

The Role of Peer Deviance and Social Support in the Development of Symptoms of Internalizing Disorders among Youth Exposed to Hurricane Georges

By

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### Abstract

Adolescents exposed to hurricanes may be at risk to develop symptoms of internalizing disorders. The impact of hurricane exposure on peer systems may contribute to the emergence of symptoms of internalizing disorders. This study examined the influence of peer system variables in the development of internalizing disorder symptoms in adolescents exposed to Hurricane Georges. Participants included 905 youth (52.6% males) ages 11-17 residing in Puerto Rico. Hurricane exposure predicted lower social support from friends ( $\beta = -.10, p = .005$ ). An interaction between age and hurricane exposure predicted peer substance use ( $\beta = -.08, p = .01$ ). Hurricane exposure, peer violence, and peer substance use also predicted whether adolescents met criteria for symptoms of internalizing disorders. With the increasing role peers play in children's lives as they develop into adolescence, understanding peers influence on the development of internalizing symptoms following hurricane exposure may assist in planning developmentally sensitive response plans.

## The Role of Peer Deviance and Social Support in the Development of Symptoms of Internalizing Disorders among Youth Exposed to Hurricane Georges

In 1998, Hurricane Georges struck land across the Caribbean and southeast United States. Puerto Rico suffered over \$2 billion in damages from the hurricane (National Climatic Data Center, 1999). Over 30,000 homes were destroyed, nine people died from direct or indirect events related to the hurricane, and a large portion of major crops (e.g., coffee, plantains, and chickens) were destroyed (National Climatic Data Center, 1999). According to the Centers for Disease Control and Prevention (1998), reports from Puerto Rico two days following the storm found that approximately 700,000 people did not have access to water and over 1 million people lost their electricity.

Exposure to disasters such as Hurricane Georges can cause many disruptions in the lives of those who survive. For instance, children and adolescents may have a decrease in school attendance or have to move to a new home or neighborhood due to the destructive effects caused by a disaster (Silverman & La Greca, 2002). Social support systems may also weaken following disasters (Silverman & La Greca, 2002). For example, families that have to move due to destruction to their home or job loss may leave behind their support network. Also, caretakers may have to focus on rebuilding the lives of their families rather than providing support to their children (Silverman & La Greca, 2002). Gaining a better understanding of the emergence of mental health symptoms following disaster exposure, as well as factors that may contribute to these responses, may inform the development of disaster intervention models. This study examined the role of peers in the development of symptoms of internalizing disorders in youth exposed to Hurricane Georges.

## **Internalizing Symptoms Following Hurricane Exposure**

For many children and adolescents, hurricane exposure can be, or seem to be, life-threatening, as it may include experiencing threats to one's own life and the lives of others, intense fear, loss of family members or friends, and destruction to property. Given the traumatic nature of these types of threat and loss experiences, and the resulting stress responses to these experiences (Vogel & Vernberg, 1993), many studies have found a relationship between hurricane exposure and post-traumatic stress disorder (PTSD; Blaze & Shwalb, 2009; Goenjian et al., 2001; La Greca, Silverman, Vernberg, & Prinstein, 1996; 2010; Vernberg, La Greca, Silverman, & Prinstein, 1996). Among studies of the development of PTSD symptoms following a hurricane, increased exposure to hurricane-related traumatic events, such as injuries and destruction to homes, has been shown to relate to increased levels of PTSD symptoms among children (Goenjian et al., 2001; Lonigan, Shannon, Finch, Daugherty, & Taylor, 1991; Vernberg et al., 1996). For example, Goenjian and colleagues (2001) found that increased exposure to hurricane-related trauma led to increased reports of PTSD symptoms in adolescents six months after the storm. Other studies have found that PTSD symptoms are maintained several months or more after exposure to a hurricane, especially when there are ongoing disruptions such as relocation, living in damaged or crowded housing, and economic strain (La Greca et al., 1996). In a study of 3<sup>rd</sup>-5<sup>th</sup> graders exposed to Hurricane Andrew, 29.8% reported severe or very severe levels of PTSD symptoms three months after the storm, 18.1% after seven months, and 12.5% after ten months (La Greca et al., 1996).

Children and adolescents' responses following exposure to a disaster may also include intense fears, sadness, and anxiety about separating from parents (Vogel & Vernberg, 1993),

which could represent symptoms of other types of internalizing disorders, such as separation anxiety disorder, panic disorder, or depressive disorders. Studies of other disasters, such as terrorism, earthquakes, and tsunamis, have found symptoms of PTSD as well as other internalizing disorders, such as separation anxiety and depression, in children in the aftermath of the event (Hoven et al., 2005; Liu et al., 2011; Thienkrua et al., 2006). Within the hurricane exposure literature, less is known about symptoms of internalizing disorders other than PTSD. However, a recent study of Hurricane Katrina survivors found a significant relationship between hurricane exposure and panic symptoms (Hensley-Maloney & Varela, 2009). Another study found that children with increased exposure to Hurricane Mitch reported higher levels of depressive symptoms (Goenjian et al., 2001).

Demographic characteristics, such as age and gender, may influence the relationship between hurricane exposure and the development of symptoms of internalizing disorders. In general, adolescent girls are more likely than boys to report symptoms of anxiety and depression (Lewisohn et al., 1994; Lewinsohn, Gotlib, Lewinsohn, Seeley, & Allen, 1998). In addition, this gender difference may increase during middle to late adolescence (Lewisohn et al., 1998). A gender difference in symptoms of PTSD has also been found in the aftermath of a disaster among elementary school-age children. For instance, girls have been shown to report more PTSD symptoms than boys following hurricane exposure (Vernberg et al., 1996); however, it is unclear if this is due to actual responses or willingness to report symptoms of PTSD (Goenjian et al., 2001). It may be that adolescent females, who are already at an increased risk of developing symptoms of an internalizing disorder, may be more likely to develop symptoms of an internalizing disorder following disaster exposure, and this gender difference may increase from early to late adolescence. Thus, it is important to consider age and gender when evaluating the

relation between hurricane exposure and the development of symptoms of internalizing disorders.

Few prior studies within the disaster literature have been able to use validated diagnostic interviews with parents and adolescents to assess for clinical disorders (Bonanno, Brewin, Kaniasty, & La Greca, 2010), relying instead on self-report on questionnaires administered in various settings, including schools. In addition, many studies on the effects of disaster have used convenience samples rather than representative samples, which may result in an overestimation of the rate of psychopathology (Bonanno et al., 2010). Given these methodological limitations, the current study contributes by using individually-administered diagnostic interviews with adolescents and their parents to measure symptoms of internalizing disorders and by using a probability sample that represents the general population.

### **Social Support from Friends in Post-Hurricane Environment**

In addition to understanding the direct mental health effects of hurricane exposure, it is important to consider social resources that may influence adolescent's post-disaster responses. Social support from friends is one social resource that may shape adolescents' responses to hurricanes. Social support, in general, is a resource used to cope during stressful times and includes the belief that people close to someone are there to provide love as well as be caring and understanding (Thoits, 1995). Social support from friends may help to normalize an adolescent's emotional reactions and interpretations of the experience and may provide a sense that normal activity is resuming (Vernberg & Vogel, 1993).

There is some evidence that social support from friends and classmates may protect elementary school-age children from developing persistent PTSD symptoms (La Greca et al., 1996; Moore & Varela, 2010; Pina et al., 2008; Vernberg et al., 1996). Following Hurricane

Andrew, lower social support from classmates and close friends was associated with higher levels of PTSD symptoms (Vernberg et al., 1996). Similarly, Moore and Varela (2010) found a significant relationship between increased classmate support and fewer PTSD symptoms following Hurricane Katrina. Various post-hurricane events, such as forced residential relocation and a change in schools, may interrupt access to friends who provide social support.

Less is known about the role of social support from friends in the development of a broader range of symptoms of internalizing disorders in adolescents following hurricane exposure. In a study of adults exposed to Hurricane Katrina, people who reported more social support from family, friends, and physicians endorsed fewer symptoms of anxiety, depression, and somatization (Weems et al., 2007). For adolescents exposed to other stressful life events, such as community violence, a decrease in peer support over time was associated with increased reports of internalizing symptoms (Rosario, Salzinger, Feldman, & Ng-Mak, 2007).

