Journal of Anxiety Disorders 23 (2009) 935–941

Contents lists available at ScienceDirect

Journal of Anxiety Disorders

# Hurricane Katrina and youth anxiety: The role of perceived attachment beliefs and parenting behaviors

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ARTICLE INFO

*Article history:*
Received 29 December 2008
Received in revised form 1 June 2009
Accepted 5 June 2009

*Keywords:*
Hurricanes
Disasters
Youth anxiety
Attachment
Parenting
Moderation

ABSTRACT

This study sought to examine the role of attachment beliefs and parenting behaviors on youth's anxious response to disaster by testing a theoretical model which posits youths' perceptions of attachment beliefs and parenting behaviors as moderators of the relation between pre and post disaster anxiety symptoms. Seventy-four youth (ages 6–17 years) and their parents exposed to Hurricane Katrina participated in pre and post disaster assessments. Results indicated that both youths' pre disaster perceived attachment beliefs (i.e., trust and communication) and perceptions of parenting behaviors (i.e., acceptance and firm control) moderated the relation between pre and post Katrina anxiety symptoms. Exploratory analyses demonstrated no age, gender, or ethnicity differences in post Katrina anxiety symptoms. Findings are discussed in terms of how parents may influence youths' pre and post disaster anxiety symptoms in the face of natural disasters and the implications for intervention.

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Hurricane Katrina had and will continue to have a powerful effect on the mental health of youth survivors (Weems & Overstreet, 2008). Previous research suggests that exposure to a natural disaster is associated with a number of different post traumatic stress (PTS) emotional reactions including symptoms of posttraumatic stress disorder (PTSD) and other anxiety disorders (La Greca, Silverman, Vernberg, & Prinstein, 1996; Vernberg, La Greca, Silverman, & Prinstein, 1996; Yule, Udwin, & Bolton, 2002). Prevalence rates in community samples suggest that 24–39% children meet criteria for PTSD within the first few weeks or months following a trauma, whereas prevalence rates of overall PTS symptoms suggest more than 50% of children have reported at least moderate levels of PTSD following a trauma (Vernberg et al., 1996). For a significant number of youth, negative effects of exposure to disasters can be pervasive and enduring (Silverman & La Greca, 2002). Youths' anxiety symptoms have been shown to be particularly stable amongst disaster exposed youth (La Greca et al., 1996; La Greca, Silverman, & Wasserstein, 1998; Weems, Pina, et al., 2007). However, relatively little empirical attention has been given to identifying factors that may influence the longitudinal course of anxiety symptoms in disaster exposed youths. Contextual theories suggest that parents may play an important role on youths' responses to disasters and severe stress (La Greca & Silverman, 2006; Weems & Overstreet, 2008). Therefore, the purpose of the current study was to examine the role of parents on changes in youths' pre to post Katrina anxiety symptoms.

In the disaster literature, the role of parents on youths' responses to disasters has tended to focus more on the role of parent psychopathology. For example, Scaramella, Sohr-Preston, Callahan, and Mirabile (2008) examined the effects of Hurricane Katrina on mothers' psychological distress, parenting, and toddler's adjustment in a sample of 102 low income families. Results indicated that mothers' depressed mood was linked to less parenting efficacy, which was related to higher levels of child psychopathology. In a sample of 70 children (ages 3–6) and their caregivers who experienced Hurricane Katrina, Scheeringa and Zeahah (2008) found that caregivers' psychopathology was significantly related to children's psychopathology. Lastly, Spell et al. (2008) examined moderating effects of maternal psychopathology in 280 children (ages 8–16) displaced due to Hurricane Katrina. Results indicated that global maternal psychological distress and maternal PTSD symptoms moderated the relation between levels of hurricane exposure and internalizing and externalizing symptoms in youth. Specifically, regardless of the level of hurricane exposure, when mothers experience higher levels of distress and PTSD symptoms, their children tend to exhibit higher levels of psychopathology.

