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Hurricane-Exposed Youth and Psychological Distress: An Examination of the Role of Social Support

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Hurricane-Exposed Youth and Psychological Distress:
An Examination of the Role of Social Support

A Thesis

Submitted to the Graduate Faculty of the
University of New Orleans
in partial fulfillment of the
requirements for the degree of

Master of Science
in
Psychology

by

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Abstract

Hurricane exposure places youth at risk for psychological distress such as symptoms of Posttraumatic Stress Disorder (PTSD), anxiety, and depression, while social support may contribute to resilience following disasters. This study examined associations among family and peer social support, level of hurricane exposure, and psychological distress using both a large single-time assessment sample ($N = 1098$) and a longitudinal sample followed over a six-month period ($n = 192$). Higher levels of hurricane exposure were related to lower levels of social support from family and peers as well as to higher levels of psychological distress. Higher levels of family and peer social support demonstrated both concurrent and longitudinal associations with lower levels of psychological distress, with associations varying by social support source and psychological distress outcome. Findings suggested that the protective effects of high peer social support against the development of PTSD symptoms may be diminished by high hurricane exposure.

Social support; Disasters; Posttraumatic stress symptoms; Children; Anxiety; Depression

1. Introduction

There are a wide range of physical and mental health consequences that may result from experiencing a disaster, and posttraumatic stress reactions such as PTSD symptoms, depression, and anxiety are among the most prevalent mental health outcomes post-disaster (e.g., Garrison et al., 1995; Goenjian et al., 2001; Pina et al., 2008). However, there is variation in the levels of psychological distress (including symptoms of PTSD, depression, and anxiety) that are experienced among trauma-exposed individuals, and some individuals experience very little distress (Weems & Overstreet, 2009). Many youth will recover from any psychological distress symptoms within a year of the event (La Greca & Silverman, 2009), but others may experience chronic and persistent symptoms. This thesis examines youths' reactions to disaster and explores the role of social support in understanding variation in outcomes.

The next section of this document presents an overview of potential psychological effects from disasters and provides a broad overview of how and why disasters may exert a negative effect on mental health. Section 3 then focuses more specifically on social support and its association with resilience among trauma-exposed individuals. Social support is defined in this section, and a theory of the mechanism by which social support may serve to promote resilience or to convey risk in the face of traumatic exposure will be discussed. Additionally, evidence is presented illustrating the association of perceived social support with psychological distress. Section 3.1 provides a review of extant literature which suggests that social support may have a protective effect on the development of psychological distress such that it may serve to buffer (moderate) the trauma-distress association. In section 3.2, an alternative perspective of social support's influence on the trauma-distress association is considered, namely that it serves to mediate the relationship. The theoretical perspective and relevant findings for this alternative

perspective will be discussed. Finally, section 4 delineates a description of the specific study, methods, results, and discussion of findings.

2. Overview of the Effects of Disasters and Predictors of Mental Health Outcomes

The extant literature suggests that a significant proportion of youth develop posttraumatic stress reactions following the experience of a natural disaster (see Furr, Comer, Edmunds, & Kendall, 2010 for a review), and research has shown that youth who experience hurricanes have a heightened risk for symptoms of PTSD (e.g., Goenjian et al., 2001; La Greca, Silverman, Vernberg, & Prinstein, 1996; Vernberg, La Greca, Silverman, & Prinstein, 1996). For example, following Hurricane Andrew in 1992, a sample of 568 children assessed 3 months post-disaster exhibited high rates of PTSD symptoms, and 30% of the youth surveyed reported severe or very severe PTSD symptoms (Vernberg et al., 1996). The potential for a high prevalence of PTSD symptoms among youth even when assessed long after the disaster (Norris, Perilla, Riad, Kaniasty, & Lavizzo, 1999; La Greca et al., 1996; La Greca et al., 2010; Shaw, Applegate, & Schorr, 1996; Weems et al., 2010a) highlights the need to understand predictors of negative response. Indeed, for some individuals, posttraumatic stress symptoms following a natural disaster may be chronic and stable; left untreated, they have been associated with disorders such as anxiety, depression, conduct disorder, substance abuse, and an impaired quality of life (Copeland, Keeler, Angold, & Costello, 2007; Giaconia et al., 1995).

Theoretically, natural disasters may have a detrimental effect on individuals' mental health resulting from threat to the satisfaction of basic human needs and goals (Sandler, 2001; Weems & Overstreet, 2009). Basic human needs and goals include physical safety and a sense of self-efficacy, self-worth, and social relatedness (Sandler, 2001). When these needs and goals are met, an individual is in theory more likely to experience healthy emotional adaptation and to

be resilient when confronted with adverse situations, such as a natural disaster (Weems & Overstreet, 2009). Conversely, when these needs and goals are not met, an individual may experience stress and negative emotions such as sadness, fear, and anger (Sandler, 2001).

The need for physical safety entails both maintaining physical survival and avoiding pain, and must be satisfied before higher order needs such as esteem or belongingness are addressed (Sandler, 2001). Destruction during and after a disaster may negatively affect the satisfaction of the physical safety need (Weems & Overstreet, 2009). Self-worth, conceptualized as a positive evaluation of the self, may be adversely affected by a disaster through mechanisms such as the interruption of activities that enhance esteem, like school or extracurricular activities; the affiliation of an individual with a devalued group; or, through the disruption of relationships that support one's esteem, including those with parents or peers (Sandler, 2001; Weems & Overstreet, 2009). Self-efficacy relates to the need for control, and the motivation to be able to effectively change one's environment (Sandler, 2001). Disasters may threaten an individual's sense of self-efficacy in that they involve potentially negative events and experiences over which an individual has little or no control (Weems & Overstreet, 2009). Finally, social relatedness involves the need to belong to a positive social network (Sandler, 2001). The disruption of an individual's social network, as may be the case in the context of a disaster, may result in distress (Weems & Overstreet, 2009).

One of the critical risk factors in the emergence of posttraumatic stress symptoms following a disaster is the number and degree of traumatic events experienced during the disaster (e.g., La Greca et al., 1996; Lonigan, Shannon, Finch, Daugherty, & Taylor, 1991). A consistent relationship between disaster exposure and resulting symptomatology has been demonstrated such that the experience of more frequent and intense hurricane-related events is likely to lead to

more severe posttraumatic stress reactions among disaster-exposed individuals (La Greca, Silverman, & Wasserstein, 1998; Norris et al., 2002; Weems et al., 2007a; Weems & Overstreet, 2008). For example, Weems et al. (2007b) found that the number of hurricane-related events that an individual experienced was significantly related to the number of PTSD symptoms reported among adults. Similar significant associations between event exposure and symptoms of PTSD have been reported in studies of hurricane-exposed youth (e.g., Hensley & Varela, 2008; La Greca et al., 1996; La Greca et al., 2010; Moore & Varela, 2010; Vernberg et al., 1996). Theoretically, the perception of life threat presents a challenge to the needs of physical safety and self-efficacy and may result in difficulty regulating emotional reactions which, in turn, increases the risk of developing negative mental health outcomes (Weems & Overstreet, 2008).

Another risk factor for the development of negative mental health outcomes following a traumatic event is major life events occurring post-trauma. Major life events following a hurricane have been associated with the development of posttraumatic stress symptoms (La Greca et al., 1996). Further, La Greca and colleagues (2010) found that hurricane-related stressors occurring either during or immediately following the hurricane contributed to the occurrence of subsequent major life events such as parental separation or divorce. The experience of major life events following a disaster has the potential to interfere with an individual's recovery as youth may be more likely to experience persistent posttraumatic stress reactions in the face of additional stressors following the initial traumatic event (La Greca et al., 2010). Additionally, major life events have the potential to affect family structure and friendship networks, thereby reducing the support available to youth from these sources (La Greca et al., 2010).

As noted, there is substantial variation in the degree of posttraumatic stress symptoms experienced by youth following a natural disaster such as a hurricane (La Greca, Silverman, Vernberg, & Roberts, 2002, as cited in Furr et al., 2010), and some youth experience very little psychological distress (Weems & Overstreet, 2009). For example, Vigna et al. (2009) conducted a longitudinal study of factors predicting positive personal adjustment outcomes among youth aged 8 to 15 who experienced Hurricane Katrina. When assessed 25-28 months post-disaster, greater positive adjustment among youth in the sample was associated with higher levels of parent-provided support and the use of diversion coping strategies, such as relying on routines and the use of social support (Vigna, Hernandez, Paasch, Gordon, & Kelley, 2009). Theory and the extant research suggest that social support may play an important role in youths' emotional functioning following hurricane exposure (Weems & Overstreet, 2008).

3. Social Support

Social support may consist of social resources perceived by an individual to be available or resources that are actually received by an individual through informal helping relationships and/or formal support groups (Cohen, Gottlieb, & Underwood, 2000). Within the context of social support, the psychological and/or material resources available from one's social support network may aid an individual in coping with stress (Cohen, 2004). Drawing from House and Kahn (1985), Cohen (2004) describes three types of resources that encompass social support, which are instrumental, informational, and emotional resources. Instrumental support resources include material aid, such as financial assistance. Informational support resources include relevant information that may help an individual cope with difficulties, including advice and guidance. Emotional support resources involve another individual's expression of caring,

empathy, trust, and reassurance to the affected individual, as well as providing the affected individual with an outlet for emotional expression and venting (Cohen, 2004).

Social support is thought to have an effect on posttraumatic stress symptoms after the initial experience of the disaster has occurred (Vernberg et al., 1996). Following a disaster, social support from others may alleviate physical and psychological distress, as this support demonstrates others' awareness of the situation and empathy (Mohay & Forbes, 2009).

