

Preschool Children's Adjustment Following a Hurricane: Risk and Resilience in the Face of Adversity

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Research Findings: It is clear that disasters negatively affect both adults and children. Yet there is little research examining the mechanisms whereby some people are negatively affected by disasters whereas others are resilient to these negative effects. Family functioning and child characteristics might be factors that influence the impact of disasters on young children. We tested this premise in a sample of 118 children living in an area affected by a Category 3 hurricane, with 47 of these children participating before and after the hurricane. Results indicated that disaster experiences and emotion regulation are predictors of adjustment following natural disasters. Findings also suggested that the effects of disaster experiences on children's adjustment are sometimes indirect through their impact on parental depression and parent hostility. *Practice or Policy:* These findings indicate that working to minimize the likelihood of parent-child separations during disasters could reduce the negative effects of disasters on children. In addition, promoting better emotional regulatory abilities in young children may help them to be more resilient when experiencing natural disasters, and providing parents with the support they need to more effectively parent may also decrease the likelihood that children will experience adjustment difficulties following disasters.

Natural disasters such as the recent tornadoes in Oklahoma, Superstorm Sandy in New Jersey and New York, and the tsunami in Japan negatively affect adults, children, and communities by causing substantial destruction of property, injury, and even loss of life. Although disasters generally have direct effects on children's adjustment, it is also clear that not all children are

equally affected by disasters. This ability to mitigate maladaptive reactions or even positively adapt in the face of adversity is often labeled *resilience* (e.g., Masten, 1994), and the factors that promote resilience operate at multiple levels both within children and in their environments (e.g., Masten, 2007; Patterson, 2002; Walsh, 2002). Based on this framework, it is clear that natural disasters disrupt functioning in the physical, social, and cultural domains, which can each have direct or indirect effects on children's postdisaster adjustment (e.g., Lia, La Greca, Auslander, & Short, 2013; Scaramella, Sohr-Preston, Callahan, & Mirabile, 2008; Weems et al., 2007). In the interest of better understanding the processes that influence whether disaster experiences lead to adjustment difficulties, the current study examined pre- and postdisaster factors related to preschool children's functioning following Hurricane Katrina.

There is generally a dose–response relationship between exposure to natural disasters and the severity of children's reactions, with more severe disaster exposure leading to more profound difficulties (see La Greca & Prinstein, 2002, for a review). In addition, some aspects of disaster exposure, such as having one's life threatened and separation from a parent, are especially detrimental to children (e.g., Vogel & Vernberg, 1993). Most studies examining children's reactions to disasters have focused on symptoms of posttraumatic stress (e.g., La Greca, Silverman, Vernberg, & Prinstein, 1996), but research findings have also suggested that young children experience a range of negative reactions to disasters and traumatic events, including elevated symptoms of anxiety, depression, externalizing behavior problems, and decreased prosocial behavior (e.g., Keresteš, 2006; Kithakye, Morris, Terranova, & Myers, 2010; Swenson et al., 1996; Terranova, Boxer, & Morris, 2009a; Weems et al., 2007). Thus, a better understanding of children's diverse reactions to disasters is needed.

Although disasters clearly can have direct effects on children's adjustment, not all children are negatively impacted by disasters. Thus, it is important to better understand the processes whereby disasters come to negatively impact some children but not others. Child characteristics such as emotional reactivity and emotional regulatory abilities are potentially important factors that could influence children's reactions to disasters and traumatic events. Studies indicate that predisaster emotional reactivity, such as trait anxiety and anxiety sensitivity, increases children's risk of anxiety and posttraumatic stress symptoms following hurricanes (La Greca, Silverman, & Wasserstein, 1998; Weems et al., 2007). Rarely, however, do studies also consider children's abilities to regulate *emotional reactivity*, which is defined as the effortful processes (i.e., effortful control) that allow children to shift and focus attention, inhibit dominant responses, and activate subdominant (but more adaptive) responses in times of stress (Eisenberg, Hofer, & Vaughan, 2007; Rothbart & Bates, 2006).

Initial evidence suggests that emotional regulatory abilities are important skills that could mitigate the effects of disasters. In adults, for example, improvements in regulatory abilities were related to reductions in emotional and behavioral difficulties following trauma (Cloitre, Karestan, Cohen, & Han, 2002). In adolescents exposed to Hurricane Katrina, an inability to regulate negative emotions was associated with increased postdisaster reactive aggression (Marsee, 2008). And in young adolescents, better emotional regulatory abilities protected children from long-term posttraumatic stress symptoms following disasters (Terranova et al., 2009a). Indeed, children who effectively regulated their emotions were more resilient in the face of stress and trauma more generally (e.g., Eisenberg, Smith, Sadovsky, & Spinrad, 2004). Thus, better regulatory abilities likely protected younger children from the negative impacts of disasters, whereas regulatory difficulties increased vulnerability to the negative

effects of disasters. Little research, however, has examined the importance of emotional regulatory abilities following disasters, particularly in young children.