The above studies highlight the importance of the role of parents in terms of parental psychopathology on youths' post disaster functioning; however, the majority of previous disaster

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doi:10.1016/j.janxdis.2009.06.002

research have not directly examined the role of parents in the parent–child relationship or identified specific parenting factors that may influence the longitudinal course of anxiety symptoms in disaster exposed youths. What is even more lacking in the disaster literature is an examination of the parent–child relationship through the child's perspective of their relationship. Embedded in the parent–child relationship is how youth *perceive* their attachment to their parents and how youth *perceive* the behaviors their parents use in their interactions with them. In fact, research has shown that youth are reliable reporters of their parent's behavior and more importantly, that youth perceptions of their relationship with their parents are just as important as the actual relationship itself (Israel, Thomsen, & Langeveld, 2007; Rohner & Cournoyer, 1994; Siqueland, Kendall, & Steinberg, 1996). The current study aims to begin filling in this gap in the disaster literature by testing a theoretical model which posits that youths' perceptions of attachment beliefs and parenting behaviors moderate youths' pre to post disaster symptoms of anxiety.

## 1. Theoretical model

Our theoretical model is broadly informed by the developmental psychopathology perspective and a developmental understanding of anxiety. This research suggests that while anxiety symptoms show a complex developmental pattern, one consistent finding is that anxiety symptoms tend to be lower among older youth and to decrease over time (Weems, 2008). It is plausible that disaster exposure may prevent these natural symptom declines (Weems, Pina, et al., 2007; Weems, Watts, et al., 2007). Another consistent finding is that mothers exert an important influence in the expression of anxiety in youth, which is demonstrated in the child and adolescent anxiety literature. Mainly through observation and parental report, insecure attachments (Manassis, Bradley, Goldberg, Hood, & Swinson, 1994; Warren, Huston, Egeland, & Sroufe, 1997) and controlling/rejecting parenting behaviors are shown to be risk factors of youth anxiety (Alonso et al., 2004; Hudson & Rapee, 2002; Moore, Whaley, & Sigman, 2004). In this study we were therefore interested in applying attachment theory (Bowlby, 1973; Warren et al., 1997) and the research on parenting behaviors to understanding risk for anxiety following a natural disaster.

Vernberg and Varela (2001) hypothesized that children with a history of insecure attachments are most vulnerable for experiencing the effects of a trauma, because of the absence of support. For example, youth are dependent on their parents for protection and security (i.e., as a secure base; Bowlby, 1973). After experiencing a trauma, such need for protection/security increases. Having caretakers who maintain or re-establish a sense of security and safety within the parent–child relationship following a traumatic experience is imperative. Support for this notion is seen throughout the hurricane literature in that interpersonal support has been shown to predict more positive PTS reactions. For example, decreases in children's PTSD symptoms over time are smaller among children with less social support (Vernberg et al., 1996) and supportive family communication has been shown to moderate the relationship between post disaster stress and children's psychopathology (Bromet, Hough, & Connell, 1984). Thus, it is likely that youths' perceptions of attachment beliefs, characterized by trust, communication, alienation, prior to Hurricane Katrina will serve as moderators of the association between youths' pre and post Katrina anxiety. That is, those youth who have higher insecure attachment beliefs (i.e., low trust, low communication, and high alienation) combined with elevated pre Katrina anxiety may have the most anxiety post Katrina (i.e., poor perceived attachment security will serve to maintain and or exacerbate elevated anxiety).

Observational research in the child anxiety literature has shown controlling and rejecting parenting behaviors to be the most salient predictors of the development and maintenance of child anxiety (Costa & Weems, 2005; Hudson & Rapee, 2002; Moore et al., 2004; Vasey & Dadds, 2001). Moreover, Siqueland et al. (1996) demonstrated that children's report of their mother's parenting behaviors on the Children's Report of Parent Behavior Inventory (CRPBI) matched independent observer ratings of the same parenting behaviors, suggesting that anxious children may not be biased in their perception of parenting behavior. Thus, perceptions of controlling and rejecting parenting behaviors prior to Hurricane Katrina may moderate the association between youths' pre and post Katrina anxiety. Those youth who perceive their mother as highly controlling and/or rejecting before the disaster combined with elevated pre Katrina anxiety may have the most anxiety post disaster (e.g., a controlling or rejecting parent will serve to maintain and or exacerbate elevated anxiety in the child exposed to trauma).