Individuals who have stronger sources of social support tend to cope better with life stresses than do individuals who do not have such means of support (Cohen & Wills, 1985). The perceived availability of social support during stressful situations, such as following a natural disaster, is thought to aid an individual in the provision of psychological resources needed to cope with the situation, and therefore serve to buffer the effects of stress (Cohen, 2004). This may operate through individuals' reappraisal of the highly stressful situation and therefore decrease the risk of negative mental health outcomes (Cohen, 2004; Mohay & Forbes, 2009; Thoits, 1986). The perception of available social support may also result in the reduction or elimination of affective and physiological responses to the stressful event which, in turn, may alter potentially maladaptive behavioral responses (Cohen et al., 2000). Additionally, social support provides an outlet for individuals to voice their problems and concerns, which has been associated with a reduction in intrusive thoughts that can serve to maintain maladaptive responses to a stressful event (Cohen et al., 2000; Lepore, Silver, Wortman, & Wayment, 1996). As Norris et al. (2002) note, perceived social support has repeatedly been demonstrated to protect disaster victims' mental health. Research suggests that higher levels of social support are associated with lower levels of PTSD symptoms following a disaster in adults (e.g., Brewin, Andrews, & Valentine, 2000; Ozer, Best, Lipsey, & Weiss, 2003; Weems et al., 2007b), as well as in youth (e.g., La

Greca et al., 1996; La Greca et al., 2010; Moore & Varela, 2010; Pina et al., 2008; Vernberg et al., 1996).

Theoretically, social support may have an effect on the development of psychological distress because of its direct association with the basic human need of social relatedness (Weems & Overstreet, 2008). Ultimately, most humans have a basic need to belong; this entails a need for personal interactions characterized by positive affect and lack of conflict, and the perception of interpersonal bonds as stable, continuous, and characterized by affective concern (Baumeister & Leary, 1995; Sandler, 2001). When the social relatedness need is met following an adverse event, individuals are more resilient, and, alternatively, when this need is not met, individuals are placed at increased risk for negative mental health outcomes (Sandler, 2001; Weems & Overstreet, 2009). Disasters may disrupt an individual's social support network (e.g., families may be separated and peer connections may be broken; Weems & Overstreet, 2009), and therefore may serve to confer risk by altering an individual's sources of social support that satisfy the need of social relatedness.

The most frequently examined sources of social support in the youth post-disaster literature are family (e.g., parents and relatives), peers (e.g., friends and classmates), and teachers. Parents have been cited as the most important source of social support to elementary school-age children following disasters (Pynoos & Nader, 1988; Vernberg & Vogel, 1993). Parents may fulfill roles such as providing comfort, nurturing, and a sense of physical safety, and they may serve to model coping behavior (Compas & Epping, 1993; Pynoos & Nader, 1988; Vernberg & Vogel, 1993). Peers may function to help youth in responding to a traumatic event by assisting in coping efforts, decreasing isolation, and decreasing youth's subjective feelings of responding abnormally (e.g., Pynoos & Nader, 1988; Vernberg & Vogel, 1993). While a

distinction may be made between youths' friends and classmates, Dubow and Ullman (1989) found that youth did not distinguish between the friend and classmate support items when completing their measure of social support (the Survey of Children's Social Support). Teachers, as a source of social support, may serve to provide factual information about a disaster and its consequences, and may aid in reestablishing familiar roles and routines for disaster-exposed youth (Vernberg & Vogel, 1993; Vernberg et al., 1996). Among all of these sources, family and friends have been found to be the greatest sources of support for disaster-exposed youth (Prinstein, La Greca, Vernberg, & Silverman, 1996).

The majority of the studies that have examined the role of social support in predicting psychological distress among hurricane-exposed youth are cross-sectional, and PTSD symptoms are the most commonly measured outcome. Following Hurricane Hugo, Hardin et al. (1994) surveyed 1482 students aged 13 to 18 to examine whether hurricane exposure was related to psychological distress (anger, depression, anxiety, and global mental distress), and whether the psychological distress was related to other variables, including perceived overall social support (i.e., distinctions were not made among various possible sources of social support) and negative life events occurring in the year following the hurricane. The assessment took place one year after Hurricane Hugo. The majority of the participants reported only minimal hurricane exposure, and the amount of depression, anxiety, and global mental distress that was reported by participants was found to be within normal ranges. However, the results did show that as hurricane exposure increased, the reported symptoms of psychological distress increased as well. Negative life events occurring in the year following the hurricane were also positively associated with psychological distress, and were at least as predictive of distress as was hurricane exposure.

Social support was negatively related to psychological distress, indicating that perceived social support was protective against the stress of the disaster.

Vernberg and colleagues (1996) examined the incidence of PTSD symptoms among youth exposed to Hurricane Andrew. One of the factors of interest in the authors' conceptual model of the emergence of PTSD symptoms was access to social support. The sources of social support measured in the study were parents, teachers, classmates, and close friends. The participants were 568 children in grades 3 through 5, and assessment took place approximately 3 months after the hurricane. Overall, lower levels of reported social support among all sources were associated with higher levels of PTSD symptoms. Participants reported the most support from parents and close friends, and the lowest support from classmates. An examination of the variance in predicting PTSD symptoms by the four sources of social support (parents, teachers, classmates, and close friends) indicated that support from teachers and classmates were each uniquely predictive of PTSD symptoms.

In an extension of the research by Vernberg et al. (1996), La Greca et al. (1996) evaluated the incidence of PTSD symptoms in youth at 7 and 10 months after Hurricane Andrew. 442 participants of the original sample (Vernberg et al., 1996) completed the assessments at each of the three times (3, 7, and 10 months). The conceptual model again included the availability of social support and was extended by including the assessment of major life events occurring between 3 and 7 months post-hurricane. At the Time 2 assessment (7 months post-hurricane), higher levels of social support from all sources (parents, friends, classmates, and teachers) predicted lower levels of PTSD symptoms, and support from parents and classmates were each found to be uniquely predictive of symptoms. Additionally, higher rates of reported major life events were associated with higher rates of PTSD symptoms. At the Time 3 assessment (10

months post-hurricane), lower levels of reported social support overall were associated with higher levels of PTSD symptomatology, and unique effects were found for low social support from teachers. Again, participants who reported higher levels of major life events also reported higher levels of PTSD symptoms. The authors noted that while the occurrence of major life events in the months following the hurricane contributed to higher rates of PTSD symptoms, the availability of social support had a protective effect and diminished the impact of the hurricane over time. In the longitudinal prediction of symptoms, higher levels of social support reported at Time 1 were associated with lower reports of PTSD symptoms at Time 2 and 3.

Following Hurricane Katrina, Pina and colleagues (2008) examined social support as an aspect of the post-hurricane recovery environment and its relation to posttraumatic stress reactions (i.e., symptoms of PTSD, depression, and anxiety). The participants were 46 youth ($M_{age} = 11.43$) who were assessed 6 to 7 months post-Katrina. Youth completed measures of hurricane-related experiences and posttraumatic stress reactions, and the participants' parents completed a measure of social support assessing familial support (e.g., relatives and own parents), extra-familial support (e.g., friends, co-workers, church members/minister), and professional support (e.g., teachers, public health and social services, and physicians). While the only social support-posttraumatic stress reaction correlation found to be significant was that of familial support-posttraumatic stress reactions ($r = -.41, p < .01$), higher levels of perceived support from extra-familial sources predicted lower levels of posttraumatic stress reactions, and higher levels of professional social support predicted higher levels of posttraumatic stress reactions. In interpreting the findings, the authors suggested that perhaps the parents of youth with higher levels of posttraumatic stress reactions sought help from professional sources and found the support to be helpful. Additionally, the authors noted that a possible explanation for a

lack of a significant predictive relationship between familial support and posttraumatic stress reactions may be in line with the suggestion by La Greca et al. (1996) that hurricanes tend to impact an entire family, and therefore the amount of social support that family members are able to provide that could protect youth from the effects of the traumatic exposure may, in turn, be affected.

Jaycox et al. (2010) conducted an assessment and field trial of two interventions among youth exposed to Hurricane Katrina. The participants were 195 youth in grades 4 through 8. At the baseline assessment 15 months post-hurricane, participants completed measures assessing PTSD symptoms and social support from friends and family. Participants who met the criteria for inclusion were randomly assigned to one of two cognitive-behavioral interventions (either Trauma-Focused Cognitive-Behavioral Therapy [TF-CBT] or Cognitive-Behavioral Intervention for Trauma in Schools Program [CBITS]). The TF-CBT intervention had a low number of participants who completed treatment, and therefore the authors were unable to evaluate the predictors of this treatment outcome. However, the predictors of treatment outcome, including social support, for the 57 participants who took part in the CBITS intervention were examined. The results indicated that higher levels of family social support, but not friend support, predicted lower PTSD scores at the follow-up assessment.

In a recent study, Self-Brown, Lai, Thompson, McGill, and Kelley (2013) examined peer and parent social support as potentially protective factors associated with trajectories of PTSD symptoms among 426 youth aged 8 to 16 who were exposed to Hurricane Katrina. Out of the three possible trajectory groups (resilient, recovering, and chronic), higher peer social support was associated with a greater probability of youth falling in the resilient group when compared to the recovering group, and a greater probability of falling in the recovering group than the chronic

group, suggesting that peer social support was an important protective factor in the development of PTSD symptoms among these youth.

The variations among sources of social support as significant predictors of posttraumatic stress symptoms speak to the complexity of youths' support systems, as well as the fact that disasters may also adversely affect youths' social support sources such as friends and family (Norris & Kaniasty, 1996). Additionally, multiple sources of social support appear to be important, and each source may fulfill varied needs of support for youth (Compas & Epping, 1993; Vernberg et al., 1996; Wilcox & Vernberg, 1985). Overall, higher levels of social support are associated with fewer posttraumatic stress symptoms in youth following a natural disaster and could have a buffering (i.e., moderating) effect on developing posttraumatic stress symptoms (Pfefferbaum, 1997) such that youth exposed to high levels of disaster events may display greater resilience, or lower levels of posttraumatic stress reactions, if they have high levels of social support (La Greca et al., 2010).