Family functioning following a disaster could also be a critical influence on children's reactions to disasters. Given the importance of the family in young children's development, family processes likely provide the context through which a significant portion of disaster experiences are filtered for young children (Morris, 2008; Proctor et al., 2007; Salmon & Bryant, 2002). In addition, at this developmental period, parents play an important role in helping young children to regulate their emotions through coregulation (e.g., Eisenberg & Morris, 2002). Coregulation is an extrinsic process of emotion regulation whereby a parent might help a child regulate his or her emotions by distracting the child from the distressing stimulus or helping the child to understand the emotional experience. Thus, if parents negatively affected by disasters are experiencing difficulty regulating their own behaviors, they likely would also experience difficulties helping to coregulate their children's negative arousal. Supporting the importance of parental functioning in children's postdisaster adjustment are findings that disasters disrupt family functioning (Kiliç, Özgüven, & Sayil, 2003) and that parental distress and adjustment difficulties following disasters were directly related to poorer child outcomes months (Kiliç et al., 2003; Proctor et al., 2007; Swenson et al., 1996) to 3 years (Lowe, Godoy, Rhodes, & Carter, 2013) after the disaster.

Two specific aspects of parental functioning that likely influence the quality of parent-child interactions and parents' ability to help children coregulate their emotions include parental hostility toward the child and parental depressive symptoms (Barber & Harmon, 2002; Denham et al., 2000). Prior research has indicated that parental depression can be exacerbated by disaster experiences, and parental depression can then disrupt children's adjustment (e.g., Lowe et al., 2013; Scaramella et al., 2008). We are, however, unaware of any disaster research with young children that has specifically examined the role of parental hostility in children's postdisaster adjustment. Outside of the context of disasters, parental hostility has been identified as a particularly important risk factor for the development of externalizing behaviors in young children (e.g., Knox, Burkhart, & Khuder, 2011), even when parental depressive symptoms are controlled (Velders et al., 2011). Thus, it is likely that parental hostility will also influence children's adjustment following disasters, either independently or by mediating the impact of disaster experiences.

In summary, there is generally a dose-response link between exposure to disaster and adjustment difficulties in children (e.g., La Greca & Prinstein, 2002). Thus, we hypothesized that the severity of disaster exposure would be associated with the severity of adjustment difficulties in children following Hurricane Katrina. Research, however, also indicates that not all children are affected equally by disasters. Thus, there is a need to better understand why some children are negatively impacted and others are resilient. In addition, there is a need to examine multiple indicators of adjustment, as children's reactions to disasters are more diverse than just symptoms of posttraumatic stress. Consequently, it was also hypothesized that child characteristics such as emotional reactivity and emotional regulatory abilities would influence the impact of disaster experiences. More specifically, we predicted that the disaster would have a stronger negative impact on children who experienced greater pre-hurricane emotional reactivity and poorer emotional regulatory abilities. In addition, disaster exposure was expected to have indirect effects on children's adjustment by negatively affecting the family, or more specifically parental functioning, as indicated in the current study by parental hostility and depression.

METHOD

Participants

Data were collected from participants in a small rural town in southern Mississippi. The area was located in the direct path of Hurricane Katrina, approximately 45 miles north of the Mississippi Gulf Coast. The hurricane was a Category 3 storm (sustained winds of 111–130 mph) on the Saffir-Simpson Hurricane Wind Scale when passing over the area, and the area experienced damage due to high winds and heavy rains that occurred for hours. Given the unexpected nature of natural disasters, the sample for this study included two groups of children. The first sample included children recruited from Head Start classrooms who were originally part of a longitudinal study examining dispositional and contextual influences on children's school adjustment. Data were collected on these children (i.e., the pre-disaster sample) at both predisaster and postdisaster assessments ($n=47$, 20 girls and 27 boys, all 4 years old). These participants were drawn from the nine Head Start classes in the school, indicating a participation rate of approximately 25% before and after the disaster.

Following Hurricane Katrina, the population of the town doubled because of an influx of families forced to relocate from more coastal areas by the hurricane, and participants for the postdisaster assessment were recruited from all of the kindergarten classes in the town (118 children, 57% male, 43% female, participation rate of approximately 50%). Thus, postdisaster data were collected on children who had moved into the area following the storm, as well as children who had resided in the area prior to the storm, and the full sample of 118 includes the 47 participants who provided data at the predisaster assessment. At this postdisaster assessment, the participants were all 5 to 6 years of age and enrolled in the local kindergartens.