## 2. The present study

The goal of this study was to test the theoretical predictions noted above. These predictions have yet to be empirically tested as studies have relied on post disaster assessments only. The current study had this unique opportunity due to the presence of these variables pre Katrina. It was hypothesized that the association between youths' anxiety pre and post Katrina would be moderated by youths' perceived: (1) attachment beliefs (trust, communication, and alienation) and (2) parenting behaviors (psychological and behavioral control and acceptance). Youth with low anxiety, perceived secure attachment beliefs, appropriate levels of parental control and high levels of acceptance prior to Hurricane Katrina should be *less* likely to respond to the hurricane with higher levels of anxiety. In contrast, youth with more anxiety combined with perceived insecure attachment beliefs and higher levels of controlling and rejecting parenting behaviors prior to Hurricane Katrina should be *more* likely to respond to the hurricane with higher levels of anxiety. Supplemental analyses were conducted to investigate the role of age, gender, ethnicity, and total number of hurricane related events on the association between youths' pre and post Katrina anxiety.

## 3. Method

### 3.1. Participants

The sample for the current study was drawn from a pool of youth aged 6–17 years old ($N = 250$) and their families who resided in the New Orleans area before the storm and participated in a series of studies at a local university (Costa & Weems, 2005; Weems & Costa, 2005). On average these children were assessed 17 months before the storm (range 6–20 months). Given the massive devastation of the area and extensive diaspora of the residents of New Orleans, 176 families were not able to be located for the post Katrina assessment. Such rate of attrition from the sample pool is also similar to that of previous studies attempting to use pre-hurricane data (La Greca et al., 1998). The current sample consisted of 74 youth and their parents who completed a post Katrina assessment via phone interviews either 5–7 months post Katrina by Arizona State University ($N = 48$) or 12 months and later by the University of New Orleans ($N = 26$). The sample was comprised of 42 males and 31 females, with a mean age of 11.34 years and an age range of 6–17 years. Sixty percent of the families were Caucasian, 30% were African American, 8% were Hispanic, 1% were Asian, and 1% were of other ethnic backgrounds. The range of the participants' family income was as follows: 0–$20,999 (20%), $21,000–$40,999

(21%), $41,000–$50,999 (12%), and over $51,000 (47%). Comparisons on all study constructs between the families who participated in the post Katrina assessment vs. families who did not [$\chi^2$, 5($N$ = 245) 21.89, $p > .001$] and between families who participated in the phone interview with ASU vs. who participated in the phone interview with UNO [$\chi^2$, 5($N$ = 74) 11.82, $p < .05$] revealed that the two groups differed on family income. Specifically, those who participated in the post Katrina assessment and participated in the earlier phone interview had a higher family income. Therefore, family income was controlled for in all main analyses.

### 3.2. Measures

#### 3.2.1. Demographic information

At pre and post Katrina assessments, demographic information was collected from each family, including age, gender, race, marital status, level of education and occupation, and family income.

#### 3.2.2. Youth anxiety

Youth anxiety was assessed through the Revised Child Anxiety and Depression Scales, Child and Parent Version (RCADS-C and RCADS-P; Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000; Spence, 1997). Both versions were administered to youth and their parents at pre and post Katrina. The RCADS (child and parent) is a 47-item instrument that assesses symptoms of anxiety disorders and depression based on DSM-IV criteria. The scale is scored 1 "Never", 2 "Sometimes", 3 "Often", 4 "Always." The RCADS has demonstrated good reliability and validity (Chorpita et al., 2000). In the current study, the alpha for the RCADS-C anxiety scale was .92. The parent version of the RCADS-P is designed to be identical to the RCADS-C with minor modifications (i.e., wording was changed from "I" to "My child"). In the current study, the alpha for the RCADS-P anxiety scale was .91.

The "youth anxiety" measure at pre and post Katrina was formed by computing a unit-weighted score from parent and child report of anxiety. Unit-weighted scores are computed as standardized deviation scores ($z$-scores) from the averaged sum of individual items identified as measuring a construct. Properties of unit-weighted factors are especially desirable for this study as this measurement approach capitalizes on integrating the sources (parent, child) and reduces the number of statistical tests of the main hypotheses (i.e., reduces the probability of Type 1 error; Holmbeck, Li, Schurman, Friedman, & Coakley, 2002). The composite youth pre and post Katrina anxiety score includes the aggregation of the standardized score of youth-rated anxiety items from the RCADS-C and the standardized score of parent-rated anxiety items on the RCADS-P. Analyses were run using RCADS-C and RCADS-P separately. Results were virtually identical.

