01$).

Three multiple regressions were conducted and were based on the framework of La Greca and colleagues (La Greca & Silverman, 2006; La Greca et al., 1996; Vernberg et al., 1996) in terms of the variables included in the models. Following the recommendations of Jaccard, Guilamo-Ramos, Johansson, and Bouris (2006), null results were viewed as preliminary in light of our small sample size and effect sizes (semipartial correlations *sr*) associated with each significant predictor were reported. Results from the regression analyses are shown in Table 4. To predict youth PTSD symptom severity scores post-Katrina, child age, sex, ethnicity, socioeconomic status, pre-Katrina PTSD, anxiety, and depression symptoms and number of hurricane events were conceptualized in the regression models as covariates. Discrimination, familial-, extra-familial-, professional-support, avoidant coping, and active coping were evaluated as predictors. Findings showed that extra-familial support ($\beta = -.98$, $t = 3.57$, $p < .01$; $sr = .05$), professional support ($\beta = 1.63$, $t = 3.69$, $p < .01$, $sr = .54$), and avoidant coping ($\beta = .80$, $t = 3.06$, $p < .01$, $sr = .31$) were significant predictors of post-Katrina PTSD symptoms.

The other two regression models were then evaluated, one model to predict post-Katrina anxiety and the other model to predict post-Katrina depression. In each regression model, child age, sex, ethnicity, socioeconomic status, pre-Katrina symptoms of PTSD, anxiety, and depression, and the number of hurricane events were conceptualized as covariates. For each model, discrimination, familial support, extrafamilial support, professional support, avoidant coping, and active coping were evaluated as predictors. Findings showed that extrafamilial support ($\beta = -1.08$, $t = 2.99$, $p < .01$, $sr = .23$) and avoidant coping ($\beta = 1.05$, $t = 2.90$, $p < .01$, $sr = .30$) emerged as significant predictors of post-Katrina anxiety. In terms of post-Katrina depression, extrafamilial support was the only significant predictor ($\beta = -.43$, $t = 2.96$, $p < .01$, $sr = .24$).

DISCUSSION

Findings extend research on the framework proposed by La Greca and colleagues (e.g., La Greca et al., 1996; Silverman & La Greca, 2002; Vernberg et al., 1996) by evaluating whether aspects of the postdisaster recovery environment and children's coping behaviors predicted reactions to the Katrina disaster. Results indicated that New Orleans' youth survivors of Katrina exhibited stress reactions (i.e., symptoms of PTSD, anxiety, and depression) similarly to youth survivors of other major hurricanes (e.g., Lonigan et al., 1991; Shaw, Applegate, & Schorr, 1996; Shaw et al., 1995). Results also showed that extrafamilial support predicted symptoms of PTSD, anxiety, and depression and professional support predicted symptoms of PTSD. Youth's avoidant coping behaviors predicted symptoms of PTSD and anxiety. Discrimination, familial support, and active coping did not emerge as significant predictors of youth posttraumatic stress reactions.

Findings from our study were consistent with past research showing that social support seems to protect youth from the impact of hurricane exposure (e.g., Jeney-Gammon et al., 1993; La Greca et al., 1996; Warheit et al., 1996; Weisler et al., 2006). That is, as perceived helpfulness of support from extrafamilial sources (e.g., teachers, friends, church members) increased, posttraumatic stress reactions in youth decreased (i.e., PTSD, anxiety, and depression). A positive predictive relation was found between PTSD symptoms and perceptions of helpfulness from professional

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support sources (e.g., from public health agencies, social services). It might be the case that parents whose children were experiencing higher PTSD symptom severity levels sought professional support and reported it to be helpful. On the other hand, familial support (from family members and relatives) did not emerge as a significant predictor in this study. This result might be explained by La Greca et al.'s (1996) suggestion that hurricanes typically impact the family as a unit (victimizing all its members) and truncate its ability to protect youth from the impact of traumatic exposure.

This is the first study to evaluate the relation between discrimination and posttraumatic stress reactions in youth following disaster exposure. In Weems, Watts, et al. (2007), a positive correlation between PTSD symptoms and discrimination among adult survivors of Hurricanes Katrina and Rita was found, suggesting that discrimination is another potential aspect of the postdisaster recovery environment to consider when examining posttraumatic stress reactions. In our study, results showed that African American families experienced significantly more discrimination events than their European American counterparts; however, discrimination did not predict youth self-rated posttraumatic stress reactions (although it closely approached significance in the prediction of PTSD). This finding may have resulted because of our small sample size. Another possibility is that other proximal factors (e.g., extrafamilial support) might also play an important role in the onset and maintenance of youths' posttraumatic stress reactions, thus making it more complex to estimate the detrimental effects of discrimination. Nevertheless, caution should be exercised in drawing generalizations from this null finding.