The majority of participants were Caucasian (55%) and African American (35%), with 3% identified as Hispanic, 3% as biracial, and 4% as other. The sample represented primarily low-income families, with 24% having a family income less than \$10,000, 18% reporting a family income between \$10,000 and \$20,000, 12% between \$20,000 and \$30,000, 8% between \$30,000 and \$40,000, and 15% more than \$40,000. Based on publicly available information on the area, the demographic characteristics of the samples were consistent with the demographic characteristics of the surrounding area.

Measures

Severity of the disaster experience. Parents reported on the family's hurricane experiences by completing the Hurricane Experience Survey, an adapted version of the Hurricane-Related Traumatic Experiences questionnaire (Vernberg, La Greca, Silverman, & Prinstein, 1996). Items asked parents to describe the extent of family and child exposure to the disaster and disaster-related hardships (e.g., "Was it hard for your child to see his/her friends after the hurricane?" "Did anyone steal anything from your home after the hurricane?"). A disaster hardship and loss score was calculated by summing participants' disaster experiences, with higher scores indicating more severe exposure (see Table 1).

TABLE 1
Extent of the Disaster Experiences

<i>Hurricane Variable</i>	<i>%</i>	<i>N</i>	<i>M</i>	<i>Range</i>
Parental separation (during disaster for a week or more)	17% yes, 83% no	115	0.17	0–1
Disaster hardship/loss ^a	Not applicable	114	2.80	0–12
	61% none	117	0.56	0–3
	27% once			
	7% twice			
Moves since hurricane	5% three times or more			
	65% same home	116	<i>n/a</i>	<i>n/a</i>
	16% new home			
	19% other (e.g., hotel, FEMA trailer, with friends, with relatives)			
Current residential status (5 months after the disaster)				
Home badly damaged	30% yes, 70% no	116	0.30	0–1
Lost job due to hurricane	22% yes, 78% no	116	0.22	0–1
Hard for child to see friends	27% yes, 73% no	115	0.27	0–1
Had trouble getting food and water	22% yes, 80% no	116	0.22	0–1
Child's clothes or toys ruined	32% yes, 68% no	116	0.32	0–1
Lost pet	12% yes, 88% no	115	0.12	0–1
Items stolen after hurricane	14% yes, 86% no	116	0.14	0–1
Still living in a house with a roof leak	10% yes, 90% no	116	0.10	0–1

Note. FEMA = Federal Emergency Management Agency.

^aDisaster hardship/loss was calculated by combining the remaining items in the table: moves since hurricane, current residential status (0 = same home, 1 = new home, 2 = hotel, trailer, friend/relative home), and the eight items from “home badly damaged” through “still living in a house with a roof leak.”

The parent providing these data on disaster exposure also reported whether he or she was separated from his or her child for a week or more as a result of the storm. This item was scored 0 if the child was not separated and 1 if the child was separated. Because parental separation is potentially a particularly salient stressor, this item was not included in the overall disaster hardship/loss score but was included in analyses as a separate indicator of disaster exposure.

Child adjustment before and after the disaster. Parents and teachers reported on child behavior via the conduct problems, prosocial behavior, and emotional symptoms scales of the Strengths and Difficulties Questionnaire (Goodman, 1997) before and after the hurricane. The parent- and teacher-report forms for children ages 4–10 were used for this study. Parents and teachers rated how true statements were for a child on a 3-point scale (1 = not true, 2 = sometimes true, and 3 = certainly true). *Aggression* was assessed via the conduct problems scale (five items; $\alpha_{\text{teacher}} = .83$, $\alpha_{\text{parent}} = .76$) with items such as “often loses temper” and “often argumentative with adults.” *Internalizing symptoms* were assessed via the emotional symptoms scale (five items; $\alpha_{\text{teacher}} = .83$, $\alpha_{\text{parent}} = .59$) with items such as “often unhappy, depressed or tearful” and “often complains of headaches, stomachaches or sickness.” *Prosocial behavior* was assessed via the prosocial behavior scale (five items; $\alpha_{\text{teacher}} = .84$, $\alpha_{\text{parent}} = .72$; e.g., “considerate of other people’s feelings”). Reliability analyses indicate internal consistency, with alphas ranging from .59 to .83 on these scales.