3.1. Social Support as a Moderator

There is a scarcity of research that has examined social support as a moderator in the link between hurricane-exposure and posttraumatic stress symptoms in youth. One of the two studies that have investigated this possibility is a prospective study conducted by La Greca et al. (2010) examining the relationship between hurricane-related exposure events, post-hurricane major life events, social support, and posttraumatic stress symptoms. Participants in grades 2 through 4 were assessed at 9 months (Time 1) and 21 months (Time 2) following the experience of Hurricane Charley. Youth completed measures assessing hurricane-related exposure and stressors, posttraumatic stress symptoms, major life events post-hurricane, and perceived family and peer social support. At Time 1, results indicated that higher levels of disaster exposure (i.e.,

perceived life threat) were predictive of higher levels of posttraumatic stress symptoms in youth. Peer social support was found to moderate the relationship between youths' disaster exposure and posttraumatic stress symptoms at the Time 1 assessment (9 months post-hurricane). Specifically, youth who thought their lives were threatened by the hurricane and had greater perceived peer social support reported significantly fewer posttraumatic stress symptoms than did youth who thought their lives were threatened and had lower perceived peer social support. The experience of major life events post-hurricane was associated with greater posttraumatic stress symptoms and also was found to decrease the amount of peer social support available to youth. When the participants were assessed at Time 2 (21 months post-hurricane), youth with lower levels of perceived peer social support at that time reported higher levels of posttraumatic stress symptoms, although peer social support was not noted to moderate the relationship between disaster exposure and posttraumatic stress symptoms. Social support reported at Time 1 was indirectly related to the Time 2 posttraumatic stress symptoms through the mediating pathways of posttraumatic stress symptoms at Time 1 and social support at Time 2 (La Greca et al., 2010).

Moore and Varela (2010) also investigated social support as a moderator in the association between hurricane exposure and PTSD symptoms. A sample of 156 Hurricane Katrina-exposed youth in grades 4 through 6 completed measures of PTSD symptoms, hurricane experiences, major life events post-hurricane, and social support from parents, teachers, classmates, and close friends. Youth were assessed 33 months after Hurricane Katrina. The results showed that perceived social support from classmates was negatively related to symptoms of PTSD such that youth with lower levels of perceived classmate support reported more symptoms of PTSD than did youth with higher levels of perceived classmate support. Social

support from classmates may have been especially important among youth exposed to Hurricane Katrina because many families were forced to relocate, which resulted in the disruption of youths' pre-disaster environments (Moore & Varela, 2010). However, the results did not show that social support moderated the relationship between disaster exposure and PTSD symptoms. The authors note that a possible explanation for the lack of moderation could be that traumatic exposure accounted for a relatively small portion of variance in predicting PTSD symptoms and so perhaps there was not enough shared variance to be moderated. Because of the length of time between the event and assessment in this study, it is possible that trauma exposure and PTSD symptoms were not as closely related as they may have been initially, and post-trauma factors such as major life events might have played a larger role in the persistence of PTSD symptoms and shared more of the variance with the symptoms at the time of assessment (Moore & Varela, 2010).

Within the broader stress and trauma literature, findings have lent support for the notion of social support as a moderator. In a study of African American youth exposed to community violence, social support moderated the association between witnessing violence and symptoms of anxiety and depression (Hammack, Richards, Luo, Edlynn, & Roy, 2004). The buffering effect was not found, however, among youth who were victims of violence, which the authors characterized as an extreme risk factor for symptom development. In another study of youth exposed to parental marital discord, peer social support was found to moderate the association between youths' perceived level of marital discord and youths' behavior problems, which included anxiety, depression, social anxiety, conduct disorder, and attention problems (Wasserstein & La Greca, 1996). Llabre and Hadi (1997) tested social support as a moderator between traumatic event exposure and psychological distress (symptoms of PTSD and

depression) in Kuwaiti youth two years after exposure to the Gulf Crisis. Social support moderated the association between traumatic exposure and psychological distress such that trauma-exposed girls with low levels of social support had significantly higher levels of PTSD and depressive symptoms than did trauma-exposed girls with high levels of social support, trauma-exposed boys, or the control groups. While social support did not moderate the association between trauma and psychological distress for boys, it should be noted that boys reported lower levels of social support overall.

Overall, there are mixed findings regarding social support as a moderator between traumatic event exposure and psychological distress. Theory suggests that social support has the potential to moderate traumatic event exposure, such as a hurricane, and psychological distress symptoms in youth. Given the inconsistent results in the extant literature and the theoretical basis for social support as a moderator, another examination of the potential buffering (moderating) effects of social support on psychological distress symptoms is warranted.

3.2. Social Support as a Possible Mediator

While theory and the extant literature suggest that social support may moderate the association between hurricane exposure and psychological distress, it is possible that there is an alternative explanation for this association. Perhaps social support functions as a mediator in the relationship between trauma and psychological distress. It may be the case that traumatic event exposure experienced during a hurricane affects the level of an individual's perceived social support and that the perceived level of social support, in turn, affects an individual's psychological distress following hurricane exposure.

Social support has been demonstrated to mediate the association between the PTSD risk factors of neuroticism, negative affect, and pre-trauma distress and PTSD symptoms among

trauma-exposed adults (Frazier et al., 2011). Llabre and Hadi (1997) examined social support as a mediator of the association between traumatic exposure and psychological distress (symptoms of PTSD and depression) in Kuwaiti youth exposed to the Gulf Crisis and did not find support for social support as a mediator. However, the sample of youth was grouped according to youth whose fathers were killed, youth whose fathers were missing, and youth who were arrested or whose parents were arrested. These are potentially quite intense traumatic events and may differ from the traumatic events experienced by the majority of a sample of hurricane-exposed youth. This possible difference may be an important consideration because it has implications for both the dose-response relationship between trauma and psychological distress and the availability of social support as one parent was absent for the majority of the Kuwaiti youth sampled. Further, the social support measure used by Llabre and Hadi (1997) was an eight-item measure designed for this study that assessed only youths' perception of available emotional support, and did not distinguish among various sources of support. The simplistic measure of social support may have failed to capture the complexity of social support.

It may be that social support mediates the association between hurricane exposure and psychological distress through indirect causal chaining. Disasters affect entire communities and, as such, have the potential to negatively impact sources of social support (Norris & Kaniasty, 1996; Weems & Overstreet, 2009). Theoretically, because individuals who have the potential to serve as sources of social support are dealing with the impact of the disaster, they may have fewer resources available that would allow them to provide support to others. The findings from a study conducted by La Greca et al. (2010) provide some support for this idea. The study's results showed that youths' social support levels declined following Hurricane Charley as a result of ongoing loss and disruption due to the hurricane and major life events post-hurricane.

Further, social support has been found to be a strong predictor of post-trauma PTSD symptoms (Brewin et al., 2000; Ozer et al., 2003), with lower levels of perceived social support being associated with higher levels of reported PTSD symptoms among hurricane-exposed youth (e.g., Vernberg et al., 1996; La Greca et al., 1996). Perhaps greater and more intense hurricane events lead to less perceived social support, and the resulting impact to social support then serves to exacerbate psychological distress.

4. The Present Study

The purpose of this study was to examine the role of perceived social support in youths' emotional functioning following the natural disaster of Hurricane Katrina. Previous research has demonstrated the risk for psychological distress among hurricane-exposed youth and has shown that some youth may experience substantial and persistent distress symptoms over time. Research has also demonstrated that the availability of perceived social support (hereafter referred to as social support) is associated with lower levels of post-hurricane psychological distress. To date, eight studies have examined the link between social support and post-hurricane psychological distress in youth samples. Out of these studies, seven have examined PTSD symptoms as an outcome and each has shown a negative association between social support and PTSD (i.e., higher social support is associated with fewer PTSD symptoms). Only two of the studies have examined the link between social support, anxiety, and depression, with both studies showing a significant link. Three studies have demonstrated a longitudinal association in which earlier social support was associated with later PTSD symptoms. In addition, the findings have varied as a function of the source of social support and the timing of assessment. The pattern seems to be one with family and peers being important with 2 of 7 studies showing a link to family social support and 3 of 7 showing a link to peer social support.

However, theory and findings in the extant literature imply not only main effect associations but also possible moderating or mediating relationships (with only 2 of 8 studies examining moderation). Thus, further examination of the role of social support in relation to hurricane exposure and psychological distress is warranted. The aim of the current study was to explore social support as a main effect predictor and as a buffer of the association between hurricane exposure and psychological distress through an examination of social support as a moderator. Social support's role as a potential mediator of the association between hurricane exposure and psychological distress was also explored.

The study examined associations among family and peer social support, level of hurricane exposure, intervening major life events, and multiple indices of psychological distress (specifically symptoms of PTSD, anxiety, and depression). The associations were tested in two studies. The first study used a large sample to examine concurrent associations, and the second study used a longitudinal sample that was re-assessed after a six-month period to examine longitudinal associations. Both peer and family social support were examined using a short form of the Survey of Children's Social Support (SOCSS; Dubow & Ullman, 1989), which was created and utilized by La Greca et al. (2010). To date, La Greca et al. (2010) is the only other study in the literature that has used the short form of the SOCSS, and so a replication of the extant literature's findings regarding social support may provide some insight into the utility of this brief measure of social support.