Friends may be an increasingly important source of social support over the course of adolescence. While younger children tend to rely more on their parents for support after exposure to trauma (Vernberg & Varela, 2001), adolescents may turn more to their friends in stressful moments. Additionally, there may be gender differences with regards to social support from friends; adolescent girls report having more support from close friends than boys (Rueger, Malecki, & Demaray, 2008), and they may perceive more satisfaction with life if they have more friends who are caring (Piko & Hamvai, 2010). Understanding how social support from friends might be related to symptoms of internalizing disorders following exposure to hurricanes may assist in planning developmentally sensitive response plans. Again, it is important to evaluate how gender and age may influence social support from friends in relation to hurricane exposure and mental health outcomes.

## **Deviant Behaviors of Friends**

Research has yielded some evidence that hurricane exposure is related to increases in deviant behaviors in youth, such as substance use and aggression, even when taking into account pre-hurricane behavior (Khoury et al., 1997; Rohrbach, Grana, Vernberg, Sussman, & Sun, 2009). For example, among middle school children exposed to Hurricane Andrew, hurricane-related stress level was significantly related to post-hurricane minor deviant behavior, such as aggression and stealing, after controlling for pre-hurricane deviant behavior (Khoury et al., 1997). In addition, a study conducted following Hurricane Katrina found that increased PTS symptoms in adolescents was significantly related to increased reports of their involvement of adolescent delinquency, demonstrating a possible link between disaster exposure, deviant behavior, and internalizing symptoms (Rowe, La Greca, & Alexandersson, 2010). Deviant behaviors, such as substance use and aggression, tend to increase from early to late adolescence, and involvement in these behaviors by close friends appears to be one factor that affects this increase (Moffitt, 1993).

Relatively little is known about the influence of hurricane exposure on involvement with friends who use substances or act aggressively, or how these two factors may together play a role in the development of mental health symptoms following hurricane exposure. However, youth exposed to other stressful life events that disrupt an adolescent's sense of safety and well-being, such as community violence and maltreatment, may be more likely to associate with deviant peers (Patchin, Huebner, McCluskey, Varano, & Bynum, 2006) or violent gangs (Thompson & Braaten-Antrim, 1998). Following disasters, adolescents may experience limited parental supervision or diminished parental support for youth as parents work to rebuild their lives and to cope with the aftermath themselves (Silverman & La Greca, 2002). Studies following Hurricane

Andrew showed that increased exposure to hurricane-related events was negatively correlated with social support from parents (La Greca et al., 1996; Vernberg et al., 1996). Furthermore, Frauenglass and colleagues (1997) found lower levels of substance use in adolescents who had increased family support even when there were high levels of reported peer substance use.

Adolescents exposed to disasters may begin to associate with friends who use substances and act aggressively if they feel a lost sense of safety and belonging due to disaster-related disruptions in their life. Studies of gang involvement have shown an increased sense of protection among gang members, even though they may be at an increased risk of victimization (Melde, Taylor, & Esbensen, 2009). Youth may feel more inclined to associate with deviant peers if they do not feel they are being supervised or supported by their parents, or if they feel an inadequate sense of safety following disaster-related disruption.

In addition to this potential of associating with deviant peers following disaster exposure, associating with deviant peers has been shown to relate to symptoms of both internalizing and externalizing disorders (Fanti & Henrich, 2010; Fite, Vitulano, Wynn, Wimsatt, Gaertner, & Rathert, 2010; Laird, Jordan, Dodge, Pettit, & Bates, 2001; Miller, Loeber, & Hipwell, 2009; Ward, Martin, Theron, & Distiller, 2007; Mason, Hitch, & Spoth, 2009). For instance, a study of South African children exposed to violence found that peer delinquency, which included items such as smoking and being out without parent permission, was significantly associated with increased depression and conduct problems (Ward et al., 2007). Mason et al. (2009) found an association between peer deviance and negative affect in a sample of 18-year-olds from a rural community. Thus, it is important to explore whether exposure to a hurricane, such as Hurricane Georges, may lead to increased associations with deviant peers, as this may increase understanding of the role of social factors in adolescents' post-disaster recovery.

## **Present Study and Research Questions**

Hurricane exposure may increase an adolescents' risk for developing symptoms of internalizing disorders in several ways. The initial life threat and loss experienced during a disaster may lead to the emergence of a range of internalizing symptoms. In addition, the disruptions of the social environment may lead to less access to close friends, which may make adolescents more vulnerable to the emergence of internalizing symptoms over time and may increase their potential for involvement with friends who engage in these behaviors, such as substance use and violence. This study aims to explore the role of hurricane exposure and peer influences, including peer support and peer deviance, in the development of internalizing symptoms in adolescents exposed to Hurricane Georges. Understanding factors within the peer social environment of youth following a major disaster may improve knowledge of adolescents' responses to these events.

Data come from an epidemiological study of children and adolescents conducted in Puerto Rico following Hurricane Georges. Prior literature from this database has examined the rates of disorders among the entire sample of participants (Canino et al., 2004) as well as a longitudinal examination of internalizing and externalizing disorders in relation to hurricane exposure, with age comparisons among older (11-18 years old) and younger (4-10 years old) participants (Felix et al., 2011). However, an examination of hurricane exposure and mental health disorders among adolescents in relation to social support from friends and peer deviance has not yet been conducted. This study has several aims. The first is to examine hurricane exposure in predicting social support from friends, peer deviance, and symptoms of internalizing disorders. The second aim is to examine how peer system variables may be related to symptoms of internalizing disorders. The third aim is to examine the relationship between hurricane

exposure and the peer variables in predicting symptoms of internalizing disorders. Several hypotheses are examined: a) Youth who are exposed to more hurricane-related experiences will report less social support from friends and greater involvement with peers who behave aggressively and use illicit substances, and higher rates of symptoms of internalizing disorders; b) Lower levels of social support from friends and greater involvement with deviant peers will be associated with the presence of symptoms of an internalizing disorder; c) The relationship between hurricane-related trauma and symptoms of internalizing disorders will be moderated by social support from friends and involvement with deviant peers. Gender and age effects will also be considered in the analysis of this adolescent sample.

## **Methods**

### **Participants**

Participants for this study include 905 adolescents, ages 11-17, and their primary caretakers. These participants were part of an epidemiological study designed to provide data on prevalence rates of DSM-IV diagnoses among children and adolescents in a representative community sample in Puerto Rico (Canino et al., 2004). The original sample was selected through a random sampling of clusters of families with at least one child between the ages of 4-17 using block groups based on US Census Bureau's 1990 Census of Puerto Rico. Clusters were established based on economic level and size, and then urban versus rural. One child from each household was randomly selected to participate. A total of 1,886 caretaker-child dyads completed the interview, out of a total of 2,102 eligible families. A more detailed description of recruitment and enrollment for the entire sample can be found elsewhere (Canino et al., 2004).

This study includes 911 adolescents and their caretakers from the original sample; youth under the age of 11 were not asked questions on peer deviance and were therefore excluded from

this analysis. Six adolescents were dropped from this subset because they endorsed “don’t know” on most items of the deviant peer behaviors questionnaire, leaving a total of 905 participants for this study. The final set of participants in the analyses included 476 boys and 429 girls with a mean age of 14.17 (SD = 1.97; range = 11-18). The primary caretaker (89.4% mother) of each participant was determined based on who had regular and close contact with the child for the longest period of time in the past six months and who was at least 18 years old. Caretakers provided written consent and adolescents provided written assent. This study was approved by the Institutional Review Board of the University of Puerto Rico.

### **Procedures**

Community-based interviews were conducted with the participating adolescents and their primary caretaker between September 1999 and December 2000, approximately 12-27 months following the hurricane. Different interviewers conducted the parent and adolescent interviews, and the interviewers could not see the results of the corresponding interview for each dyad. Interviews were audio taped and quality control was conducted on 15% of the tapes of the entire sample.