Family characteristics/functioning after the disaster. Parents reported on components of family functioning via two measures used to assess parental depression and hostility toward the child following the hurricane. The 19-item Beck Depression Inventory (BDI; Beck, Steer, & Garbin, 1988), a self-report measure of attitudes and symptoms characteristic of depression, was utilized as an indicator of *parental depressive symptoms*. The BDI has been shown to have high internal consistency ranging from .73 to .92 (Beck et al., 1988). Cronbach's alpha for the 19-item adapted form falls in a similar range ($\alpha = .90$). The 5-item hostility scale of the Preschool Parenting Measure (Sessa, Avenvoli, Steinberg, & Morris, 2001) was used as an indicator of *parental hostility* ($\alpha = .73$; e.g., "I sometimes make fun of my child").

Child characteristics after the disaster. In both samples, teachers reported on children's *emotion regulation* via the effortful control scale of the Child Behavior Questionnaire–Shortened Scales (CBQ; Fabes, 1994; Goldsmith & Rothbart, 1991), a common indicator of emotion regulation (Eisenberg & Morris, 2002). Teachers were asked to rate how true an item was for the child on a 7-point Likert scale (1 = *extremely untrue* to 7 = *extremely true*). Internal consistency estimates for the CBQ range from .67 to .94 (Goldsmith & Rothbart, 1991; see Fabes, 1994, for the reliability of the shortened scales), and scales from the CBQ have correlated with similar observed constructs and child adjustment (see Eisenberg et al., 1997). The effortful control scale is created by combining the attention focusing, attention shifting, and inhibitory control scales in an approach that has been used in prior research (Morris et al., 2002). Mean scores were created for each scale, with higher scores indicative of better emotion regulation. The scores were then standardized and summed, creating the *emotion regulation* scale. Reliability estimates for the combined effortful control scale were high ($\alpha = .94$ with 23 items). Sample items on this scale include "is able to resist laughing or smiling when it isn't appropriate," "can easily quit working on a project if asked," and "is easily distracted when listening to a story." The 11-item anger scale was utilized as an indicator of children's *anger reactivity*. Sample items include "gets irritated when s/he makes a mistake" and "rarely gets upset when told s/he has to go to bed."

Procedures

All procedures were approved by the internal review board of the university overseeing the research. Prior to data collection, parents completed two consent forms: one for the parent and child participation and another to obtain data from the child's teacher. Teachers also completed a consent form. As part of a larger study designed to examine preschool children's social and emotional adjustment more broadly, predisaster data were collected from one of each child's parents and one of his or her teachers during the winter of the children's preschool year. Parents and teachers reported on children's internalizing symptoms, aggressive behaviors, and prosocial behaviors. Postdisaster data were also collected from parents and teachers approximately 5 months after Hurricane Katrina. At this time, one teacher and one parent each reported on each child's behavior and functioning (i.e., internalizing symptoms, aggression, and prosocial behaviors). Teachers also reported on children's emotional regulatory abilities, and parents also reported on family disaster experiences and postdisaster family functioning.

RESULTS

Descriptive Findings

Using the postdisaster sample, we found that participants experienced variability in their disaster experiences, with 39% of the sample forced to move after the hurricane and 17% of the children being separated from their parents (see Table 1). *T* tests were conducted to examine whether boys or girls were more prone to disaster exposure and to postdisaster adjustment difficulties. These analyses indicated that there were no significant sex differences in overall disaster exposure or on any of the postdisaster adjustment indices ($t_s = -1.64$ to 1.63 , $p > .05$).

Correlations generally indicated that children's predisaster functioning (i.e., internalizing symptoms, aggressive behavior, and prosocial behavior) was not correlated with disaster exposure (see Table 2). In contrast, correlations in the postdisaster sample indicated that disaster experiences were associated with postdisaster difficulties in children and their parents, and indicators of children's temperament were also correlated with postdisaster adjustment (e.g., anger reactivity was associated with higher levels of internalizing symptoms and aggressive behaviors and lower parent and teacher reports of prosocial behaviors). Postdisaster parental functioning was also associated with several indicators of children's postdisaster functioning.

Direct Effects of Disaster Exposure on Child Adjustment (Predisaster Sample)

Among participants providing both pre- and postdisaster data, multiple regression analyses were utilized to examine the impact of disaster exposure on children's postdisaster adjustment while controlling for predisaster adjustment. In each of these regression analyses, an aspect of children's postdisaster adjustment (i.e., internalizing symptoms, aggression, or prosocial behaviors) was the criterion variable. Disaster hardship/loss and parental separation were entered into the model as predictors while controlling for the predisaster adjustment variable of interest and sex of the child. Of the 47 participants with some predisaster data, six were missing some predisaster teacher reports of child adjustment, 16 were missing some parent reports of child adjustment, and one did not report on parental separation. Multiple imputation was used to deal with these missing data to reduce potential bias due to the missing data not being missing completely at random. Fifty imputations were done for the missing data using regression or logit models as appropriate based on the other data available. For robustness, the analyses were also conducted using listwise deletion. Although accounting for the missing data via multiple imputations did reveal a few marginally significant relationships, in general there were no substantial differences in the analyses. The additional variation required to account for the imputations did, however, reduce the precision for many of the estimated coefficients.