Hypotheses of the Study

1. Higher levels of hurricane exposure would be related to lower levels of social support from peers and family.
2. Lower levels of social support from peers and family would be related to higher levels of psychological distress (i.e., PTSD, anxiety, and depression symptoms).
3. Social support would moderate the association between hurricane exposure and psychological distress.
 - a. The association between hurricane exposure and psychological distress would be stronger among youth with lower levels of peer and family social support.
 - b. The association between hurricane exposure and psychological distress would be weaker among youth with higher levels of peer and family social support.
4. Alternatively, social support would mediate the association between hurricane exposure and psychological distress.
 - a. When hurricane exposure and social support were both predictors of psychological distress, the previously significant relationship between hurricane exposure and psychological distress would be substantially reduced.

Additionally, the possibility of differential effects by age, gender, and cohort on associations among hurricane exposure, social support, and psychological distress were also examined.

Study 1

Method

Participants

Data for this study came from an existing data set collected by the Youth and Family Anxiety, Stress, and Phobia Lab at the University of New Orleans (UNO). The participants were 1209 youth aged 7 to 18 (median age = 14 years; 53% female; 90.8% African American) assessed at a single time point. All of the participants were attending schools in New Orleans neighborhoods that received massive damage and almost total flooding following Hurricane Katrina. Youth completed self-report measures to assess posttraumatic stress symptoms (PTSD-RI), anxiety and depression symptoms (modified version of the RCADS), hurricane exposure (survey of hurricane events and hurricane-related distress), major life events (LEC) and social support (SOCSS) approximately 36 to 65 months following Hurricane Katrina. Following the examination of missing data, the total number of participants for inclusion in the study was 1098.

Measures

Hurricane exposure. Hurricane Katrina exposure experiences were assessed via a survey of exposure to the hurricane and its aftermath based on the work of La Greca and colleagues (La Greca et al., 1998; Vernberg et al., 1996). The survey consists of 16 items representing disaster exposure (i.e., exposure experiences). Sample items include: “Did you get hurt during the hurricane?” “Was your home damaged badly or destroyed by the hurricane?” Respondents indicated “*Yes*” (1) or “*No*” (0) to whether they were exposed to each event. Items are summed to create an exposure events score (i.e., number of hurricane-related exposure events experienced during and after the hurricane). This and similar measures of hurricane events have been shown

to be valid indices of exposure (e.g., associated with PTSD symptoms; La Greca et al., 1996; Weems et al., 2010a [*r*s from .23 to .44]).

Major life events. A short form of the Life Events Checklist (LEC; Johnson and McCutcheon, 1980) used in previous disaster research (e.g., La Greca et al., 1996) was administered to assess intervening life events (non-disaster events) associated with psychological distress symptoms. The short form contains 14 major life events that reflect personal stressors (e.g., death of a family member or loved one; serious illness or hospitalization), as well as other major stressful events (e.g., birth of a sibling). Respondents indicated “*Yes*” (1) or “*No*” (0) to whether each event occurred following the hurricane. The items endorsed are summed to yield a total number of major life events occurring since the hurricane. The test-retest reliability of the LEC over a 2-week interval has been shown to be .72 and studies have provided support for its validity (e.g., Greenberg, Siegel, & Leitch, 1983, as cited in Weems et al., 2010a).

PTSD symptoms. Symptoms of PTSD were measured using a modified version of the Post Traumatic Stress Reaction Index for Children (PTSD-RI; Frederick, Pynoos, & Nadar, 1992). The PTSD-RI is a widely used instrument to assess posttraumatic stress reactions and thus allows for easy comparison among studies. The measure has been found to have good internal consistency (many studies report Cronbach’s alpha in the range of 0.90), convergent validity (ranging from .70 to .82 in comparison other measures assessing PTSD symptoms), and test-retest reliability (0.84; see Steinberg, Brymer, Decker, & Pynoos, 2004 for a review). The internal consistency for this study (Cronbach’s alpha = .87) was similar to reports from other studies (e.g., Moore & Varela, 2010; Vernberg et al., 1996).

As done in previous research (Hensley & Varela, 2008; Vernberg et al., 1996; La Greca et al., 1996), the PTSD-RI administered to participants in the proposed study contains 20 items,

with answer choices modified for ease of administration from the original five options to three options (*none of the time, some of the time, most of the time*; coded as 0, 2, 4 respectively) and youth were instructed to rate their symptoms in response to the Hurricane Katrina events. Total PTSD-RI scores thus range from 0 to 80. The system developed by Frederick et al. (1992) was used to classify the sample by the severity of symptoms, and includes the following categories: Doubtful (total score of 0-11), Mild (12-24), Moderate (25-39), Severe (40-59), and Very Severe (60-80).

Anxiety and depression symptoms. Symptoms of anxiety (i.e., Generalized Anxiety Disorder, Separation Anxiety Disorder, Social Phobia, and Panic Disorder) and Major Depressive Disorder were assessed using a modified version of the Revised Child Anxiety and Depression Scales (RCADS; Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000; Spence, 1997). The measure consists of 38 items that assess the symptoms of the aforementioned anxiety and depressive disorders based on the *Diagnostic and Statistical Manual of Mental Disorders-IV* (DSM-IV) criteria (American Psychological Association, 1994). Youth are asked to rate how often they experience these symptoms on a four-point scale. Possible responses consist of *Never* (1), *Sometimes* (2), *Often* (3), and *Always* (4). Weems and colleagues (2010b) reported that the modified version of the RCADS demonstrated satisfactory to good reliability for each of the anxiety and depression subscales (alphas ranged from .76 to .90 for anxiety subscales and was .85 for the depression subscale). In the current study, the internal consistency was .83 for the depression subscale and .94 for the overall anxiety subscale. The measure has additionally been demonstrated to have good convergent validity with other measures assessing youth anxiety and depression symptoms (Chorpita et al., 2000)

Social support. A short form of the Survey of Children’s Social Support (SOCSS; Dubow & Ullman, 1989) was used to assess youths’ perceived social support. This short form of the SOCSS was created and utilized by La Greca et al. (2010). Five of the measure’s items pertain to perceived family support (e.g., “Can you count on your family for help or advice when you have problems?”), and six of the items assess perceived peer support (e.g., “Do you think your friends care about you?”). La Greca and colleagues (2010) selected items from the family and peer/friend SOCSS subscales because these two sources have been reported to provide the most support for youth following disasters (Prinstein et al., 1996). The items selected from the family and peer/friend subscales were the ones with the highest factor loadings on each respective subscale (La Greca et al., 2010). Responses are rated on a five-point scale ranging from 0 (“*never*”) to 4 (“*always*”). Relevant items are averaged to calculate individual subscale scores, and all items are averaged to yield a total social support score. Dubow and Ullman (1989) found that the test-retest reliability for the total SOCSS was .74, and internal consistencies for the subscales were between .78 and .82. In the current study, the internal consistency for the peer support subscale was .71, and the internal consistency for the family support subscale was .88.

Procedures

Data collection was conducted as a part of the schools’ counseling curriculum. Parental active written informed consent for use of the data in research was obtained. Oral assent was also obtained from youth, and youth were not required to participate in the study or to complete the questionnaires. The procedures were reviewed by the UNO IRB and use of the de-identified data was approved. Participants completed the measures within a group classroom setting and were assisted by trained staff. Younger children were read the instructions and measurement

items by a staff member. Staff additionally helped individual children as necessary, consistent with previous research (La Greca et al., 1996; Vernberg et al., 1996).

Results & Discussion (Study 1)

Preliminary Analyses

Descriptive information on the events experienced during and after Hurricane Katrina (which comprised the total hurricane events variable) are below presented in Table 1.

Table 1. *Percentage of Study 1 participants experiencing events during and after Hurricane Katrina*

		<i>N</i>	<i>n</i>	% of participants
Events experienced during Hurricane Katrina	Windows or doors breaking	1078	405	37.6
	Got hurt	1080	67	6.2
	Thought I might die	1080	283	25.8
	Saw someone get hurt badly	1081	424	38.6
	Had to go outside during hurricane because building was badly damaged	1075	133	12.1
	Got hit by something falling or flying	1076	46	4.2
	Thought someone might die	1078	719	65.4
	Thought I might be badly hurt	1067	282	25.7
Events occurring after Hurricane Katrina	Home damaged or destroyed	1080	713	64.9
	Moved to a new place	1078	747	68.0
	One of parents lost job	1075	461	41.9
	Hard to see friends	1081	816	74.2
	Family had trouble getting food or water	1077	234	21.3
	Clothes or toys ruined	1080	744	67.7
Lived away from parents for week or more	1080	208	18.9	

Note. *Ns* vary due to missing data for specific items

The distribution of the PTSD severity categories for the participants was as follows: 36.5% “Doubtful”, 32.8% “Mild”, 20.2% “Moderate”, 9.3% “Severe”, and 1.3% “Very Severe”. Examination of the social support, life events, and hurricane events scores’ range and skew indicated acceptable levels for the planned analyses. PTSD, depression, and anxiety scores were somewhat positively skewed but were retained for all analyses. However, given the skew, main analyses were supplemented with identical analyses using logarithmic transformations to normalize the distributions. Additionally, the planned parametric correlational analyses were supplemented with non-parametric correlational analyses using both the non-transformed and transformed outcome variables. The parametric and non-parametric correlational analyses yielded mostly identical findings, as did the main analyses of non-transformed and transformed outcome variables. As such, the analyses of the non-transformed outcome variables are emphasized in this report with differences reported as needed in supplementary analyses.