### **Measures**

**Hurricane exposure questionnaire.** Hurricane exposure was reported independently by caretakers and adolescents. Exposure items were drawn from a questionnaire used in a study conducted in Puerto Rico following exposure to a mud slide disaster (Bravo, Rubio-Stipec, Canino, Woodbury, & Ribera, 1990), a hurricane exposure questionnaire used in North Carolina (Norris & Kaniasty, 1992), and a hurricane exposure questionnaire developed by Vernberg et al. (1996). The caretaker version of the interview included 15 yes/no items assessing the extent of the damage to their home and belongings. The youth version included 5 yes/no items All of the

questions asked to adolescent participants overlapped with questions asked to caretakers (Items from parent and adolescent questionnaires are listed in the Appendix).

Items assessing hurricane exposure examined the adolescents' and family's exposure both during and in the aftermath of the hurricane. Parents and youth were both asked about items assessing for threat to life (e.g., physical injury to adolescent or someone close to the adolescent; death of someone close to the adolescent) and loss of material objects (e.g., loss of clothing, books, toys). Parents were also asked about disruption to the adolescent's daily activity (e.g., separation from family during the hurricane; spending nights outside the house due to the hurricane), loss or damage to the home (e.g., did trees fall on your house; did you lose your house), and their own hurricane exposure (e.g., fear of dying or getting injured; getting sick during hurricane). A sum of experiences reported by the parent and youth was used to create a continuous measure of exposure, because increased levels of exposure has been found to relate to increased mental health symptom levels (e.g., Vernberg et al., 1996). Experiences reported by either the adolescent or the caretaker, or both, were included in the sum total.

**Diagnostic Interview Schedule for Children (DISC-IV).** DSM-IV psychiatric disorders in the past year were assessed through caretaker and youth interviews using the most recent version of the DISC-IV translated into Spanish (Bravo et al., 2001; Bravo, Woodbury-Farina, Canino, & Rubio-Stipec, 1993). Translation and back translation procedures for the Spanish version of the DISC-IV are reported by Bravo et al. (2001, 1993). The DISC-IV test-retest reliability has been reported in both Spanish and English-speaking clinic samples. In community samples, combined reports of parents and youth have shown a test-retest reliability ranging between .22-.85 for symptom counts across disorders in English-speaking samples and

.29-.88 for different diagnoses in Spanish-speaking samples (Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000; Bravo et al. 2001). Internalizing disorder symptoms that were assessed for this analysis were: Social Phobia, Separation Anxiety, Panic Disorder, Generalized Anxiety Disorder, PTSD, Major Depressive Disorder, and Dysthymia. Due to the low number of participants in this community sample endorsing full DSM-IV criteria for internalizing disorders when both symptom endorsement and clinical impairment was included (Felix et al., 2011), this analysis coded internalizing disorders as present when symptom endorsement met DSM-IV criteria for any internalizing disorders based on either adolescent and caretaker report, regardless of level of impairment reported. A dichotomous variable indicating the presence of symptoms of any internalizing disorder was used in the analysis.

**Social support from friends.** Social support from friends was measured using questions based on the work of Thoit (1995) that examined both adult and peer social support (Bird, Canino, et al., 2006; Bird, Davies, et al., 2006). Previous use of these questions yielded a cronbach's alpha of .71 (Bird, Canino, et al., 2006). For this analysis, three items from the interview were summed together for a social support from friends subscale (see Appendix for questions). Higher scores indicate higher social support. Two questions (i.e., Can you share your happiness and your pain with friends? Can you talk to your friends about your problems?) were measured using a four-point likert scale from 0 (never) to 3 (always). One question (with how many friends can you count on to talk about your problems) was originally asked as an open-ended question. For this analysis, responses to the open-ended question were coded using a four-point scale (0, 1, 2, 3 or more friends) so that it was on a metric similar to the other social support from friends questions. The resulting friend social support subscale had adequate internal consistency (cronbach's alpha of .68).

**Peer deviance.** Deviant peer behavior in the past 12 months was assessed using items based on the work of Loeber, Farrington, Stouthamer-Loeber, and Van Kammen (1998) and used in an earlier epidemiological study which sampled Puerto Rican youth (Bird, Canino, et al., 2006; Bird, Davies, et al., 2006). Items for the current study were divided into two subscales: substance use and violence (see Appendix). Peer substance use was measured through four questions that asked about friends' use of alcohol, marijuana, and crack, cocaine, speed, heroin, or LSD, as well as selling drugs. Peer violence was measured by four questions about friends getting into physical fights, using a weapon, stealing things/robbing someone, and belonging to a gang. Response choices for these items were all "yes or no." A sum of endorsed items was used to create a measure of each subscale. Higher scores indicate higher levels of violence and substance use by friends. Cronbach's alpha for the substance use subscale in this sample was .63. Cronbach's alpha for the violence subscale in this sample was .77.

## **Results**

Descriptive statistics were calculated to determine the levels of hurricane exposure, peer social support, peer deviance, and prevalence of internalizing disorder symptoms over the previous year, as well as the mean age of this sample. Independent samples t-tests and chi-square analyses were conducted to compare boys and girls on these variables between males and females to explore potential gender effects. Bivariate correlations were then calculated to examine the relations between the study variables. To test hypothesis one, three separate hierarchical linear regression models were run to predict the three peer variables from hurricane exposure, while taking into consideration gender (0 = girls, 1 = boys) and age. Next, a logistic regression was run to predict the presence of internalizing disorder symptoms from hurricane exposure. Hurricane and age were mean centered to test for interactions of these continuous

variables. To test hypothesis two, a logistic regression was run to predict internalizing disorder symptoms from social support from friends, peer violence, and peer substance use, taking into consideration age and gender. The three peer variables and age were mean centered for this analysis. Finally, to test hypothesis three, a logistic regression was run to predict the presence of symptoms of an internalizing disorder from the three peer variables and hurricane exposure, while including age and gender in the analysis. Hurricane exposure, age, and the three peer variables were mean centered for this regression. Tests for multicollinearity indicated that none of these variables were highly correlated and thus could be included within the same regression model. Single imputation was used to handle missing data because less than 5% of the data were missing for the study variables.

### **Descriptive Statistics**

A total of 182 (13.5%) participants met criteria for symptoms of one or more of the studied internalizing disorders. Among individual disorders (see Table 1), Separation Anxiety was endorsed most commonly, with 6.1% of participants meeting symptom criteria for this disorder. Sixty-two percent of youth (or their caretaker) endorsed at least one item indicating hurricane exposure, with the mean of 2.44 (SD = 3.04) hurricane exposure items endorsed. Approximately 43% of the sample adolescents responded “yes” to at least one item about having friends who used drugs or alcohol ( $M = .78$ ,  $SD = 1.15$ ) and approximately 37% responded “yes” to at least one item about having friends who engaged in violence ( $M = .54$ ,  $SD = .89$ ). Table 2 compares male and female reports of each variable. Independent samples t-tests indicated that girls reported more peer social support than boys,  $t(903) = 5.46$ ,  $p < .0001$  (two-tailed). There were no gender differences in age, hurricane exposure, peer substance use, or peer violence. A chi-square test for independence assessing gender differences on symptoms of internalizing

disorders showed that girls met criteria more often than boys,  $X^2(1, n = 905) = 6.59, p = .01$ .

### **Correlates of Mental Health Outcomes**

Bivariate correlations were run to determine the association between age, hurricane exposure, social support, and the two peer deviance subscales. Bivariate correlations were first calculated separately by gender. The differences between boys and girls were: in boys, hurricane exposure was significantly related to age ( $r = 0.10, p < .05$ ) and social support ( $r = -0.10, p < .05$ ); in girls, social support was significantly related to age ( $r = 0.11, p < .05$ ), and peer substance use ( $r = 0.16, p < .05$ ). Bivariate correlations were then calculated with gender combined (see Table 3). Higher age was significantly related to increased social support, increased peer violence, and increased substance use. Increased hurricane exposure was significantly related to having lower levels of social support. Increased social support was significantly related to increased peer substance use.

### **Hypothesis 1: Relationship between hurricane exposure and peer deviance, social support, and symptoms of internalizing disorders**

To test hypothesis 1, three hierarchical linear regressions and one logistic regression were computed. For the hierarchical linear regression models, hurricane exposure was entered into step one; step two included age and gender; step three examined interactions between hurricane exposure and gender as well as hurricane exposure and age. Each included a different dependent variable, which included social support from friends, peer violence, and peer substance use. Results are presented in Table 4. The same steps were entered into the logistic regression to predict presence of symptoms of an internalizing disorder. Results are presented in Table 5.