When we controlled for predisaster adjustment, we found that disaster experiences predicted more internalizing symptoms and aggressive behaviors and fewer prosocial behaviors in children (see Table 3). Findings, however, were not necessarily replicated across reporters and disaster variables. Disaster hardship and loss predicted higher teacher reports of postdisaster internalizing symptoms ($\beta = .32$, $p < .05$) and lower teacher reports of postdisaster prosocial behavior ($\beta = -.31$, $p < .05$). Regarding parent reports of adjustment, disaster hardship and loss predicted higher postdisaster aggression scores ($\beta = .24$, $p < .10$) and lower postdisaster prosocial behavior scores ($\beta = -.27$, $p < .10$). Parental separation during the disaster predicted higher parent

TABLE 2
Correlations Between Disaster Exposure and Parent and Child Postdisaster Functioning in the Postdisaster Sample

Variable	N	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Parental separation	115	—												
2. Disaster hardship/loss	114	.02	—											
3. Parental hostility	118	.26**	.05	—										
4. Parental depression	118	.26**	.30***	.28**	—									
5. Emotion regulation	118	-.17 [†]	-.02	-.20*	-.14	—								
6. Anger reactivity	118	.24**	.01	.34***	.20*	-.68***	—							
7. Internalizing symptoms ^P	118	.30**	.16 [†]	.23*	.25**	-.09	.20*	—						
8. Internalizing symptoms ^T	118	.14	.12	-.04	.07	-.19*	.27**	.11	—					
9. Aggression ^P	118	.29**	.14	.41***	.34***	-.34***	.36***	.38***	.12	—				
10. Aggression ^T	118	.26**	.03	.31***	.22*	-.64***	.67***	.02	.08	.29***	—			
11. Prosocial behaviors ^P	118	-.10	-.01	-.20*	-.05	.13	-.23**	-.24**	-.02	-.50***	-.26**	—		
12. Prosocial behaviors ^T	118	-.02	-.13	-.16 [†]	-.22*	.56***	-.46***	-.04	-.00	-.28**	-.62***	.19*	—	
13. Female	118	.12	-.15	.07	.02	.12	-.06	.07	-.02	-.07	-.09	.11	.15	—

Note. ^P = parent report; ^T = teacher report.
[†] $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

TABLE 3
Impact of Disaster Experiences on Post-Hurricane Child Adjustment Controlling for Pre-Hurricane Adjustment

Variable	Internalizing Symptoms Time 2		Aggression Time 2		Prosocial Behaviors Time 2	
	Parent Reported	Teacher Reported	Parent Reported	Teacher Reported	Parent Reported	Teacher Reported
Parental separation	.29 [†]	.07	-.01	.27 [†]	.05	-.01
Disaster hardship/loss	.22	.32*	.25 [†]	.19	-.27 [†]	-.31*
Time 1 child adjustment	-.03	-.01	-.00	.01	-.04	.11
Female	.14	.28 [†]	-.27 [†]	-.08	.22	.24 [†]
Model R ²	.18	.18	.16	.14	.18	.19
n	47	47	47	47	47	47

Note. Data are beta coefficients. Time 1 child adjustment is the Time 1 control of parent or teacher report of internalizing symptoms, aggression, or prosocial behaviors as appropriate for each regression. The reported model fit is the mean R² across multiple imputations.

[†] $p < .10$. * $p < .05$.

reports of postdisaster internalizing symptoms ($\beta = .29$, $p < .10$) and higher teacher reports of postdisaster aggression ($\beta = .27$, $p < .10$).

Impact of Child Characteristics on Postdisaster Adjustment (Postdisaster Sample)

Using the postdisaster sample, we examined the potential impacts of children's temperament and gender on their postdisaster adjustment while controlling for disaster exposure. There were three cases of missing reports of parental separation and four cases of missing information for disaster hardship and loss. Once again we used multiple imputation to account for the missing data. For robustness, we also conducted the analyses using listwise deletion, and the results showed no substantial differences, though the additional variation to account for the imputations did slightly reduce the precision for some of the estimated coefficients.