#### 3.2.3. Youth perceived attachment beliefs

Youth perceived attachment beliefs were measured pre Katrina only using the Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987). The IPPA is a 60-item (20: mother, 20: father, 20: peers) self-report scale designed to assess children's attachment beliefs about their parents and peers. For purposes of this study, the 20-item attachment to mother scale was used. Each item is rated on a 5-point Likert scale ranging from "never true" to "always true." Attachment beliefs are measured through three subscales (Trust, Communication, and Alienation). Sample items from the Trust scale are: "My mother respects my feelings" and "My mother understands me." Sample items from the Communication scale are: "If my mother knows that something is bothering me, she asks me about it" and "I talk to my mother when I'm having a problem." Sample items from the Alienation scale are: "I get upset easily with my mother" and "My mother does not understand what I am going through these days." The IPPA has good internal consistency (.86–.91) and test–retest reliability (.93) (Armsden & Greenberg, 1987). In the current study, the alphas were: .92 (Trust subscale), .85 (Communication subscale), and .73 (Alienation subscale) for the total sample reporting on their attachment beliefs to their mother.

#### 3.2.4. Perceived parenting behaviors

The Children's Report of Parent Behavior Inventory (CRPBI; Schludermann & Schludermann, 1970) was administered pre Katrina only to assess children's perceptions of their mothers' accepting and controlling behaviors toward them. The 30-item questionnaire consists of three subscales: Psychological Control (PC), Firm Control (FC), and Acceptance. Sample items from the Psychological Control scale are: "Says, if I really care for her, I would not do things that cause her to worry" and "Is always trying to change me." Sample items from the Firm Control scale are: "Insists that I must do exactly as I am told" and "Is very strict with me." Sample items from the Acceptance scale are: "Cheers me up when I am sad" and "Gives me a lot of care and attention." The CRPBI has good reliability estimates (.65–.74) (Schwartz, Barton-Henry, & Pruzinaky, 1985). In the current study, the alphas were: .80 (Psychological Control), .53 (Firm Control), and 86 (Acceptance).

### 3.3. Procedures

For the pre Katrina assessments, families were recruited through university classes at a local university and one local high school. Assessments took place at the Youth and Family Anxiety, Stress, and Phobia Lab on the university's campus. Because the city and the university were closed for an extended period of time after the hurricane, phone interviews were conducted to collect post Katrina data, which are similar procedures used in other disaster studies (Asarnow et al., 1999). Due to time constraints, not all of the same measures administered pre Katrina were administered post Katrina. The initial post Katrina assessments were conducted by colleagues at the Arizona State University. Trained assessors obtained verbal consent (assent for child) prior to the administration of the assessment. The assessors informed the parent that both the parent and the child needed to be in separate rooms while doing the phone assessment to ensure that both the parents and child felt comfortable. Both parent and child were administered the post Katrina assessment battery and were also asked a set of 23 questions to assess level of hurricane exposure (La Greca et al., 1998). Respondents indicate No (0) or Yes (1) as to whether they were exposed to the events or situations. The number of hurricane related events was computed by adding the number of "yes" responses separately for parent and child.

## 4. Data analysis

A series of hierarchical regression analyses as outlined in Baron and Kenny (1986) were used to test for moderation. Control variables were entered into the first step (age, gender, ethnicity, family income, and level of hurricane exposure). The independent variable (centered) was entered into the second step of the regression (Youth Anxiety). The moderator variable (centered) was then entered into the third step (IPPA Trust, IPPA Communication, IPPA Alienation, CRPBI Acceptance, CRPBI Psychological Control, and CRPBI Firm Control). Lastly, the interaction term (independent variable by the moderator variable) was entered into the last step. As recommended by Holmbeck (2002), graphs of the slopes for each significant regression equation are depicted to clarify the nature of the interaction. Relations between youths' anxiety pre and post Katrina were then examined for youth at high (1 S.D. above the mean) and low (1 S.D. below the mean) levels of the

moderator variables using Holmbeck's (2002) procedure for testing the significance of the slopes for youth in the high and low groups. Separate regression equations were run for each proposed moderator to maintain power.