**Predicting social support from friends.** For the social support model, hurricane exposure explained 1% of the variance in social support from friends,  $F(1, 903) = 8.7, p = .003$ .

Once age and gender were entered into the model, the total variance explained by the model was 4.7%,  $F(3, 901) = 14.9, p < .001$ . When the interaction terms were entered, the total variance only changed to 4.9%, which was not statistically significant. Neither of the interaction terms were significant. Therefore, the final model included the three main effects (Block 2). In the final model, hurricane exposure ( $\beta = -.09, p = .005$ ), age ( $\beta = .08, p = .01$ ), and gender ( $\beta = -.18, p < .001$ ) were all statistically significant, meaning that there is a relationship between hurricane exposure and social support even after controlling for age and gender.

**Predicting peer violence.** For the peer violence model, hurricane exposure did not explain any of the variance in peer violence. Once age and gender were entered into the model, the total variance explained by the model was 2.4%,  $F(3, 901) = 7.4, p < .001$ . When the interaction terms were entered, the total variance changed to 2.5%, which was not statistically significant; however, the model as a whole was statistically significant,  $F(5, 899) = 4.6, p < .001$ . In the final model (Block 2), only age was statistically significant ( $\beta = .14, p < .001$ ). Therefore, the hypothesis was not supported in this analysis.

**Predicting peer substance use.** For the peer substance use model, hurricane exposure explained 0.3% of the variance in peer substance use. Once age and gender were entered into the model, the total variance explained by the model was 18.6%,  $F(3, 901) = 68.7, p < .001$ . When the interaction terms were entered, the total variance changed to 19.2%,  $F(5, 899) = 42.8, p < .001$ . In the final model, a significant main effect was seen for age ( $\beta = .43, p < .001$ ). A significant interaction was seen between hurricane exposure and age ( $\beta = -.08, p = .01$ ). To better understand this interaction, an analysis was conducted with a dichotomized hurricane exposure variable (low hurricane exposure = 0 -1 exposure experiences; high hurricanes exposure = 2 or more exposure experiences) and age variable (younger = 11-13, older = 14-18). Results showed

that that among the older group of adolescents, higher hurricane exposure was related to having fewer peers who use substances; among younger adolescents, hurricane exposure was not related to associating with peers who use substances (see Figure 1).

**Predicting symptoms of internalizing disorders.** To predict the presence of symptoms of an internalizing disorder, the same steps as the linear regression models were entered into a logistic regression. The first two steps were significant; the third step containing the three predictors and two interactions, though the overall model was statistically significant,  $X^2(5, 905) = 16.97, p = .005$ , indicating that the model was able to distinguish between participants reported symptoms of an internalizing disorder from those who did not. Gender was a significant main effect. A significant interaction was seen between age and hurricane exposure. Using the same dichotomized variables as the prior interaction analysis, an analysis of the interaction showed that younger adolescents with hurricane exposure were more likely to report meeting symptom criteria for an internalizing disorder than young adolescents without symptoms of an internalizing disorder; exposure did not appear to have as much impact on meeting symptom criteria for an internalizing disorder among older adolescents (see Figure 2). Therefore, the hypothesis was partially supported in this model, in that the link between hurricane exposure and symptoms of internalizing disorders was seen for younger adolescents more than for older adolescents.

## **Hypothesis 2: Relationship between Peer Variables and Symptoms of Internalizing Disorders**

Two logistic regressions were run to assess the relation of each of the three peer variables to reports of symptoms of an internalizing disorder. In the first regression, social support from friends, peer violence, and peer substance use were entered into step one. Age and gender were

entered into step 2. Step three included two-way interactions between the three peer variables and gender (see Table 6). None of the interactions were significant; therefore the final full model included only the five predictor variables. The final full model containing the five predictors was statistically significant,  $X^2(5, 905) = 31.8, p < .001$ , indicating that the model was able to distinguish between participants who reported symptoms of an internalizing disorder from those who did not. Odds ratios for peer violence, peer substance use, and gender were all significant; therefore, the hypothesis was partially supported. In the second logistic regression, the same variables were entered into steps one and two. Step three included interactions between the three peer variables and age. None of the interactions were significant (see Table 7). Therefore, the final model was identical to the final model in the previous logistic regression model run for this hypothesis.

### **Hypothesis 3: Relationship between Peer Variables and Hurricane Exposure in predicting Symptoms of Internalizing Disorders**

To test hypothesis three, a logistic regression was run that included hurricane exposure, social support from friends, peer violence, and peer substance use in step one. Step two included those variables as well as age and gender. Step three included a two-way interaction between hurricane exposure and each of the three peer variables. Results are presented in Table 8. The full model containing the five predictors was statistically significant,  $X^2(9, 905) = 41.9, p < .001$ , indicating that the model was able to distinguish between participants reported symptoms of an internalizing disorder from those who did not. Significant main effects were seen for gender, peer violence, peer substance use, and hurricane exposure, meaning that those variables can each predict the presence of symptoms of an internalizing disorder when controlling for the others. A significant negative interaction was seen between hurricane exposure and peer

violence. To better understand this interaction, an analysis was conducted with a dichotomized hurricane exposure variable (low hurricane exposure = 0 -1 exposure experiences; high hurricanes exposure = 2 or more exposure experiences) and peer violence variable (low = .54 or lower, high = .55 or higher). The results demonstrated that the relationship between having aggressive friends and meeting symptom criteria for an internalizing disorder was stronger among adolescents who have higher hurricane exposure (see Figure 3).

### **Discussion**

This study examined the effects of hurricane exposure, social support from friends, and peer deviance on the development of symptoms of internalizing disorders in adolescents following Hurricane Georges. Approximately 14% of the sample met self-report or parent-report symptoms criteria for having one or more of the seven internalizing disorders assessed in this study. Results indicated that exposure to Hurricane Georges was associated with having less social support from friends and meeting symptom criteria for having an internalizing disorder. In addition, adolescents who reported having friends who used substances, and those who reported having friends who engaged in violence, were more likely to report having symptoms of an internalizing disorder, even when controlling for age and gender. Finally, an interaction was found between hurricane exposure and peer violence in predicting the presence of symptoms of an internalizing disorder.

Exposure to the hurricane appeared to influence some of the peer relationships in these adolescents. For instance, participants exposed to the hurricane reported less social support, even when controlling for age and gender. This finding was similar to other studies of post-disaster recovery in youth (e.g., Vernberg et al., 1996). Disasters may lead to separation between youth and their friends, leading to a reduction in social support from this group of peers (Silverman &

La Greca, 2002). In adolescence, this loss of support from friends may be challenging as they enter a phase of life when they wish to be more autonomous from their parents and rely on friends for more support.

The finding that hurricane exposure was associated with reporting symptoms of an internalizing disorder was not surprising, given prior research demonstrating the relationship between the two constructs (La Greca et al., 1996; Roberts et al., 2010). Unlike most post-hurricane studies, this study did not only measure symptoms of PTSD when examining internalizing symptoms. In fact, symptoms of PTSD were only endorsed by 1.1% of the sample, while symptoms of Separation Anxiety were endorsed by 6.1% of the sample. Several factors may have influenced this difference, such as the time between exposure to the hurricane and when data were collected for this study. Previous studies have found that symptoms of PTSD as a result of hurricane exposure tend to decrease over time (La Greca et al., 1996). It may be that youth in this sample are entering a new phase of coping with the aftermath of the hurricane, in addition to dealing with stressors of being in adolescence, which may explain the higher prevalence of symptoms of other internalizing disorders. Consequently, adults working with adolescents who experienced a disaster such as Hurricane Georges may wish to look for signs of symptoms of other internalizing disorders in addition to PTSD.

Participants who endorsed either measured type of peer deviance were more likely to have symptoms of an internalizing disorder. Given that some studies have found youth who exhibit deviant behaviors tend to exhibit symptoms of internalizing disorders (Rowe et al., 2010), this finding was not surprising. In addition, an interaction was found between peer violence and hurricane exposure in predicting symptoms of internalizing disorders. This relationship may be a consequence of changes to an adolescent's life following a disaster (Silverman & La Greca,

2002). Although many youth will engage in deviant behaviors during adolescence (Moffit, 1993), providing youth with prosocial outlets in the aftermath of a disaster may reduce the potential for them associating with deviant peers in relation to their experiences following a disaster.