Findings indicated that better emotional regulatory abilities were associated with fewer teacher-reported aggressive behaviors and higher levels of teacher-reported prosocial behaviors following the storm (see Table 4), even when disaster experiences and anger reactivity were controlled. Findings also indicated that anger reactivity added to the prediction of higher reports of aggression and a marginally significant trend of higher levels of teacher-reported internalizing symptoms (see Table 4). More intense anger reactivity also predicted lower levels of parent-reported prosocial behaviors symptoms, even when we considered disaster experiences and emotional regulatory abilities (see Table 4). Participants' sex did not add to the prediction of postdisaster adjustment.

Impact of Family Characteristics/Functioning on Children's Postdisaster Adjustment (Postdisaster Sample)

The final hypothesis was that disaster experiences would also have indirect effects on children's adjustment by negatively affecting parents, specifically parental hostility and depression, which in turn would then increase the risk of adjustment difficulties in children. Consequently, in the postdisaster sample, the mediator variables of parental hostility and depression were examined according to guidelines discussed in Baron and Kenny (1986) and Holmbeck (2002). Thus,

TABLE 4
Impact of Emotion Regulation, Anger Reactivity, and Disaster Experiences on Post-Hurricane Child Adjustment in the Postdisaster Sample

Variable	Internalizing Symptoms Time 2		Aggression Time 2		Prosocial Behaviors Time 2	
	Parent Reported	Teacher Reported	Parent Reported	Teacher Reported	Parent Reported	Teacher Reported
Parental separation	.26**	.08	.22**	.10	-.07	.09
Disaster hardship/loss	.17†	.12	.13	.01	.01	-.11
Emotion regulation	.08	-.01	-.16	-.33***	-.07	.44***
Anger reactivity	.20	.24†	.20†	.42***	-.25*	-.18†
Female	.07	.00	-.05	-.04	.11	.06
Model R ²	.14	.09	.21	.53	.07	.35
n	118	118	118	118	118	118

Note. Data are beta coefficients. The reported model fit is the mean R² across multiple imputations.
†p < .10. *p < .05. **p < .01. ***p < .001.

when indices of disaster exposure were significantly correlated with parental functioning and both indices of disaster exposure and indices of parental functioning were correlated with children’s postdisaster adjustment, multiple regression analyses were conducted. In each of these regression analyses, an indicator of children’s postdisaster functioning (i.e., internalizing symptoms or aggression) was the criterion. Then an indicator of disaster exposure (i.e., overall severity or parental separation) and an indicator of family functioning (i.e., parental depression or hostility) were entered as predictors.

As expected, results indicated that in the postdisaster sample parental depression and hostility mediated the impact of disaster experiences on child adjustment in several models (see Figure 1).

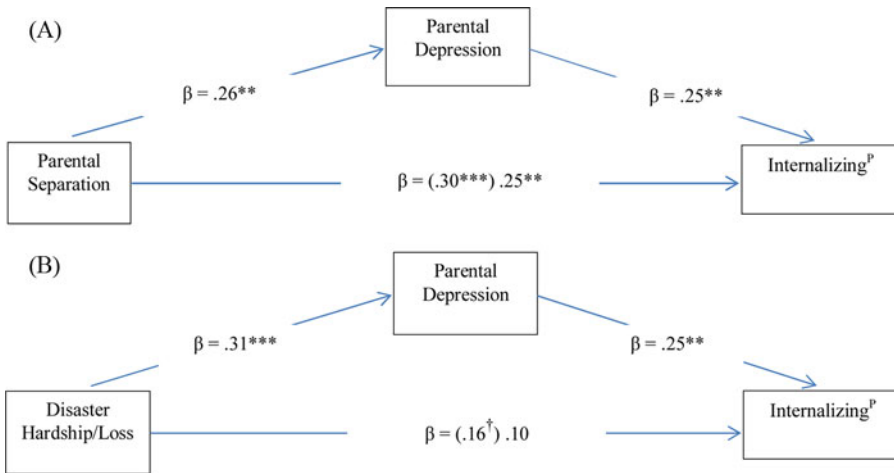


FIGURE 1 Parental depression mediates the association between disaster experiences and internalizing symptoms in the postdisaster sample. Beta coefficients in parentheses are based on analyses without the mediator. ^P = parent report. †p < .10. **p < .01. ***p < .001. (A) Parental depression mediates the link between parental separation and parent reported internalizing symptoms in children. (B) Parental depression mediates the link between disaster hardship/loss and parent reported internalizing symptoms in children.

Specifically, parental depression partially mediated the link between both parental separation and disaster hardship/loss and parent-reported child internalizing symptoms. The Sobel test indicated that 17% of the path between parental separation and children’s internalizing symptoms ($z = 1.73, p < .10$) and 39% of the path between disaster hardship/loss and children’s internalizing symptoms ($z = 1.81, p < .10$) was accounted for by parental depression.