## 5. Results

### 5.1. Preliminary analyses

Mean scores, standard deviations, and ranges on pre and post Katrina measures are presented in Table 1. Examination of the scores on all measures indicated acceptable ranges for the planned analyses.

### 5.2. Exploratory analyses

Independent sample *t*-tests or Chi-squares were conducted to test for differences in the study variables among (1) age, (2) gender, and (3) ethnicity. For age comparisons, the sample was divided into two groups based on pre Katrina age: (1) 11 years old and younger ($N = 37$) and (2) 12 years old and older ($N = 37$) based on biological and cognitive changes (Marshall & Tanner, 1970; Piaget, 1983). The younger group had higher levels of three pre Katrina variables: (1) IPPA Trust [mean difference = 3.92, S.E. of the mean = 1.81; $t$ (74) = 2.17, $p = .03$], CRPBI Acceptance [mean difference = 2.43, S.E. of the mean = 1.01; $t$ (74) = 2.40, $p = .02$], and CRPBI Psychological Control [mean difference = 3.21, S.E. of the mean = .00; $t$ (74) = 3.12, $p = .00$]. In terms of gender, girls reported higher levels of pre-Katrina IPPA Alienation [mean difference = 2.207, S.E. of the mean = .96; $t$ (74) = 2.29, $p = .03$]. For ethnicity, the sample was divided into Caucasian ($N = 44$) and African American ($N = 22$) due to the low number of families in the other ethnic categories. Differences between Caucasian and African American were found in pre Katrina: (1) father's education level [$\chi^2$, 4($N = 62$) 10.81, $p < .05$], in which more Caucasian fathers tended to have completed higher levels of education, (2) marital status [$\chi^2$, 6($N = 66$) 27.59, $p < .001$], in which more Caucasian families were married compared to African American families, and (3) family income [$\chi^2$, 5($N = 65$) 25.77, $p < .001$], in which Caucasian families had higher incomes compared to African American families.

### 5.3. Main moderation analyses

#### 5.3.1. IPPA perceived Trust

Youths' anxiety post Katrina was the criterion variable and then age, gender, ethnicity, family income, and level of hurricane exposure were added into the model in the first step [change in $R^2 = .12$, $F$ change (5, 74) = 1.88, $p = .13$]. Youths' IPPA Trust was entered in the second step [change in $R^2 = .05$, $F$ change (1, 74) = 3.42, $p = .07$]. Youths' anxiety pre Katrina was entered into the third step [change in $R^2 = .16$, $F$ change (1, 74) = 12.39, $p = .00$]. The interaction term (youths' anxiety pre Katrina × Trust) was entered into the fourth and final step [change in $R^2 = .10$, $F$ change (1, 74) = 9.23, $p = .00$] and is presented in Fig. 1. Testing the significance of the slopes revealed that among children with low Trust, youths' anxiety pre Katrina was significantly related to youths' anxiety post Katrina ($\beta = .55$, $p = .00$); however, among children with high perceived IPPA Trust, youths' anxiety pre Katrina, while still significant, was less strongly related to youths' anxiety post Katrina ($\beta = .42$, $p = .01$). Overall, the slopes of the regression lines show that the model predicts those with high anxiety and low acceptance pre Katrina will have the highest post Katrina anxiety.