Demographic variables were included in correlational analyses to determine which demographic variables to include in subsequent analyses (see Table 2). Gender and age were both significantly related to the outcome variables of symptoms of PTSD, depression, and anxiety. Age was negatively related to psychological distress symptoms such that older children reported fewer symptoms of distress than did younger children. One difference did emerge when the non-parametric correlational analysis using transformed outcome variables was conducted. Age was no longer significantly correlated with depression. *t*-tests indicated that girls reported more symptoms of PTSD ($M = 21.76, SD = 14.87$) than boys ($M = 15.96, SD = 13.65$), $t(1014) = -6.50, p < .001$, as well as higher levels of anxiety ($M = 20.71, SD = 14.97$ for girls; $M = 15.47, SD = 13.95$ for boys; $t(998) = -3.65, p < .001$) and depression ($M = 7.29, SD = 5.60$ for girls; $M = 6.03, SD = 5.24$ for boys; $t(991) = -5.67, p < .001$). Because of the significant relationship

between age and gender with psychological distress symptoms, these demographic variables were controlled for in subsequent regression analyses.

1. Associations between Hurricane Exposure, Social Support, and Psychological Distress

Correlational analyses were conducted to examine whether higher levels of hurricane exposure were related to lower levels of social support from peers and family (Hypothesis 1). The results are presented in Table 2. Higher levels of hurricane exposure were significantly related to lower levels of family social support, thus supporting Hypothesis 1. However, while there was a negative correlation between hurricane exposure and peer social support, the relationship was not significant.

The results of the correlational analyses were also used to examine whether lower levels of social support from peers and family were related to higher levels of psychological distress (i.e., symptoms of PTSD, anxiety, and depression) as postulated in Hypothesis 2. Social support from peers and family were both significantly negatively related to PTSD, anxiety, and depression. Regression analyses were next conducted to examine whether lower levels of peer and family social support were related to higher levels of distress while controlling for hurricane exposure, the time since Hurricane Katrina, major intervening life events, age, and gender (see Table 3). When controlling for these additional variables, peer social support was still significantly negatively associated with symptoms of PTSD, anxiety, and depression. Family social support was uniquely associated with depression, but not with PTSD or anxiety. Taken together, the results of the analyses generally supported Hypothesis 2 but with stronger effects for peer social support than family.

Table 2. Zero-Order Correlations for predictor, outcome, and demographic variables in Study 1

	1	2	3	4	5	6	7	8	9
1. Peer Social Support									
2. Family Social Support	.23**								
3. PTSD Symptoms	-.30**	-.10**							
4. Anxiety	-.34**	-.11**	.63**						
5. Depression	-.35**	-.24**	.57**	.77**					
6. Life Events	-.01	-.07*	.29**	.18**	.19**				
7. Hurricane Exposure	-.02	-.11**	.41**	.27**	.24**	.42**			
8. Age	.19**	-.14**	-.17**	-.14**	-.08**	-.01	.08**		
9. Gender	.12**	.05	.20**	.18**	.12**	< -.01	.13**	.06*	
10. Months Since Katrina	.06	-.08**	-.05	-.02	-.01	.11**	.16**	.41**	.04

Note. * $p < .05$ (2-tailed). ** $p < .01$ (2-tailed)

2. *Social Support as a Moderator Between Hurricane Exposure and Psychological Distress*

Building upon the regression analyses predicting symptoms of PTSD, anxiety, and depression noted above, additional steps were added to investigate whether social support moderated the association between hurricane exposure and psychological distress (Hypothesis 3). Prior to conducting the analyses, the variables of average hurricane events, family social support, and peer social support were centered to the mean in order to reduce the possibility of multicollinearity influencing the results. Family social support, peer social support, hurricane exposure, life events, months since Hurricane Katrina, age, and gender were entered in step 1, and two-way interactions between hurricane exposure (centered) and family social support (centered) and between hurricane exposure (centered) and peer social support (centered) were entered in step 2. The results of these analyses are also presented in Table 3. None of the interactions were significant in the parametric analyses. In the analyses of the transformed outcome variables, the pattern of findings for the outcomes of anxiety and depression remained very similar with one exception: the hurricane exposure by peer social support interaction significantly predicted PTSD symptoms ($\beta = .06, p < .05$). The interaction is depicted in Figure 1. Post hoc probing (as recommended by Holmbeck, 2002; i.e., computation of two new conditional moderator variables using separate analyses) indicated that hurricane exposure was associated with PTSD among both those with low and high peer social support; however, the association was stronger among youth with high levels of peer social support ($t(998) = 10.14, p < .001; \beta = .22$) than those with lower levels of peer social support ($t(998) = 7.77, p < .001; \beta = .29$). Post hoc probing of the interaction with hurricane events as the moderator of the relation between peer social support and PTSD symptoms was consistent with this interpretation. Peer social support had a weaker association with PTSD symptoms among youth with high hurricane

exposure ($t(998) = -5.92, p < .001, \beta = -.21$) than youth with lower hurricane exposure ($t(998) = -8.50, p < .001; \beta = -.32$). The stronger association between hurricane exposure and PTSD symptoms considered together with the weaker association between peer social support and PTSD symptoms for those with high peer social support suggests that peer social support is not buffering the effect of hurricane exposure against the development of PTSD symptoms, contrary to Hypothesis 3. Rather, high hurricane exposure level is lowering the positive effect of peer social support against the development of PTSD symptoms. However, as depicted in Figure 1, this difference was rather small.

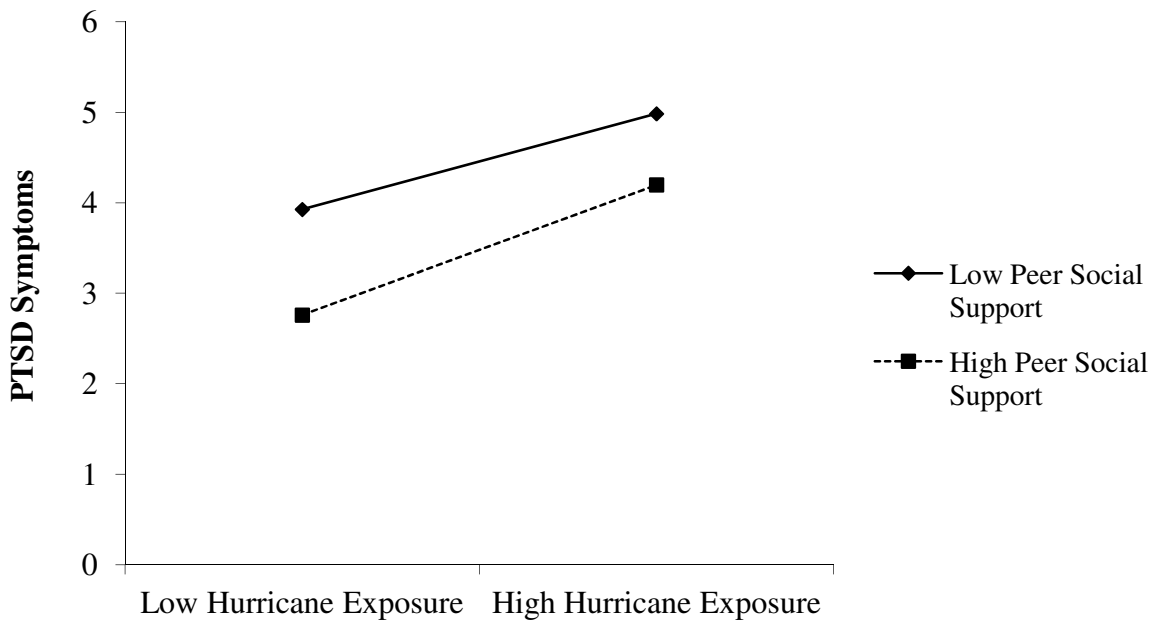


Figure 1. Interaction between hurricane exposure and peer social support predicting PTSD symptoms.

3. Alternative Explanation of Social Support as a Mediator

As can be seen in Table 2 and noted above, the first three conditions of mediation were met for the associations between hurricane exposure with psychological distress and with family

social support, and between both sources of social support with psychological distress.

However, as can be seen in Table 3 below, hurricane exposure remained a significant predictor of psychological distress while controlling for social support, so no evidence was found for mediation. Identical regression analyses were also conducted without the covariates of gender, age, months since Hurricane Katrina, and life events, and the pattern of findings remained the same. Thus, little evidence for social support mediating the hurricane exposure-psychological distress association was found.

Table 3. *Prediction of Psychological Distress Symptoms in Study 1*

Outcome		Variable	B	SE B	β	<i>t</i>
PTSD	Step 1	Gender	5.89	.78	.20	7.59**
		Age	-.84	.18	-.14	-4.84**
		Months Since Katrina	-.05	.04	.04	-1.36
		Life events	.97	.20	.14	4.95**
		Hurricane Exposure	1.45	.13	.32	10.91**
		Peer Social Support	-5.50	.53	-.29	-10.33**
		Family Social Support	.02	.39	< .01	.06
			$R^2 = .33$			
			$R^2 \Delta = .33$			
	Step 2	Peer Support x Exposure	.23	.15	.04	1.54
Family Support x Exposure		-.01	.11	< .01	-1.2	
			$R^2 = .33$			
		$R^2 \Delta = .002$				
Anxiety	Step 1	Gender	5.76	.85	.20	6.76**
		Age	-.67	.19	-.11	-3.52**
		Months Since Katrina	.00	.04	< .01	-.10
		Life events	.53	.22	.08	2.47*
		Hurricane Exposure	.98	.15	.22	6.77**
		Peer Social Support	-6.42	.58	-.33	-11.07**
		Family Social Support	-.43	.43	-.03	-1.00
			$R^2 = .24$			
			$R^2 \Delta = .24$			
	Step 2	Peer Support x Exposure	-.02	.16	< .01	-.11
Family Support x Exposure		-.10	.12	-.03	-.82	
			$R^2 = .24$			
		$R^2 \Delta = .001$				
Depression	Step 1	Gender	1.55	.32	.14	4.90**
		Age	-.16	.07	-.07	-2.23*
		Months Since Katrina	-.01	.02	-.02	-.61
		Life events	.27	.08	.11	3.37**
		Hurricane Exposure	.29	.05	.17	5.37**
		Peer Social Support	-2.26	.21	-.32	-10.55**
		Family Social Support	-.87	.16	-.16	-5.42**
			$R^2 = .24$			
			$R^2 \Delta = .24$			
	Step 2	Peer Support x Exposure	.03	.06	.02	.52
Family Support x Exposure		-.04	.04	-.03	-.96	
			$R^2 = .24$			
		$R^2 \Delta = .001$				

The full models associated with each of the interaction terms were significant, $ps < .001$. The *F* values associated with $R^2 \Delta$ were not significant. Gender was coded 1 = boy, 2 = girl.