The most consistent mediational finding was that in the postdisaster sample family functioning mediated the link between disaster experiences and both parent and teacher reports of children’s postdisaster aggressive behaviors (see Figure 2). Parental depression mediated the impact of parental separation on parent reports of children’s postdisaster aggression, with the Sobel test indicating that 27% of the path between parental separation and children’s aggression was accounted for by parental depression ($z = 2.20, p < .05$).

Parental hostility also mediated the impact of disaster experiences and children’s postdisaster aggressive behaviors in the postdisaster sample, with parental hostility partially mediating the link between parental separation and both parent reports and teacher reports of children’s

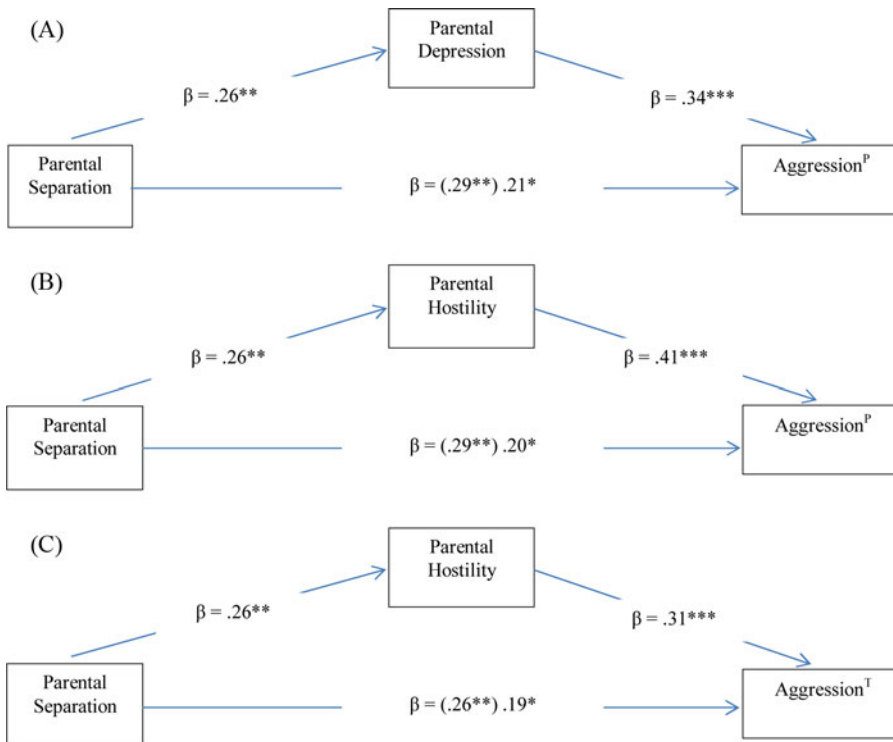


FIGURE 2 Parental functioning mediates the association between disaster experiences and aggressive behaviors in the postdisaster sample. Beta coefficients in parentheses are based on analyses without the mediator. ^P = parent report; ^T = teacher report. * $p < .05$. ** $p < .01$. *** $p < .001$. (A) Parental depression mediates the link between parental separation and parent reported aggression in children. (B) Parental hostility mediates the link between parental separation and parent reported aggression in children. (C) Parental depression mediates the link between parental separation and teacher reported aggression in children.

postdisaster aggressive behaviors. The Sobel test indicated that 32% of the path between parental separation and parent-reported child aggression was accounted for by parental hostility ($z = 2.35, p < .05$) and that 26% of the path between parental separation and teacher-reported child aggression ($z = 1.99, p < .05$) was accounted for by parental hostility.

DISCUSSION

Although a dose–response relationship between severity of disaster exposure and adjustment difficulties is one of the most widely replicated findings in the literature (e.g., Silverman & La Greca, 2002; Swenson et al., 1996; Weems et al., 2007), the current findings suggest that the link between disaster exposure and adjustment is more complex. The current findings indicate that there is a need to consider multiple aspects of children’s functioning, as disasters can negatively affect children’s adjustment in diverse domains, such as internalizing symptoms and prosocial behaviors, even when children’s predisaster functioning is considered. The current findings also indicate that it is important to consider children’s temperament, as anger reactivity and emotional regulatory abilities added to the prediction of postdisaster adjustment, even when disaster experiences were controlled. Finally, family functioning (i.e., parental depression and hostility) was found to mediate the link between families’ disaster experiences and children’s adjustment.