Contrary to expectation, social support from friends was not related to having symptoms of an internalizing disorder, nor did it interact with hurricane exposure to predict symptoms of an internalizing disorder. This was surprising given prior research on social support and PTSD following disasters (Vernberg et al., 1996; Moore & Varela, 2010; Pina et al., 2008). However, this study did not examine youth-perceived family or adult support, which have both been found to negatively relate to the development of PTSD symptoms (Pina et al., 2008; Vernberg et al., 1996). More exploration into these relationships and how they affect mental health symptoms may help inform areas of focus for interventions aimed at supporting adolescents following a disaster. For instance, studies have found that adolescents may co-ruminate with their friends, which has been found to be related to internalizing symptoms (Rose, 2002). It may be that adolescents recovering from hurricane exposure who do experience social support from friends are not receiving healthy social support as they process the experiences. Researchers may wish to investigate interventions that promote the development of healthy social support from friends in the aftermath of disaster exposure.

Future research will want to use validated measures of peer deviance to assess for associations with friends who are violent or exhibit substance use behaviors. While the current measures showed good internal consistency and has been used in other studies of Puerto Rican youth (Bird, Canino, et al., 2006; Bird, Davies, et al., 2006), using validated measures may help to clarify some of the findings in this study. In addition, a hurricane exposure measure was

developed for this study to fit the culture and disaster experiences of this particular sample. It will be important to use validated measures of hurricane exposure in future studies examining these various mental health disorders to get a better understanding of the relationship between these two constructs. Finally, although the interviews did not begin until one year following the hurricane, the wide range of time that interviews were completed may have affected the recovery process, such that those who were interviewed later in the data collection process had more time to potentially rebuild and resume normal activity following the storm. Nonetheless, this study does provide information on the post-hurricane recovery process.

Few studies have explored the role of peer deviance in adolescents' adjustment following exposure to a hurricane. This study attempts to provide information to begin understanding the relationships between peer deviance and hurricane exposure in the psychosocial development of adolescents. Increased understanding for these relationships may provide clinicians, parents, and schools with areas to focus on when helping adolescents to cope with hurricane exposure. Future research should further examine the differences between deviant peer behaviors and how these may influence mental health development in youth exposed to hurricanes. Examining specific hurricane-related changes in an adolescent's life may help explain some of their associations with different peer groups. Interventions may want to focus on enhancing positive social support mechanisms to limit the associations with deviant peers who may currently provide this support to adolescents affected by stressful events such as hurricane exposure.

## References

- Bird, H. R., Canino, G. J., Davies, M., Duarte, C. S., Febo, V., Ramírez, R., ... Loeber, R. (2006). A study of disruptive behavior disorders in Puerto Rican youth: I. Background, design, and survey methods. *Journal of the American Academy of Child & Adolescent Psychiatry, 45*(9), 1032–1041.
- Bird, H. R., Davies, M., Duarte, C. S., Shen, S., Loeber, R., & Canino, G. J. (2006). A study of disruptive behavior disorders in Puerto Rican youth: II. Baseline prevalence, comorbidity, and correlates in two sites. *Journal of the American Academy of Child & Adolescent Psychiatry, 45*(9), 1042–1053.
- Blaze, J. T., & Shwalb, D. W. (2009). Resource loss and relocation: A follow-up study of adolescents two years after Hurricane Katrina. *Psychological Trauma: Theory, Research, Practice, and Policy, 1*(4), 312–322.
- Bonanno, G. A., Brewin, C. R., Kaniasty, K., & La Greca, A. M. (2010). Weighing the costs of disaster. *Psychological Science in the Public Interest, 11*(1), 1-49.
- Bravo, M., Ribera, J., Rubio-Stipec, M., Canino, G., Shrout, P., Ramírez, R., Fábregas, L., et al. (2001). Test-retest reliability of the Spanish version of the Diagnostic Interview Schedule for Children (DISC-IV). *Journal of Abnormal Child Psychology, 29*(5), 433–444.
- Bravo, M., Rubio-Stipec, M., Canino, G. J., Woodbury, M. A., & Ribera, J. C. (1990). The psychological sequelae of disaster stress prospectively and retrospectively evaluated. *American Journal of Community Psychology, 18*(5), 661–680.
- Bravo, M., Woodbury-Farina, M., Canino, G. J., & Rubio-Stipec, M. (1993). The Spanish translation and cultural adaptation of the Diagnostic Interview Schedule for Children (DISC) in Puerto Rico. *Culture, Medicine and Psychiatry, 17*(3), 329–344.

- Canino, G., Shrout, P. E., Rubio-Stipec, M., Bird, H. R., Bravo, M., Ramirez, R.,...Martinez-Taboas, A. (2004). The DSM-IV rates of child and adolescent disorders in Puerto Rico: prevalence, correlates, service use, and the effects of impairment. *Archives of General Psychiatry*, *61*(1), 85.
- Centers for Disease Control and Prevention. (1998, October 30). Deaths associated with Hurricane Georges -- Puerto Rico, September 1998. Retrieved from <http://www.cdc.gov/mmwr/preview/mmwrhtml/00055476.htm>
- Fanti, K. A., & Henrich, C. C. (2010). Trajectories of pure and co-occurring internalizing and externalizing problems from age 2 to age 12: Findings from the National Institute of Child Health and Human Development Study of Early Child Care. *Developmental Psychology*, *46*(5), 1159–1175.
- Frauenglass, S., Routh, D. K., Pantin, H. M., & Mason, C. A. (1997). Family support decreases influence of deviant peers on Hispanic adolescents' substance use. *Journal of Clinical Child Psychology*. *26*(1), 15-23.
- Felix, E., Hernández, L. A., Bravo, M., Ramirez, R., Cabiya, J., & Canino, G. Natural disaster and risk of psychiatric disorders in Puerto Rican children (2011). *Journal of Abnormal Child Psychology*, *39*(4), 589–600.
- Fite, P. J., Vitulano, M., Wynn, P., Wimsatt, A., Gaertner, A., & Rathert, J. (2010). Influence of perceived neighborhood safety on proactive and reactive aggression. *Journal of Community Psychology*, *38*(6), 757–768.
- Goenjian, A. K., Molina, L., Steinberg, A. M., Fairbanks, L. A., Alvarez, M. L., Goenjian, H. A., & Pynoos, R. S. (2001). Posttraumatic stress and depressive reactions among Nicaraguan adolescents after Hurricane Mitch. *American Journal of Psychiatry*, *158*(5), 788-794.

- Hensley-Maloney, L., & Varela, R. E. (2009). The influence of hurricane exposure and anxiety sensitivity on panic symptoms. *Child and Youth Care Forum, 38*, 135–149.
- Hoven, C. W., Duarte, C. S., Lucas, C. P., Wu, P., Mandell, D. J., Goodwin, R. D., Cohen, M., et al. (2005). Psychopathology among New York City Public School children 6 Months after September 11. *Archives of General Psychiatry, 62*, 545-552.
- Khoury, E. L., Warheit, G. J., Hargrove, M. C., Zimmerman, R. S., Vega, W. A., & Gil, A. G. (1997). The impact of Hurricane Andrew on deviant behavior among a multi-racial/ethnic sample of adolescents in Dade County, Florida: A longitudinal analysis. *Journal of Traumatic Stress, 10*(1), 71–91.
- La Greca, A. M., Silverman, W. K., Vernberg, E. M., & Prinstein, M. J. (1996). Symptoms of posttraumatic stress in children after Hurricane Andrew: A prospective study. *Journal of Consulting and Clinical Psychology, 64*(4), 712–723.
- Laird, R. D., Jordan, K. Y., Dodge, K. A., Pettit, G. S., & Bates, J. E. (2001). Peer rejection in childhood, involvement with antisocial peers in early adolescence, and the development of externalizing behavior problems. *Development and Psychopathology, 13*(2), 337–354.
- Lewinsohn, P. M., Gotlib, I. H., Lewinsohn, M., Seeley, J. R., Allen, N. B. (1998). Gender differences in anxiety disorders and anxiety symptoms in adolescents. *Journal of Abnormal Psychology, 107*(1), 109–117.
- Lewinsohn, P. M., Rohers, R. E., Seeley, J. R., Rhode, P., Gotlib, I. H., Hops, H. (1994). Adolescent psychopathology: II. Psychosocial risk factors for depression. *Journal of Abnormal Psychology, 103*(2), 302–315.
- Liu, M., Wang, L. Shi, Z., Zhang, Z., Zhang, K., Shen, J. (2011). Mental health problems among children one year after Sichuan Earthquake in China: A follow-up study. *PLoS ONE*,

6(2), 1–6.