When coping was examined, avoidant coping behaviors (i.e., repression, avoidant actions) predicted post-Katrina PTSD symptoms and anxiety (but not depression). These significant findings may be related to the suggestion that clinical manifestations of anxiety are characterized by "avoidance" (Lang, 1968), whereas depression is characterized by low positive affectivity (Clark & Watson, 1991). These findings further substantiate clinical recommendations by La Greca and Silverman (2006) and Allen et al. (2006) that the exposure-based strategies used to target anxious avoidance might be helpful in treating youth survivors of disasters who show clinically significant impairment. In fact, exposure-based therapies might be as promising for youth exposed to hurricanes as they are for youth exposed to other types of trauma (e.g., Deblinger, Lippmann, & Steer, 1996; Chemtob, Nakashima, & Carlson, 2002; Cohen, Mannarino, & Knudsen, 2005; Jaberghaderi, Greenwald, Rubin, Zand, & Dolatabadi, 2004; Silverman & Kurtines, 1996; Silverman et al., 2008). Active coping (i.e., positive cognitive restructuring, problem-focus coping) was not a significant predictor of youths' posttraumatic stress reactions. Although this finding may be because of our small sample size, it may be the case that it is related to the uncontrollability of the situation (i.e., a natural disaster). After all, there is some evidence that active coping attempts in situations that are uncontrollable (e.g., illness) are not particularly efficacious (see Clarke, 2006).

Several limitations of our study are noteworthy. First, as already stated, power to detect significant effects was low in this study. Consequently, nonsignificant results should be interpreted with caution. For example, comparative analyses of data corresponding to African American and European American participants yielded few statistically significant differences. Our null ethnicity findings should be viewed tentatively but with the reservation that African American youth may possibly be no more vulnerable in the face of trauma than European American youth. Second, although significant findings were generally consistent with past research (and the framework of La Greca and colleagues), it is important to consider that some results may be due to shared variance in the criterion variables (i.e., symptoms of PTSD anxiety and depression). Thus, significant results might be overestimates. Third, the study relied on youth's self-reports of posttraumatic stress reactions and on parents' reports of both the helpfulness of various social support sources and discrimination. It might be the case that when predicting children's postdisaster symptoms it is more important to understand how youths interpret the recovery environment. Nevertheless, parents' experiences and viewpoints do influence children, and data about these relations are conceptually and clinically meaningful.

Implications for Research, Policy, and Practice

Our study's findings that extrafamilial sources of social support, professional support, and avoidant coping behaviors predicted posttraumatic stress reactions are important because the relations among these variables (although previously suggested in the disaster literature) have not previously been examined in the context of a disaster of this magnitude and contextual uniqueness. If these findings replicate, future research efforts should focus on testing prospective mediation hypotheses about these factors. For example, it could be the case that when extensive diasporas result from disasters such as Hurricane Katina, disruptions of social support networks hamper youths' ability to use active coping strategies (e.g., seeking support), whereas perceptions of discrimination promote youths' use of avoidant coping strategies (e.g., isolation, repression). Tests of these mediated relations can inform future research efforts,

especially efforts to develop models with potential to inform prevention interventions. However, the difficulty associated with obtaining prospective data about children's reactions to traumatic events requires attention not only from scholars interested in prevention research but also from policymakers and funding agencies. Given the grim realization that current funding opportunities are not usually well suited for supporting these types of investigations (i.e., prospective studies of outcomes associated with unpredictable natural disasters), policymakers should work with funding agencies to create new funding mechanisms aimed at learning more about children's reactions to disasters. In the absence of more robust data, practitioners (e.g., school interventionists, school psychologists, health teachers) should consider teaching youth effective coping behaviors as well as strategies for seeking social support in the contexts of events such as those which characterized this natural disaster. Targeting these factors may help ameliorate the potential negative effects of disaster exposure. Sadly, this disaster will likely remain a salient reminder that the mental health of youth survivors needs urgent attention as part of preparedness and recovery plans on the federal, state, and local levels.

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