* $p < .05$; ** $p < .01$

4. *Differential Effects by Gender, Cohort, and Age*

The above analyses were further examined by gender, cohort, and age to determine whether there were any differential effects. In the analyses examining potential gender differences, peer social support significantly predicted symptoms of PTSD, anxiety, and depression for both boys and girls. Family social support significantly predicted depression for both genders with a stronger effect for girls, $r(527) = -.321, p < .001$ than for boys, $r(447) = -.164, p < .05$ ($z = 2.59, p < .01$). The results of the analysis of the transformed outcome variable of depression yielded a slightly different finding between family social support and gender, however. While family social support was still a significant predictor of depression for girls, $r(527) = -.30, p < .001$, it was no longer significantly predictive for boys, $r(447) = -.13, p = .15$. Family social support did not significantly predict either PTSD or anxiety. None of the hurricane exposure by social support interaction terms were statistically significant for either gender. Overall, the pattern of findings was highly similar for both boys and girls.

Next, potential differences in findings among three cohorts were examined. Cohort 1 included participants whose assessment occurred approximately 36 to 40 months following Hurricane Katrina. The participants in Cohort 2 were assessed approximately 48 to 50 months post-Katrina, and Cohort 3 was assessed approximately 60 to 65 months post-Katrina. The cohorts differed in terms of hurricane exposure events reported, mean age, intervening life events reported, and level of family social support. Cohort 1 reported fewer hurricane exposure experiences and intervening major life events than Cohorts 2 and 3, and reported significantly more family social support than Cohort 3. Participants' mean age in Cohort 1 was younger than Cohorts 2 and 3, and the mean age of Cohort 2 was younger than Cohort 3. Each of the main analyses were run separately in each cohort. In general, the pattern of findings was similar across

cohorts. Peer social support significantly predicted each dimension of psychological distress (PTSD, anxiety, and depression) among each of the three cohorts. Its effect in predicting depression was stronger for Cohort 1, $r(492) = -.42, p < .001$, than for Cohort 3, $r(296) = -.27, p < .001$ ($z = -2.31, p < .05$). Family social support significantly predicted PTSD in Cohort 3, and also predicted depression in each of the three cohorts. Its effect in predicting depression was stronger for Cohort 3, $r(296) = -.32, p < .001$, than for Cohort 1, $r(492) = -.18, p = .01$ ($z = 2.03, p < .05$).

Two differences emerged among the cohorts when social support and hurricane exposure interactions were tested. One difference was that a statistically significant interaction term was obtained between peer social support and hurricane exposure in Cohort 1 for the prediction of PTSD symptoms ($\beta = .09, p < .05$). Post hoc probing of the interaction (Holmbeck, 2002) indicated that the association between hurricane exposure and PTSD symptoms was positive and significant among both those with higher levels of peer social support ($t(501) = 7.31, p < .001; \beta = .39$) and with lower levels of peer social support ($t(501) = 4.29, p < .001; \beta = .22$). The second difference was that the interaction between hurricane exposure and peer social support also significantly predicted depression in Cohort 1 ($\beta = .08, p < .05$) when tested in the analyses of transformed outcome variables. Post hoc probing indicated that, again, hurricane exposure had a stronger association with depression for youth with higher levels of peer social support ($t(492) = 4.16, p < .001; \beta = .24$) than those with low peer social support ($t(492) = 3.25, p = .001; \beta = .23$). Similar to the overall interaction between hurricane exposure and peer social support in the analyses of the transformed outcome variables, these results indicated that the association between hurricane exposure and the psychological distress indices of PTSD and depression was

stronger among those who had higher levels of peer social support. However, given the age differences across cohorts, the differential cohort effects may be confounded by age.

Thus, in the final set of analyses, differential effects by age were tested. Age was examined as a continuous moderator. Building from the regression models in Table 3, an additional third step was added with interaction terms. The variable of cohort (i.e., a measure of time since Hurricane Katrina) was added to the list of variables in Step 1, and interaction terms of age by social support and cohort by social support were added in Step 2. Three-way interactions between age, hurricane exposure, and the two sources of social support were tested for the prediction of PTSD, anxiety, and depression in Step 3, and none of the interactions were significant. A two-way interaction between peer social support and age significantly predicted symptoms of PTSD ($\beta = .06, p < .05$). Post hoc analyses showed that there was a stronger negative association between peer social support and PTSD symptoms among younger youth ($t(998) = -9.58, p < .001; \beta = -.31$) than older youth ($t(998) = -5.84, p < .001; \beta = -.25$). However, it should be noted that this interaction was not significant when tested in the analyses of the transformed outcome variables. Two-way interactions between family social support and age significantly predicted PTSD ($\beta = -.13, p < .001$), anxiety ($\beta = -.09, p < .01$), and depression ($\beta = -.09, p < .01$). Again, post hoc analyses were conducted, showing that family social support had a negative association with PTSD symptoms among older youth ($t(998) = -3.56, p < .001; \beta = -.14$), but a positive association with PTSD symptoms among younger youth ($t(998) = 3.59, p < .001; \beta = .14$). Family social support had a negative association with anxiety for older youth, ($t(967) = -2.87, p < .01; \beta = -.12$), but the association was not significant among younger youth, ($t(967) = 1.38, p = .17; \beta = .06$). A similar pattern was obtained between family social support and depression, with a significant negative association between the two among older youth,

($t(974) = -6.36, p < .001; \beta = -.26$), and a non-significant association obtained for younger youth, ($t(974) = -1.58, p = .11; \beta = -.06$).

Overall, peer and family social support were associated with lower psychological distress for older youth. Family social support, in particular, was associated with less PTSD, anxiety, and depression for older youth. Peer social support was associated with fewer PTSD symptoms among younger youth, and perhaps more strongly so than for older youth. This finding must be interpreted with some caution since the results differed between the analysis of the transformed and non-transformed outcome variables. In contrast, family social support had a positive association with PTSD symptoms for younger youth, and was not significantly associated with anxiety or depression. Further, none of the cohort by social support interactions were significant in any of the analyses examining differential effects by age, suggesting that the cohort effect may better be explained instead as a function of age.

Study 2

The purpose of Study 2 was to replicate the concurrent associations from Study 1 using a longitudinal design (i.e., to determine whether the findings hold over time to predict later distress).

Method

Participants

Data for this study came from an existing data set collected by the Youth and Family Anxiety, Stress, and Phobia Lab at UNO consisting of a longitudinal sample of youth aged 8 to 15 years (median age = 11.5 years; 55% male; 97% African American) who were assessed twice during a six-month period (further details about the sample are reported in Weems et al., 2010a).

The first assessment occurred approximately 24 months following Hurricane Katrina (Time 1), and the second assessment occurred approximately 30 months post-Katrina (Time 2). All of the participants attended a school in New Orleans that received massive damage and almost total flooding following Hurricane Katrina. The total number of participants for inclusion in the study was 192 following data cleaning and examination of missing data.

Measures

Participants completed the same measures as those in Study 1. The PTSD-RI, modified version of the RCADS, survey of hurricane events and hurricane-related distress, LEC, and SOCSS were administered at the initial assessment (Time 1). The internal consistencies of the SOCSS subscales were .66 for peers and .84 for family. Additionally, participants were re-administered the PTSD-RI and modified version of the RCADS approximately six months following the initial assessment to reassess symptoms of PTSD, anxiety, and depression (Time 2).

Procedures

The procedures for Study 2 were the same as Study 1 except that students were reassessed at Time 2 with the PTSD-RI and RCADS.

Results & Discussion (Study 2)

Preliminary Analyses

The participants in Study 2 reported similar levels of hurricane exposure experiences as those in Study 1 (see Weems et al., 2010). At Time 1, the distribution of the PTSD severity categories for the participants was as follows: 27% “Doubtful”, 32% “Mild”, 22% “Moderate”, 15% “Severe”, and 4% “Very Severe”. At Time 2, the distribution of the PTSD severity categories was: 25% “Doubtful”, 36% “Mild”, 23% “Moderate”, 13% “Severe”, and 4% “Very

Severe”. Descriptive analyses and examination of the scores’ ranges and skew indicated acceptable levels for the planned analyses. However, parametric analyses were supplemented with non-parametric correlational analyses and regression analyses were supplemented with identical analyses using logarithmic transformations to normalize the distributions. In this study, the parametric and non-parametric correlational analyses and the main analyses of both transformed and non-transformed outcome variables all yielded identical findings. Therefore, only the parametric and non-transformed variable analyses are reported.

Demographic variables were included in correlational analyses to determine which demographic variables to include in subsequent analyses (see Table 4). Age and gender were both significantly related to the Time 2 outcome variables of symptoms of PTSD, depression, and anxiety. Age was negatively related to psychological distress symptoms such that older children reported fewer symptoms of distress than did younger children. Girls reported more symptoms of PTSD ($M = 28.81, SD = 16.15$) than boys ($M = 18.25, SD = 12.51$), $t(164) = -5.02, p < .001$, as well as higher levels of anxiety ($M = 24.23, SD = 15.91$ for girls; $M = 16.73, SD = 12.76$ for boys; $t(168) = -3.57, p < .001$) and depression ($M = 8.26, SD = 5.89$ for girls; $M = 5.71, SD = 4.65$ for boys; $t(166) = -3.30, p = .001$). Age and gender were therefore controlled for in subsequent regression analyses.