The current findings generally replicate past findings, indicating that disaster experiences directly impact children’s postdisaster functioning (e.g., Silverman & La Greca, 2002; Swenson et al., 1996; Weems et al., 2007) even when young children’s predisaster adjustment is controlled. Findings from the postdisaster sample, however, also indicate that children’s temperament is an important factor to consider in children’s adjustment following disasters. Anger reactivity, for example, was generally associated with poorer adjustment. More specifically, higher levels of anger reactivity were associated with more aggression and fewer prosocial behaviors. In addition, better emotional regulatory abilities were associated with better adjustment, in particular fewer teacher-reported aggressive behaviors and more teacher-reported prosocial behaviors.

Overall, being able to manage emotional reactivity after a disaster seems to help make even young children more resilient. This finding is consistent with past findings that have indicated that better regulatory abilities are associated with resilience more generally (e.g., Masten, 2007) and that improved emotional regulatory abilities have made adults (Cloitre et al., 2002) and young adolescents more resilient in the face of trauma (Kithakye et al., 2010; Terranova et al., 2009a).

In addition to temperament, findings from the postdisaster sample also indicate that disaster exposure can have indirect effects on children’s postdisaster adjustment by impacting parental functioning, which then predicts young children’s postdisaster adjustment. More specifically, disaster experiences and parent–child separation both were associated with higher levels of parental depression and parental hostility, and these indicators of parental functioning both accounted for a significant amount of the variance in children’s postdisaster internalizing symptoms and aggressive behaviors. Although consistent with the notion that disasters can increase internalizing and externalizing difficulties in children (Swenson et al., 1996; Terranova, Boxer, & Morris, 2009b), the current findings advance the extant literature by further substantiating one of the mechanisms whereby disasters increase the risk for adjustment difficulties (i.e., by negatively impacting parental functioning). This pattern of findings suggests that interventions

looking to mitigate the effects of disasters on young children could target parent depression and hostility to help parents provide more supportive environments for their children.

Although the current study advances understanding of how disasters impact children's adjustment, it has limitations. The internal reliabilities of some of the scales, for example, were a little lower than would be ideal, and the measure of parental separation only measured separation from the parent/guardian providing the data. Although predisaster data were collected from some participants, this subsample was small, with a low participation rate, restricting the number and types of analyses that could be conducted when considering predisaster functioning. Given the unexpected nature of disasters, however, the collection of pre- and postdisaster data is rare, and thus having such data is a strength of the study. In addition, low participation rates are also not uncommon in disaster research because of the chaos associated with recovery efforts (e.g., La Greca et al., 1998; Terranova et al., 2009b; Weems et al., 2007), and it is important to note that the demographics of the samples seemed similar to the demographics for the area from which the samples were drawn. Although the multi-informant design is a strength of the study, there appeared to be some shared method variance in the findings that utilized variables from a single source. Teacher-reported indicators of temperament, for instance, tended to be more consistently related to teacher reports (than parent reports) of postdisaster adjustment (see Table 4). Mediation analyses were also conducted using only postdisaster data. Thus, these findings are more of a statistical mediation and need to be replicated with longitudinal data.

Even with these limitations, the current study has important strengths, which include the multi-informant and longitudinal design, the consideration of predisaster functioning, the inclusion of multiple indicators of child functioning (both positive and negative), and the examination of child and family factors that might further influence children's reactions to disasters. Though it has been theorized that disasters have less of an effect on young children, recent research using developmentally sensitive measures of posttraumatic stress following Hurricane Katrina has indicated that young children are negatively affected by disasters at high rates (e.g., Scheeringa, Zeanah, Myers, & Putnam, 2003), and the current findings suggest that disasters can result in a wider variety of negative outcomes in young children, increasing the risk of internalizing symptoms and aggressive behaviors. It is becoming clear that a better understanding of the impact of disasters on young children is needed to guide intervention efforts.

The current findings point to three important factors that could be addressed by intervention efforts. Reducing anger reactivity and promoting emotional regulatory abilities needed to regulate anger in children will likely help protect young children from developing aggressive behavior patterns that result from disaster exposure and promote more prosocial behaviors. Promoting parental psychological health will also likely reduce the severity of children's behavioral problems following disasters. These two potential foci of intervention efforts are also potentially related to each other, because during the transition from early to middle childhood, children need adults to help them coregulate their emotions (Eisenberg & Morris, 2002). If parents are having difficulty regulating their own hostility and depressive symptoms, they are less likely to be able to help their children coregulate their emotions. So, if parents are provided with the support they need, they will presumably be better able to help children recover from disaster experiences (Walsh, 1996). Finally, working to minimize the likelihood of parental separations during these disasters might also mitigate the negative effects of disasters on young children. In general, studies such as the one conducted here provide needed evidence of the importance of considering both parents and children when examining the effects of disaster experiences on young children.

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