Loeber, R., Farrington, D. P., Stouthamer-Loeber, M., Van Kammen, W. B. (1998), *Antisocial behavior and mental health problems: Explanatory factors in childhood and adolescence*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Lonigan, C. J., Shannon, M. P., Finch, A. J., Daugherty, T. K., & Taylor, C. M. (1991). Children's reactions to a natural disaster: Symptom severity and degree of exposure. *Advances in Behaviour Research and Therapy*, 13(3), 135–154.

Mason, W. A., Hitch, J. E., & Spoth, R. L. (2009). Special populations: Adolescents: Longitudinal relations among negative affect, substance use, and peer deviance during the transition from middle to late adolescence. *Substance Use & Misuse*, 44(8), 1142-1159.

Melde, C., Taylor, T. J., & Esbensen, F.-A. (2009). “I got your back”: An examination of the protective function of gang membership in adolescence. *Criminology: An Interdisciplinary Journal*. 47(2), 565-594.

Miller, S., Loeber, R., & Hipwell, A. (2009). Peer deviance, parenting and disruptive behavior among young girls. *Journal of Abnormal Child Psychology*, 37(2), 139–152.

Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review*, 100(4), 674-701.

Moore, K. W., & Varela, R. E. (2010). Correlates of long-term Posttraumatic stress symptoms in children following Hurricane Katrina. *Child Psychiatry and Human Development*, 41(2), 239–250.

National Climatic Data Center. (1999, April 12). Georges pummels Caribbean, Florida Keys, and U.S. Gulf Coast. Retrieved from

<http://lwf.ncdc.noaa.gov/oa/reports/georges/georges.html>

- Norris, F. H., & Kaniasty, K. (1992). Reliability of delayed self-reports in disaster research. *Journal of Traumatic Stress, 5*(4), 575–588.
- Patchin, J. W., Huebner, B. M., McCluskey, J. D., Varano, S. P., & Bynum, T. S. (2006). Exposure to community violence and childhood delinquency. *Crime & Delinquency, 52*(2), 307-322.
- Piko, B. F., Hamvai, C. (2010). Parent, school, and peer-related correlates of adolescents' life satisfaction. *Children and Youth Services Review, 32*, 1479-1482.
- Pina, A. A., Villalta, I. K., Ortiz, C. D., Gottschall, A. C., Costa, N. M., & Weems, C. F. (2008). Social support, discrimination, and coping as predictors of posttraumatic stress reactions in youth survivors of Hurricane Katrina. *Journal of Clinical Child & Adolescent Psychology, 37*(3), 564–574.
- Roberts, Y. H., Mitchell, M. J., Witman, M., & Taffaro, C. (2010). Mental health symptoms in youth affected by Hurricane Katrina. *Professional Psychology: Research and Practice, 41*, 10-18.
- Rohrbach, L. A., Grana, R., Vernberg, E., Sussman, S., & Sun, P. (2009). Impact of Hurricane Rita on adolescent substance use. *Psychiatry: Interpersonal and Biological Processes, 72*(3), 222-237.
- Rosario, M., Salzinger, S., Feldman, R. S., & Ng-Mak, D. S. (2007). Intervening processes between youths' exposure to community violence and internalizing symptoms over time: The roles of social support and coping. *American Journal of Community Psychology, 41*(1-2), 43-62. doi: 10.1007/s10464-007-9147-7
- Rose, A. J. (2002). Co-rumination in the friendships of girls and boys. *Child Development, 73*(6),

1830-1843. doi: 10.1111/1467-8624.00509

- Rowe, C. L., La Greca, A. M., & Alexandersson, A. (2010). Family and individual factors associated with substance involvement and PTS symptoms among adolescents in Greater New Orleans after Hurricane Katrina. *Journal of Consulting and Clinical Psychology, 78*(6), 806-817. doi: 10.1037/a0020808
- Rueger, S. Y., Malecki, C. K., Demaray, M. K. (2008). Gender differences in the relationship between perceived social support and student adjustment during early adolescence. *School Psychology Quarterly, 23*(4), 496–514.
- Shaffer, D., Fisher, P., Lucas, C. P., Dulcan, M. K., Schwab-Stone, M. E. (2000). NIMH Diagnostic Interview Schedule for Children Version IV (NIMH DISC-IV): Description, differences from previous versions, and reliability of some common diagnoses. *Journal of the American Academy of Child and Adolescent Psychiatry, 39*(1), 28–38.
- Silverman, W. K., & La Greca, A. M. (2002). Children experiencing disasters: Definitions, reactions, and predictors of outcomes. In A. M. La Greca, W. K. Silverman, E. M. Vernberg, & M. C. Roberts, (Eds.), *Helping children cope with disasters and terrorism* (pp. 11-34). Washington D.C.: American Psychological Association.
- Thienkrua, W., Cardozo, B. L., Chakkraband, M. L., Guadamuz, T. E., Pengjuntr, W., Tantipiwatanaskul, P.,...van Griensven, F. (2006). Symptoms of posttraumatic stress disorder and depression among children in tsunami-affected areas in southern Thailand. *Journal of the American Medical Association, 296*(5), 549–559.
- Thoits, P. A. (1995). Stress, coping, and social support processes: Where are we? What Next? *Journal of Health and Social Behavior, 35*, 53–79.
- Thompson, K. M., & Braaten-Antrim, R. (1998). Youth maltreatment and gang involvement.

- Journal of Interpersonal Violence*, 13(3), 328-345. doi:10.1177/088626098013003002
- Vernberg, E. M., La Greca, A. M., Silverman, W. K., & Prinstein, M. J. (1996). Prediction of posttraumatic stress symptoms in children after Hurricane Andrew. *Journal of Abnormal Psychology*, 105(2), 237–248.
- Vernberg, E. M., & Varela, R. E. (2001). Posttraumatic stress disorder: A developmental perspective. In M. W. Vasey & M. R. Dadds, (Eds.), *Developmental Psychopathology of Anxiety* (pp. 386-406). New York: Oxford University Press.
- Vernberg, E. M., & Vogel, J. M. (1993). Part 2: Interventions with children after disasters. *Journal of Clinical Child Psychology*, 22(4), 485–498.
- Vogel, J. M., & Vernberg, E. M. (1993). Part 1: Children's psychological responses to disasters. *Journal of Clinical Child Psychology*, 22(4), 464–484.
- Ward, C. L., Martin, E., Theron, C., & Distiller, G. B. (2007). Factors affecting resilience in children exposed to violence. *South African Journal of Psychology*, 37(1), 165–187.
- Weems, C. F., Watts, S. E., Marsee, M. A., Taylor, L. K., Costa, N. M., Cannon, M. F., Carrion, V. G., et al. (2007). The psychosocial impact of Hurricane Katrina: Contextual differences in psychological symptoms, social support, and discrimination. *Behaviour Research and Therapy*, 45(10), 2295–2306.

Table 1. Frequency Counts of Specific Internalizing Disorders

Disorder	N (%)
Social Phobia	29 (3.2)
Separation Anxiety	55 (6.1)
Panic Disorder	10 (1.1)
Generalized Anxiety Disorder	17 (1.9)
PTSD	10 (1.1)
Major Depression	37 (4.1)
Dysthymic Disorder	10 (1.1)
Any Internalizing Disorder	122 (13.5)

*Note.* PTSD = Posttraumatic Stress Disorder

Table 2. Means and Standard Deviations

Variable	Girls (N = 429)	Boys (N = 476)
	Mean (SD)	Mean (SD)
Age	14.10 (1.98)	14.24 (1.96)
Hurricane Exposure	2.39 (2.96)	2.48 (3.10)
Social Support*	5.59 (2.32)	4.71 (2.52)
PD – Violence	.49 (.86)	.59 (.92)
PD – Substance Use	.75 (1.14)	.81 (1.17)
	N(%)	N(%)
Any Internalizing Disorder**	71 (17)	51 (11)

*Note.* PD = peer deviance.