Table 4. *Zero-Order Correlations for predictor, outcome, and demographic variables in Study 2*

	1	2	3	4	5	6	7	8	9	10	11
1. Peer Social Support											
2. Family Social Support	.13										
3. PTSD (T1)	-.35**	.03									
4. Anxiety (T1)	-.47**	.01	.69**								
5. Depression (T1)	-.44**	-.02	.61**	.86**							
6. PTSD (T2)	-.31**	< .01	.57**	.47**	.46**						
7. Anxiety (T2)	-.37**	-.08	.54**	.58**	.55**	.71**					
8. Depression (T2)	-.37**	-.13	.46**	.48**	.51**	.68**	.81**				
9. Life Events	-.22**	-.07	.35**	.25**	.22**	.28**	.18*	.19**			
10. Hurricane Exposure	-.15*	.04	.48**	.37**	.31**	.43**	.34**	.29**	.42**		
11. Age	.21**	-.07	-.22**	-.12	-.10	-.33**	-.21**	-.15*	-.16*	-.14*	
12. Gender	.06	.16*	.35**	.28**	.22**	.35**	.25**	.24**	.07	.26**	-.07

Note. * $p < .05$ (2-tailed). ** $p < .01$ (2-tailed); T1 = Time 1, T2 = Time 2.

1. *Associations between Hurricane Exposure, Social Support, and Psychological Distress*

Correlational analyses were used to examine whether higher levels of hurricane exposure were related to lower levels of peer and family social support at the Time 1 assessment (Hypothesis 1). Results are shown in Table 4. There was a significant negative correlation between hurricane exposure and peer social support, thus supporting the hypothesis. However, the correlation between exposure and family social support was not significant.

Next, the association between social support and psychological distress was examined to determine whether lower levels of peer and family social support (assessed at Time 1) were related to higher levels of psychological distress at both Time 1 and Time 2 (Hypothesis 2). Social support from peers was significantly negatively related to both Time 1 and Time 2 symptoms of PTSD, anxiety, and depression. In contrast, family social support was not significantly related to PTSD, anxiety, or depression at Time 1 or Time 2.

Regression analyses were then conducted to examine whether lower levels of social support were associated with higher Time 2 psychological distress while controlling for hurricane exposure, major life events, Time 1 psychological distress, age, and gender (see Table 5). Results showed that peer social support was significantly predictive of lower depression at Time 2, and that family social support was again not significantly related to PTSD, anxiety, or depression at Time 2 while controlling for the additional variables.

2. *Social Support as a Moderator Between Hurricane Exposure and Psychological Distress*

Similar to study 1, hierarchical regression analyses were used to examine whether social support moderated the association between hurricane exposure and Time 2 psychological distress (Hypothesis 3). Three separate hierarchical regressions were conducted with the outcome variables of PTSD, anxiety, and depression. The variables of gender, age, life events, hurricane

exposure, Time 1 psychological distress, peer social support, and family social support were entered in step 1, and two-way interactions between hurricane exposure (centered) and the two sources of social support (both centered) were entered in step 2. The results of these analyses are also presented in Table 5. None of the interactions were significant, indicating that social support did not moderate the association between hurricane exposure and Time 2 psychological distress and thus the hypothesis was not supported.

3. Alternative Explanation of Social Support as a Mediator

Both peer and family social support were examined as mediators between hurricane exposure and Time 2 psychological distress. As noted above and seen in Table 4, hurricane exposure was associated with PTSD, anxiety, and depression (condition 1 of mediation), and was also associated with peer social support (condition 2). Peer social support was associated with PTSD, anxiety, and depression at Time 2 (condition 3). Hurricane exposure remained a significant predictor of PTSD symptoms while controlling for social support, but was no longer a significant predictor of anxiety and depression (condition 4; see Table 5, below). Therefore, Sobel tests were conducted to determine whether peer social support carried a significant proportion of the variance in predicting anxiety and depression (i.e., whether it had a significant indirect effect on anxiety and depression). Sobel test results showed that peer social support did not have a significant indirect effect on anxiety (Sobel test statistic = 1.20, $SE = .07$, $p = .23$) or depression (Sobel test statistic = 1.59, $SE = .03$, $p = .11$). Therefore, there was little evidence for social support mediating the hurricane exposure-psychological distress association. The non-significant relationship between hurricane exposure and the outcomes of anxiety and depression when controlling for social support is likely due to the influence of the additional covariates

(gender, age, life events, and Time 1 psychological distress) that were included in the regression analyses.

Table 5. *Prediction of Time 2 Psychological Distress Symptoms in Study 2*

Outcome		Variable	B	SE B	β	<i>t</i>
PTSD	Step 1	Gender	5.35	1.90	.18	2.82**
		Age	-1.88	.54	-.20	-3.45**
		Life events	.25	.50	.03	.51
		Hurricane Exposure	.89	.37	.17	2.44**
		PTSD Time 1	.31	.07	.34	4.72**
	Step 2	Peer Social Support	-2.28	1.19	-.12	-1.92
		Family Social Support	-.42	1.01	-.02	-.41
		$R^2 = .42$				
		$R^2 \Delta = .44$				
		Peer Support x Exposure	-.28	.33	-.05	-.85
Anxiety	Step 1	Family Support x Exposure	.34	.38	.05	.90
		$R^2 = .44$				
		$R^2 \Delta = .01$				
		Gender	3.31	2.05	.11	1.61
		Age	-.90	.60	-.09	-1.46
	Step 2	Life events	-.09	.55	-.01	-.16
		Hurricane Exposure	.67	.39	.13	1.72
		Anxiety Time 1	.38	.07	.44	5.64**
		Peer Social Support	-2.06	1.42	-.11	-1.45
		Family Social Support	-1.55	1.11	-.09	-1.40
Depression	Step 1	$R^2 = .39$				
		$R^2 \Delta = .36$				
		Peer Support x Exposure	-.15	.35	-.03	-.43
		Family Support x Exposure	-.61	.43	-.09	-1.42
		$R^2 = .40$				
	Step 2	$R^2 \Delta = .01$				
		Gender	1.73	.75	.16	2.30*
		Age	-.20	.22	-.06	-.92
		Life events	.10	.20	.03	.47
		Hurricane Exposure	.15	.14	.08	1.03
Step 1	Depression Time 1	.32	.07	.37	4.86**	
	Peer Social Support	-1.19	.51	-.18	-2.36*	
	Family Social Support	-.76	.41	-.12	-1.84	
	$R^2 = .34$					
	$R^2 \Delta = .34$					
Step 2	Peer Support x Exposure	.01	.13	.01	.09	
	Family Support x Exposure	-.11	.16	-.04	-.66	
	$R^2 = .34$					
		$R^2 \Delta = .002$				

The full models associated with each of the interaction terms were significant, $ps < .001$. The *F* values associated with $R^2 \Delta$ were not significant. Gender was coded 1 = boy, 2 = girl.

* $p < .05$; ** $p < .01$

General discussion

Given that there are potentially complex pathways to psychological outcomes following a hurricane (Compas, Hinden, & Gerhardt, 1995; Kronenberg et al., 2010), the aim of this study was to examine social support's association with hurricane exposure and psychological distress, as social support may fulfill the basic need of social relatedness and thereby promote resilience following disasters. The present study explored both concurrent and longitudinal associations between social support and psychological distress among youth who experienced Hurricane Katrina, and makes a number of important contributions to the literature.

The study increments our existing knowledge of the role of social support in youth's emotional functioning following a natural disaster. As expected, lower social support was associated with higher psychological distress (i.e., PTSD, anxiety, and depression) when examined concurrently. This is consistent with findings from previous studies and adds to the literature demonstrating the protective nature of peer and family social support following hurricanes (e.g., Hardin et al., 1994; Jaycox et al., 2010; La Greca et al., 1996; La Greca et al., 2010; Pina et al., 2008; Self-Brown et al., 2013). Additionally, there was an association between lower social support and higher psychological distress longitudinally. This finding is similar to the results from the few studies that have examined this (Jaycox et al., 2010; La Greca et al., 1996; La Greca et al., 2010) and furthers our understanding of the longitudinal association between social support and psychological distress.

There were variations between the two sources of social support and their associations with psychological distress in the main analyses. Overall, peer social support demonstrated more frequent protective associations with psychological distress outcomes than did family social support. Specifically, those participants who reported higher levels of peer social support had

lower levels of PTSD, anxiety, and depression in the cross-sectional sample, and these associations held while controlling for factors that may affect distress such as major life events. Longitudinally, higher peer social support was also associated with lower PTSD, anxiety, and depression, and remained uniquely associated with lower depression even while controlling for additional factors such as major life events and distress reported at the initial assessment. These findings are similar to previous studies that have shown peer social support to be associated with lower PTSD, anxiety, and depression among hurricane-exposed youth (La Greca et al., 2010; Pina et al., 2008; Self-Brown et al., 2013). The results point to the importance of peer support following a natural disaster, and indeed friends have been found to be significant sources of coping assistance for youth following a hurricane (Prinstein et al., 1996). However, the findings from this study suggest the protective effects of peer social support may be negatively impacted by high hurricane exposure. That is, the effect of high hurricane exposure may overwhelm the benefit of peer social support against the development of PTSD symptoms for some youth. To date, this is the first identified study to show a conditional association between the protective nature of higher social support with lower PTSD symptoms based upon hurricane exposure. However, it should be noted that this finding emerged following the transformation of PTSD symptoms to normalize the distribution, and therefore should be interpreted with some caution. Further research is needed to determine whether this finding is reliable. Higher family social support was related to lower PTSD, anxiety, and depression when examined concurrently and remained associated with lower depression while controlling for additional factors including major life events. Similarly, the findings from other studies have shown that family social support is associated with lower distress post-hurricane (Jaycox et al., 2010; La Greca et al., 1996).