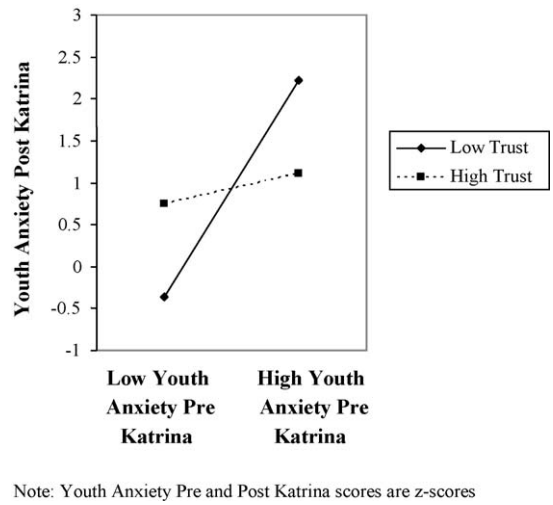


**Fig. 1.** Moderation by IPPA perceived Trust. *Note*: Youth anxiety pre and post Katrina scores are *z*-scores.

#### 5.3.2. IPPA perceived Communication

Youths' anxiety post Katrina was the criterion variable and then age, gender, ethnicity, family income, and level of hurricane exposure were added into the model in the first step [change in $R^2 = .13$, $F$ change (5, 74) = 2.14, $p = .09$]. Youths' IPPA Communication was entered in the second step [change in $R^2 = .05$, $F$ change (1, 74) = 3.57, $p = .06$]. Youths' anxiety pre Katrina was entered into the third step [change in $R^2 = .18$, $F$ change (1, 74) = 15.75, $p = .00$]. The interaction term (youths' anxiety pre Katrina × Communication) was entered into the fourth and final step [change in $R^2 = .14$, $F$ change (1, 74) = 14.65, $p = .00$] and is presented in Fig. 2. Testing the significance of the slopes revealed that among children with low Communication, youths' anxiety pre Katrina was significantly related to youths' anxiety post Katrina ($\beta = .96$, $p = .00$); however, among children with high Communication, youths' anxiety pre Katrina was not significantly related to youths' anxiety post Katrina ($\beta = .13$, $p = .33$). Overall, the slopes of the regression lines show that the model predicts those with high anxiety and low communication pre Katrina will have the highest post Katrina anxiety.

#### 5.3.3. Perceived CRPBI Acceptance

Youths' anxiety post Katrina was the criterion variable and then age, gender, ethnicity, family income, and level of hurricane exposure were added into the model in the first step [change in $R^2 = .11$, $F$ change (5, 74) = 1.67, $p = .17$]. Youths' CRPBI Acceptance was entered in the second step [change in $R^2 = .02$, $F$ change

**Table 1**
Means, standard deviations, and ranges for pre and post Katrina measures.

| | Mean | S.D. | Range |
|---|---|---|---|
| Youth anxiety pre Katrina | −.20 | 1.45 | −2.51 to 4.40 |
| Youth anxiety post Katrina | .04 | 1.50 | −2.51 to 4.56 |
| Parent-report of total # of hurricane related experiences | 10.68 | 2.83 | 3–21 |
| Child-report of total # of hurricane related experiences | 7.64 | 2.91 | 1–14 |
| IPPA Trust | 43.90 | 7.76 | 15–50 |
| IPPA Communication | 20.08 | 4.76 | 7–25 |
| IPPA Alienation | 9.85 | 4.09 | 5–21 |
| CRPBI Acceptance | 25.81 | 4.31 | 9–30 |
| CRPBI Psychological Control | 17.78 | 4.49 | 11–28 |
| CRPBI Firm Control | 21.65 | 3.45 | 13–30 |

*Note*: The "youth anxiety" score is a combined score; therefore, the mean is not 0 and the S.D. is not 1.
Youth anxiety = Revised Child Anxiety and Depression Scales (child and parent version combined), IPPA = Inventory of Parent and Peer Attachment, CRPBI = Children's Report of Parent Behaviors Inventory.