\* $p < .0001$  for independent-sample t-test comparison. \*\* $p = .01$  for chi-square test of independence

Table 3. Bivariate Correlations

	1	2	3	4	5
1. Age	—	-.05	.08*	.15**	.43**
2. Hurricane Exposure		—	-.10**	.01	-.05
3. Social Support			—	.002	.10**
4. PD – Violence				—	.48**
5. PD – Substance Use					—

Note: PD = peer deviance; \* $p < .05$ . \*\* $p < .01$

Table 4. Relationship between Hurricane Exposure and Peer Variables

Predictor	Peer Variables								
	<u>Social Support</u>			<u>Peer Violence</u>			<u>Peer Substance Use</u>		
	R <sup>2</sup>	ΔR <sup>2</sup>	β	R <sup>2</sup>	ΔR <sup>2</sup>	β	R <sup>2</sup>	ΔR <sup>2</sup>	β
Block 1	.01*	.01*		.00	.00		.003	.003	
Hurricane Exposure			-.10*			.01			-.05
Block 2	.047**	.04**		.02**	.02**		.18**	.18**	
Hurricane Exposure			-.09**			.02			-.03
Age			.08*			.14**			.43**
Gender			-.18**			.05			.12
Block 3	.049	.001		.03	.001		.19*	.006*	
Hurricane Exposure			-.09			.05			-.04
Age			.08*			.14**			.43**
Gender			-.18**			.08			.002
Hurricane Exposure x Age			-.03			.002			-.08*
Hurricane Exposure x Gender			-.002			-.06			.01

\*p &lt; .05. \*\*p &lt; .01.

Table 5. Relationship between Hurricane Exposure and Internalizing Disorders

Predictors	Odds Ratio (95% CI)
Block 1	
Hurricane Exposure*	1.06 (1.00 – 1.13)
Block 2	
Hurricane Exposure*	1.07 (1.01 – 1.13)
Age	1.06 (.96 – 1.17)
Gender**	1.68 (1.14 – 2.48)
Block 3	
Hurricane Exposure	1.04 (.95 – 1.13)
Age	1.08 (.97 – 1.19)
Gender **	2.02 (1.2 – 3.4)
Hurricane Exposure x Age*	.97 (.94 – 1.0)
Hurricane Exposure x Gender	1.06 (.94 – 1.19)

\* $p < .05$ . \*\* $p < .01$

Table 6. Relationship between Peer Variables and Internalizing Disorders with Interaction of Gender

Predictors	Odds Ratio (95% CI)
Block 1	
Social Support from Friends	1.0 (.92 – 1.08)
Peer Violence**	1.35 (1.10 – 1.67)
Peer Substance Use*	1.20 (1.01 – 1.42)
Block 2	
Social Support from Friends	.97 (.90 – 1.06)
Peer Violence**	1.37 (1.11 – 1.70)
Peer Substance Use*	1.23 (1.02 – 1.50)
Age	.97 (.90 – 1.09)
Gender**	1.81 (1.21 - 2.70)
Block 3	
Social Support from Friends	.98 (.87 – 1.11)
Peer Violence**	1.50 (1.11 – 2.01)
Peer Substance Use	1.19 (.91 – 1.55)
Age	.97 (.87 – 1.08)
Gender**	1.84 (1.21 – 2.80)
Social Support from Friends x Gender	.99 (.84 – 1.16)
Peer Violence x Gender	.86 (.55 – 1.29)
Peer Substance Use x Gender	1.09 (.77 – 1.54)

\* $p < .05$ . \*\* $p < .01$

Table 7. Relationship between Peer Variables and Symptoms of Internalizing Disorders with Interaction of Age

Predictors	Odds Ratio (95% CI)
Block 1	
Social Support from Friends	1.0 (.92 – 1.08)
Peer Violence**	1.35 (1.10 – 1.67)
Peer Substance Use*	1.20 (1.01 – 1.42)
Block 2	
Social Support from Friends	.97 (.90 – 1.06)
Peer Violence**	1.37 (1.11 – 1.70)
Peer Substance Use*	1.23 (1.02 – 1.50)
Age	.97 (.90 – 1.09)
Gender**	1.81 (1.21 - 2.70)
Block 3	
Social Support from Friends	.97 (.90 – 1.06)
Peer Violence**	1.42 (1.13 – 1.78)
Peer Substance Use*	1.28 (1.04 – 1.58)
Age	.99 (.88 – 1.02)
Gender**	1.80 (1.20 – 2.70)
Social Support from Friends x Age	.99 (.96 – 1.04)
Peer Violence x Age	.93 (.83 – 1.05)
Peer Substance Use x Age	.96 (.87 – 1.07)

\* $p < .05$ . \*\* $p < .01$

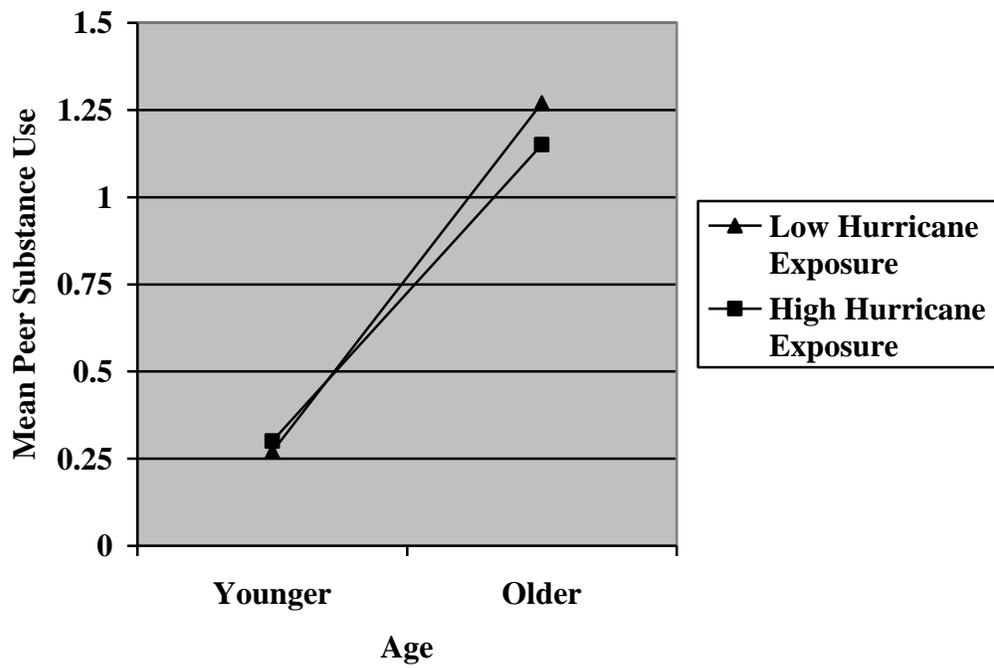
Table 8. Relationship between Hurricane Exposure, Peer Variables, and Symptoms of Internalizing Disorders

Predictors	Odds Ratio (95% CI)
Block 1	
Social Support from Friends	1.01 (.93 – 1.09)
Peer Violence**	1.34 (1.09 – 1.66)
Peer Substance Use*	1.21 (1.02 – 1.45)
Hurricane Exposure	1.07 (1.01 – 1.14)
Block 2	
Social Support from Friends	.98 (.91 – 1.07)
Peer Violence**	1.36 (1.10 – 1.68)
Peer Substance Use*	1.25 (1.03 – 1.52)
Hurricane Exposure*	1.07 (1.01 – 1.14)
Age	.97 (.87 – 1.09)
Gender**	1.80 (1.20 - 2.70)
Block 3	
Social Support from Friends	.98 (.90 – 1.06)
Peer Violence**	1.38 (1.11 – 1.72)
Peer Substance Use*	1.25 (1.03 – 1.52)
Hurricane Exposure*	1.07 (1.03 – 1.14)
Age	.98 (.87 – 1.09)
Gender**	1.86 (1.24 - 2.79)
Hurricane Exposure x Social Support from Friends	.99 (.97 – 1.02)