There are a number of possible explanations for these variations among peer and family social support as significant predictors of psychological distress symptoms. For example, peer relationships become more salient across the developmental age range of the youth in these two samples (ages 8 to 18), and so youth may have turned to peers more so than family for assistance in coping and decreasing isolation following the hurricane (e.g., Pynoos & Nader, 1988; Vernberg & Vogel, 1993). Another possible explanation is that family social support may have played less of a role in psychological distress outcomes because the amount of social support that family members are able to provide which could protect youth from the effects of the traumatic exposure may have been affected due to the fact that hurricanes tend to impact the entire family (La Greca et al., 1996). Despite the variations between the source of social support and distress outcomes, as researchers have previously noted, multiple sources of social support both are important and fulfill youths' varied needs of support (Compas & Epping, 1993; Vernberg et al., 1996; Wilcox & Vernberg, 1985). Overall, it appears that both peer and family social support may contribute to better mental health outcomes following a hurricane, which points to the importance of bolstering social support from these sources following a natural disaster.

The results of the present study additionally inform us about the nature of social support's association with anxiety and depression, two outcomes that have been studied less frequently than PTSD in the extant literature in relation to hurricane exposure and social support. Social support from peers and family were both related to anxiety and depression, demonstrating associations concurrently and longitudinally. These findings were expected given prior research on social support and PTSD following a hurricane (e.g., Vernberg et al., 1996, La Greca et al., 2010), and also contribute to the literature that has found associations between higher social

support and lower anxiety and depression among hurricane-exposed youth (Hardin et al., 1994; Pina et al., 2008).

Some noteworthy findings emerged following the examination of differential effects by gender and age. Overall, girls reported higher rates of anxiety, depression, and PTSD than boys. These findings add to the literature demonstrating higher reports of anxiety and depression by girls post-hurricane (e.g., Hardin et al., 1994; Kronenberg et al., 2010) and are consistent with previous findings in the literature that girls exhibit higher rates of post-hurricane PTSD (e.g., La Greca et al., 2010; Kronenberg et al., 2010; Weems et al., 2007 a, b; Vernberg et al., 1996). However, social support did show a protective effect against psychological distress for both genders. Higher peer support was associated with lower PTSD, anxiety, and depression for boys and girls. Higher family social support was associated with lower depression for both genders, although this effect was stronger for girls than boys. While speculative, since girls reported higher levels of depression than did boys and family social support predicted lower depression for girls, this may point to the importance of family social support following a natural disaster in the development of depression among girls.

In terms of age, there were variations among reported psychological distress and associations with social support. Peer social support was associated with lower PTSD symptoms for both older and younger youth. This negative association may have been stronger for younger youth, although this finding is somewhat tentative given that it did not hold in the analyses of transformed outcome variables. Family social support functioned differently between younger and older youth in the prediction of distress. Among younger youth, higher levels of family social support were associated with higher levels of PTSD symptoms, whereas higher levels of family social support among older youth were associated with lower levels of PTSD, anxiety,

and depression. While these findings may suggest that family social support was protective for older youth, they may also indicate that younger youth are more vulnerable to the effects of a disaster as some researchers have suggested (Kronenberg et al., 2010; Osofsky, 2004; Weems et al., 2010a). Indeed, results showed that, in general, younger youth reported higher levels of PTSD, anxiety, and depression than older youth, and some evidence from prior studies examining post-disaster psychological distress support these findings (e.g., Giannopoulou et al., 2006; Kronenberg et al., 2010; Lonigan et al., 1994; McDermott & Palmer, 2002; Osofsky et al., 2009).

It is also possible that younger youth had caregivers who experienced higher rates of distress which, in turn, affected youths' distress. There is evidence to suggest that hurricane-exposed youth whose mothers report higher levels of distress post-hurricane (including PTSD and depression symptoms) tend to report higher levels of distress, including PTSD and depression (Scheeringa & Zeanah, 2008). Additionally, maternal care has been found to have measurable effects on stress reactivity (i.e., susceptibility to anxiety disorders) in animal models (e.g., Meaney, 2001; Parker, Buckmaster, Sundlass, Schatzberg, & Lyons, 2006) and the evidence suggests this is true for humans as well (e.g., Bernard & Dozier, 2010). While speculative, it is possible that the younger youth in this sample were more susceptible to developing psychological distress due to environmental factors such as maternal care. Social support was examined as both a moderator and a mediator between hurricane exposure and psychological distress. The predicted buffering (moderating) effect was not found in this study. This finding is similar to Moore and Varela's (2010) finding that social support does not moderate the hurricane exposure-PTSD distress association, and further extends the examination by including anxiety and depression as outcomes. In contrast, La Greca et al. (2010) did find

that peer social support moderated the association between hurricane exposure and PTSD symptoms in the same manner hypothesized in this study. One notable difference between these three studies that have examined social support as a moderator is the variation in assessment times. That is, both this study and the one by Moore and Varela (2010) included assessments of youth occurring at least 24 months post-disaster, whereas the study by La Greca et al. (2010) assessed youth 9 months post-hurricane when moderation was found. This potentially could be a factor in the inconsistent results, as youth may have reported different levels of psychological distress and even hurricane exposure if they were assessed at a time more proximal to the disaster. However, this is speculative and would have to be tested in future research. Social support was examined as a mediator as an alternative explanation of the association between hurricane exposure and psychological distress, and there was little to no evidence to support a mediating relationship.

As predicted, hurricane exposure was related to lower levels of social support. This finding is similar to the results from other studies of youth post-disaster (e.g., La Greca et al., 2010; Vernberg et al., 1996), and makes theoretical sense because disasters may disrupt social support networks through mechanisms such as family separation and difficulty maintaining peer connections, which may serve to confer risk by altering an individual's sources of social support that satisfy the need of social relatedness (Weems & Overstreet, 2009). A possible direction for future research would be to examine youth's pre-disaster levels of social support, as this could provide further information concerning the disruption to support networks following a hurricane and also how pre-disaster support levels may be related to psychological distress outcomes. Hurricane exposure was also a risk factor for the development of psychological distress. Higher levels of hurricane exposure were associated with greater PTSD, anxiety, and depression in the

cross-sectional sample, and predicted higher PTSD symptoms longitudinally. These findings provide further evidence that the number and intensity of hurricane events experienced is related to distress such as has been shown in previous research (e.g., La Greca et al., 1998; Weems et al., 2007a). The results are also consistent with theory suggesting that negative effects to mental health may follow a natural disaster because of the associated threat to the satisfaction of basic human needs and goals (Sandler, 2001; Weems & Overstreet, 2009).

Finally, the measure of social support used in this study, the short form of the Survey of Children's Social Support, has only been used in one other study to date (La Greca et al., 2010). The findings from this study concerning the associations between social support and psychological distress are similar to those that have been found in past research. For example, the finding that lower peer social support was associated with higher psychological distress has been shown by previous research (La Greca et al., 2010; Pina et al., 2008; Self-Brown et al., 2013), and the finding that lower family social support was associated with higher psychological distress has also been demonstrated in past research (Jaycox et al., 2010; La Greca et al., 1996). Additionally, the measure's internal consistencies in the present study for the most part ranged from acceptable to good (Cronbach's $\alpha = .71$ to $.88$). The internal consistency for the peer social support subscale was somewhat lower (Cronbach's $\alpha = .66$) in Study 2, however. Although speculative, perhaps the inclusion of an item assessing support from classmates within the peer support scale contributed to the lower internal consistency. However, as previously noted, Dubow and Ullman (1989) did not find that youth distinguished between the friend and classmate support items when completing their measure of social support (the Survey of Children's Social Support). Overall, while further study is needed, the findings from the present study are similar to those of previous post-disaster social support research, suggesting that this

short form of the SOCSS is measuring the intended constructs of peer and family social support and that the measure shows promise as a valid measure of social support.

This study's contributions to the existing literature must be considered in light of its limitations. First, the study is limited by the fact that youth completed self-report measures to assess symptoms. It is possible that other sources such as parents or teachers would have provided different reports of youths' levels of psychological distress. Future research that incorporates information from multiple sources (e.g., youth, parents, and teachers) could be an informative and important next step. Second, the measure of social support used in this study has not been validated, and so this study's findings should be considered in terms of this limitation. Additionally, the cross-sectional nature of the data in Study 1 does not allow for causal inferences to be made. This limitation should be noted for Study 2 as well. While it is possible to infer predictive associations for the prediction of Time 2 psychological distress, one cannot conclude that any of the variables caused these outcomes. In both studies, there could be additional variables that were not examined that could be affecting the findings. Finally, the youth in both samples were predominantly minority youth and were recruited from the community. Thus, these results may not generalize to other ethnicities or to clinical populations.

Despite these limitations, the present study makes a number of contributions to the literature by furthering our understanding of post-hurricane social support in relation to psychological distress outcomes. The results suggest that youth are experiencing symptoms of PTSD, anxiety, and depression even long after the experience of a hurricane, and that both peer and family social support may play a protective role following a hurricane due to their associations with lower psychological distress. Given the potential for negative mental health outcomes such as symptoms of PTSD, anxiety, and depression following natural disasters such

as a hurricane, efforts to enhance youths' social support to the extent possible through mechanisms such as interventions may be especially important.

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