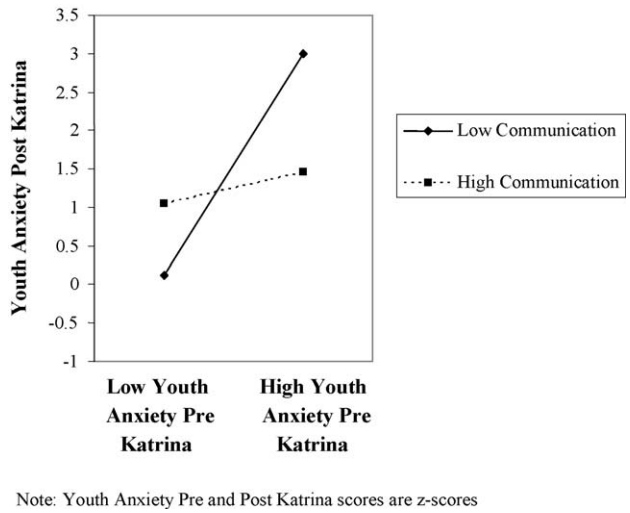


**Fig. 2.** Moderation by perceived IPPA Communication. *Note*: Youth anxiety pre and post Katrina scores are *z*-scores

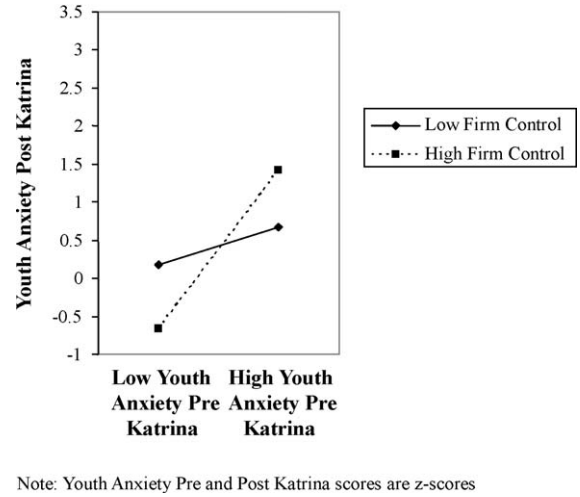


**Fig. 4.** Moderation by perceived CRPBI Firm Control. *Note*: Youth anxiety pre and post Katrina scores are *z*-scores.

(1, 74) = 1.13, $p$ = .29]. Youths' anxiety pre Katrina was entered into the third step [change in $R^2$ = .20, $F$ change (1, 74) = 15.26, $p$ = .00]. The interaction term (youths' anxiety pre Katrina × Acceptance) was entered into the fourth and final step [change in $R^2$ = .09, $F$ change (1, 74) = 7.44, $p$ = .01] and is presented in Fig. 3. Testing the significance of the slopes revealed that among children with low Acceptance, youths' anxiety pre Katrina was significantly related to youths' anxiety post Katrina ($\beta$ = .76, $p$ = .00); however, among children with high Acceptance, youths' anxiety pre Katrina was not significantly related to youths' anxiety post Katrina ($\beta$ = .18, $p$ = .27). The slopes of the regression lines show that the model predicts that those with high anxiety and low perceptions of acceptance pre Katrina will have the highest post Katrina anxiety.

*5.3.4. CRPBI perceived Firm Control*

Youths' anxiety post Katrina was the criterion variable and then age, gender, ethnicity, family income, and level of hurricane exposure were added into the model in the first step [change in $R^2$ = .11, $F$ change (5, 74) = 1.67, $p$ = .17]. Youths' CRPBI Firm Control was entered in the second step [change in $R^2$ = .00, $F$ change (1, 74) = .15, $p$ = .67]. Youths' anxiety pre Katrina was entered into the third step [change in $R^2$ = .21, $F$ change (1, 74) = 15.53, $p$ = .00].

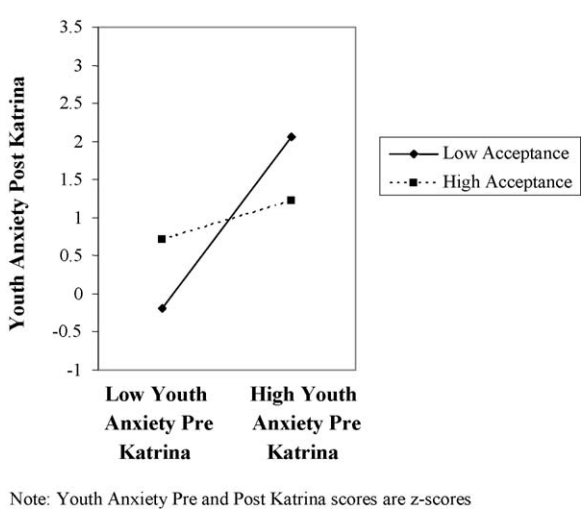


**Fig. 3.** Moderation by perceived CRPBI Acceptance. *Note*: Youth anxiety pre and post Katrina scores are *z*-scores.

The interaction term (youths' anxiety pre Katrina × Firm Control) was entered into the fourth and final step [change in $R^2$ = .05, $F$ change (1, 74) = 3.72, $p$ = .05] and is presented in Fig. 4. Testing the significance of the slopes revealed that among children with high Firm Control, youths' anxiety pre Katrina was significantly related to youths' anxiety post Katrina ($\beta$ = .73, $p$ = .00); however, among children with low Firm Control, youths' anxiety pre Katrina was not significantly related to youths' anxiety post Katrina ($\beta$ = .16, $p$ = .45). The slopes of the regression lines show that the model predicts that those with high anxiety and high perceptions of firm control pre Katrina will have the highest post Katrina anxiety.