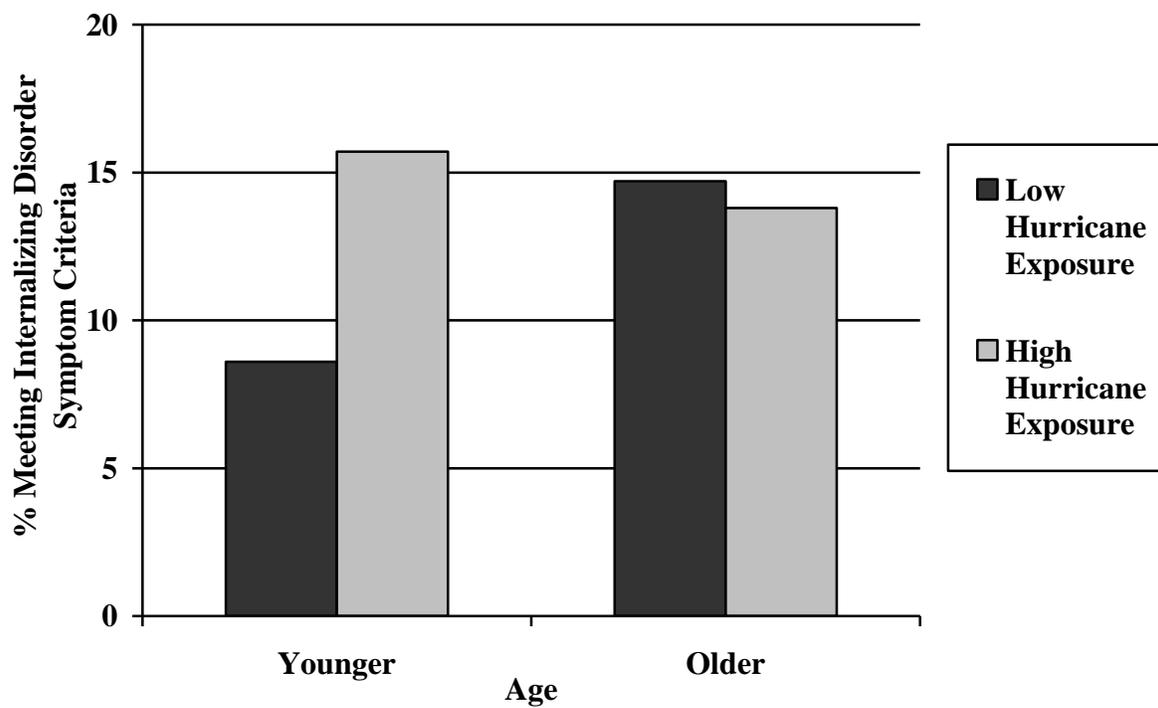
Hurricane Exposure x Peer Violence*	.92 (.85 - .99)
Hurricane Exposure x Peer Substance Use	1.04 (.98 – 1.11)

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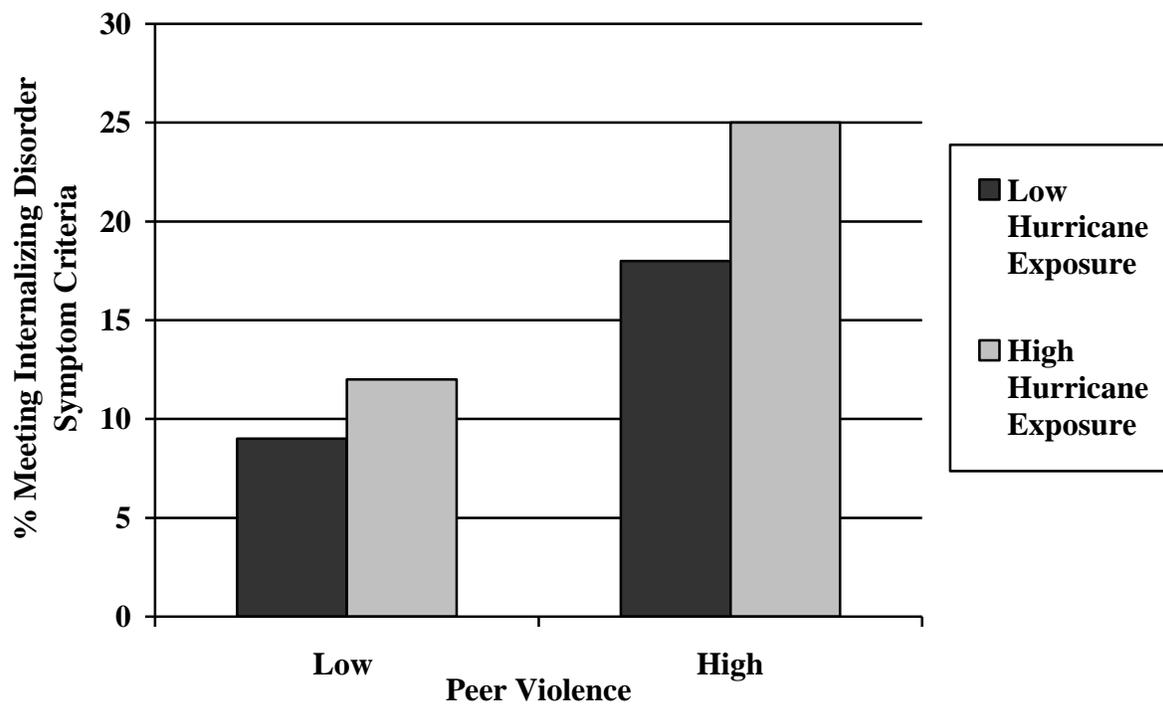
\* $p < .05$ . \*\*  $p < .01$ .



*Figure 1.* Interaction of Hurricane Exposure and Age in Predicting Peer Substance Use



*Figure 2.* Interaction of Hurricane Exposure and Age in Predicting Symptoms of Internalizing Disorders



*Figure 3.* Interaction of hurricane exposure and peer violence in predicting symptoms of internalizing disorders.

## Appendix

### Interview Questions

#### **Exposure Questions**

Questions asked to Caregiver:

1. Was the child with his/her parents/caregiver during the hurricane? (Y/N)
2. While the hurricane passed, was the child separated for a time from the people who he/she lives with because of the hurricane? (Y/N)
3. Did the child have to spend some nights outside his or her house due to the hurricane? (Y/N)
4. Did the child get severely injured or hit? (Y/N)
5. Did someone close to the child get severely injured or hit? (Y/N)
6. Did someone close to the child die? (Y/N)
7. Did he/she lose a loved animal? (Y/N)
8. Did the child lose clothes, books, toys or other items that were important to him/her? (Y/N)
9. At any moment were you afraid of dying or getting injured? (Y/N)
10. Did you get sick or hurt during the hurricane? (Y/N)
11. Did trees fall on your house? (Y/N)
12. Did your house flood? (Y/N)
13. Did your roof fly off? (Y/N)
14. Did the walls of your house fall? (Y/N)
15. Did the windows or doors open or break? (Y/N)
16. Did you lose your house? (Y/N)

#### **Peer Social Support Questions**

1. Can you share your happiness and your pain with your friends?  
*Never*                      *Sometimes*                      *A lot*                      *Always*

2. Can you talk to your friends about your problems?

*Never*            *Sometimes*            *A lot*            *Always*

3. With how many friends can you count on to talk about your problems? \_\_\_\_ # persons

### **Peer Violence Questions**

1. In the past 12 months, have your friends or the group you hang out with:

A. gotten into physical fights with other groups of kids, gangs, or kids one-on-one? Y/N

B. used a weapon like a stick, knife, gun, or other sharp object in a fight? Y/N

C. stolen things, or robbed someone? Y/N

2. Do you have any friends who belong to a gang? Y/N

### **Peer Substance Use Questions**

1. Do you have any friends who:

A. drink alcohol? Y/N

B. use marijuana? Y/N

C. use crack or cocaine, speed, heroin, or LSD? Y/N

D. sell drugs or help to sell drugs? Y/N