## 6. Discussion

The current study begins filling in a gap in the disaster literature by examining the role of youths' perceptions of the parent–child relationship on anxiety. Due to presence of pre Katrina data, this study had the unique opportunity to empirically test the above predictions. Youths' perceptions of trust and communication with their mother as well as perceptions of acceptance and firm control pre Katrina moderated the association between youths' pre and post Katrina anxiety. Youth with higher levels of anxiety and *lower* perceptions of trust, communication, or acceptance as well as higher *perceptions* of firm control pre Katrina were most likely to show increases in anxiety. Manassis et al. (1994) have theorized that insecure attachments can result in children having a maladaptive approach to situations based on the expectation that their needs will not be met by their caregiver(s). This can result in either low interpersonal contact/avoidance behaviors or high interpersonal contact/demanding behaviors. These behaviors can be expressed in maladaptive forms of coping and avoidance behaviors creating a chronic and persistent state of anxiety within children. Therefore, children who perceive their attachment to be insecure may be at risk for developing more severe and prolonged PTS reactions following a natural disaster.

In terms of acceptance, perceptions of rejection can minimize children's feelings and hinder their ability to deal with and regulate negative affect, resulting in the internalization of these feelings. Perceptions of firm control can convey the perception of the continual presence of threat and danger and prevent children from facing the disaster thereby, hindering children's ability to develop solutions to face the disaster, as well as successful coping mechanisms (Vasey & Dadds, 2001). The consequence of both of these parenting behaviors can result in worse and prolonged PTS

reactions following a natural disaster. Moreover, these findings appear consistent across age, gender, and ethnicity as these comparisons revealed no significant differences on levels of anxiety post Katrina.

Vernberg and Vogel (1993) point to the need for a better understanding of how to respond to the psychological needs of children and families following natural disasters. The main strength and most significant finding of the current study is that this study identified youths' perceptions of their parent–child relationship as risk factors for worse PTS reactions following a natural disaster. Although the current study did not find support for these factors as protective factors, this possibly should not be dismissed. Overall, results of the current study point to the need to focus not only on the parent–child relationship, but also to the child's perception of that relationship as possible ways to decrease youths' PTS response to a disaster.

The main limitation of the current study is the sample characteristics. The families that were recruited for the study tended to have higher income levels, which may afford resources and abilities that lower income levels may not (Weems et al., 2009; Weems, Watts, et al., 2007). Therefore, the full scope of responses to Hurricane Katrina may not have been captured in the current study. Caution should be used in drawing too wide of a generalization from the findings. The current study is also limited by its sample size, so results indicating non-significant findings should be interpreted with caution. The perception variables relied solely on youths' self-reports. Reports from other sources (i.e., parents) and observational data could result in additional information. The current study focused solely on the maternal–child relationship because of the lack of data including fathers. Future studies would benefit from examining both the maternal and paternal–child relationship. An additional limitation of this study is that we had little control over the post disaster time frames examined. The extent of devastation made reassessment of families immediately following Hurricane Katrina impossible. Data collected in various time frames following the storm could have helped clarify the temporal associations of youths' symptom reactions.

Despite the above limitations, the current study had a unique opportunity to examine factors that may influence youths' disaster reactions. Our findings lay the framework for investigating the implicated mechanisms (i.e., unavailability of social support, coping behaviors, confrontation of fear, communication of threat) by which perceived attachment beliefs and parenting behaviors may influence disaster exposed youth.

## Acknowledgements

This research was supported in part by the American Psychological Foundation: Elizabeth Munsterberg Koppitz Fellowship awarded to Natalie M. Costa. This study was also funded in part by grants from the National Institute of Mental Health (MH067572) and UNO Investing in Research Excellence program to Carl F. Weems and from the Institute for Social Science Research awarded to Armando A. Pina and Carl F. Weems.

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