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Family Influences on the Relationship Between Hurricane Exposure and *Ataques de Nervios*

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Abstract This study focused on characteristics of the family environment that may influence the relationship between hurricane exposure and *ataques de nervios* in Puerto Rican children and youth. Approximately 18 months after Hurricane Georges hit Puerto Rico in 1998, participants were randomly selected based on a probability household sample using 1990 US Census block groups. Caregivers and children were interviewed about past year and lifetime experience of *ataques de nervios*, hurricane exposure, and the family environment in Spanish. Areas of the family environment assessed include parent–child relationship quality, parent–child involvement, parental monitoring, discipline, and parents’ relationship quality. Structural equation models were estimated for parents and children, and by age group. For children (4–10 years old, $N = 582$), hurricane exposure was directly related to lifetime experience of *ataques*, but not for past year experience of *ataques*. However, for children, none of the family variables had a significant mediating role in the relation between hurricane exposure and either past year or lifetime experience of *ataques*; rather, parent–child involvement decreased risk for lifetime and past year *ataques*. For youth (11–17 years old, $N = 569$), per youth report, positive discipline mediated the hurricane exposure to lifetime experience of *ataques* relationship, whereas

parents’ relationship quality mediated the relationship between exposure and past year experience of *ataques*. Hurricane exposure decreased positive discipline and parents’ relationship quality, and positive discipline and parents’ relationship quality decreased risk for *ataques*. Per parent report, parent–child involvement decreased risk for past year or lifetime experience of *ataques*. Implications for post-disaster mental health recovery efforts are discussed.

Keywords Disaster · Culture · *Ataques de nervios* · Children · Mental health

Introduction

When disasters strike, normally confident and protective adults may show terror, shock, and fear, which can affect parents’ relationships with each other and with their children (Felix et al. 2013). Stress in the aftermath can be prolonged for more severely exposed families, as parents cope with demands associated with recovery and reconstruction, such as rebuilding homes or relocating, as well as social disruptions and financial losses. In their comprehensive review, Bonanno et al. (2010) describe the potential influence of disaster-related stressors on family dynamics, which needs further research. When exploring how disasters affect mental health in Latino populations, it is important to consider culturally-relevant expressions of distress, such as *ataques de nervios* (attacks of the nerves). This has largely been neglected in post-disaster research (for exceptions, see Guarnaccia et al. 1993; Rubens et al. in press), despite implications for culturally-sensitive and relevant public mental health services post-disaster.

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Ataques de nervios (hereafter referred to as *ataques*), are a cultural idiom of distress common among many different Latino groups, but found most prevalent among Puerto Ricans (Guarnaccia et al. 2010). *Ataques* represent a culturally-sanctioned reaction to acute, severe distress, often precipitated by actual or threatened loss, such as the death or injury of a loved one, grief, or family conflicts (Febo San Miguel et al. 2006; Guarnaccia et al. 1993). A disaster, with its acute, intense disruption to normal life; threat, or actual loss, of life and property; potential for missing loved ones; and increased familial stress during the recovery and reconstruction can be considered a prime precipitant of episodes of *ataques* among Latino survivors. Indeed, in a representative sample of adults following a mud-slide disaster in Puerto Rico in 1985, a prevalence rate of 13.8 % for *ataques* was found, making it one of the most common syndromes found post-disaster in this group (Guarnaccia et al. 1993). Hence, it is important to understand the prevalence and correlates of *ataques* in the post-disaster recovery period to guide potential mental health services for Latinos.

Ataques include a number of internalizing and externalizing symptoms (Febo San Miguel et al. 2006; Guarnaccia et al. 1993, 2005). Guarnaccia et al. (1993) identified four categories of experiences and symptoms related to *ataque* that fall into internalizing and externalizing dimensions. These include (1) emotional expressions, such as crying spells, screaming, and feeling anguish, anxious, depressed, and/or fearful; (2) physical sensations, such as trembling, chest pain, heart palpitations, breathlessness, headaches, stomach aches, weakness, loss of sensation in part of the body, convulsion, and seizures; (3) changes in feelings of consciousness, such as fainting, amnesia, dizziness, increased thoughts and memories, and possibly hallucinations or a sense of “going crazy”; and (4) actions, such as suicidal ideation or attempts and self-injurious behavior. If a person loses a sense of consciousness, they often regain it quickly and may not remember the *ataque* (Guarnaccia et al. 1993). *Ataques* often occur in the presence of others, and brings forth social support from the afflicted person’s social network (Guarnaccia et al. 1993).

Ataques are commonly comorbid with a range of psychiatric disorders, particularly anxiety and depressive disorders (Guarnaccia et al. 1993), but also substance use disorders (Guarnaccia et al. 2010) and somatic complaints (Lopez et al. 2011). However, Guarnaccia et al. (1993) note in their research that *ataques* were associated with a variety of disorders, not exclusively one, and “could not be treated as simply a culturally shaped version of a specific psychiatric disorder” (p. 161). A prior study with adolescents found that 45 % of those with an *ataque* in the past year also met DSM-IV diagnostic criteria for internalizing

psychopathology (Rubens et al. in press). *Ataques* can be distinguished from panic disorder due to the clear precipitating event (Lewis-Fernández et al. 2002).

Prior research in Puerto Rico with the current sample found a 9 % prevalence rate of *ataques* in children and youth age 4–17 years, in contrast to a 26 % rate in a clinical sample (Guarnaccia et al. 2005). Another study comparing Puerto Rican children aged 5–13 years in San Juan, Puerto Rico and in Bronx, New York found prevalence rates of 5 and 4 % respectively (Lopez et al. 2009). In both the community and clinical samples of the Guarnaccia et al. (2005) study, more girls than boys had an experience of *ataque*, perception of poverty was related to *ataque*, and an experience of *ataque* was associated with comorbidity with another psychiatric disorder. This was most often an anxiety or depressive disorder, but also included any disruptive behavior disorder. All of this is consistent with adult research. In addition, across both samples, children and youth with *ataques* were more likely to have a family history of *ataques*. To our knowledge, no other published study has explored the role of family environment on *ataques* among children and youth following a natural disaster.

Although disaster-related distress tends to decrease over time (Norris et al. 2002), prolonged difficulties in the recovery environment may produce more persistent symptoms (Weems et al. 2010). For example, disasters can lead to increased family conflict, as families deal with the stresses associated with recovery and rebuilding. Interparental conflict has been connected to post-disaster post-traumatic stress symptoms in children (Wasserstein and La Greca 1998). Prior research with this sample supports the role of parents’ relationship quality in the post-disaster internalizing psychopathology of youth (Felix et al. 2013); but, there were differences between parent and youth report. Per youth, hurricane exposure negatively affected parents’ relationship quality, and better parents’ relationship quality was related to lower risk for internalizing psychopathology. Although parents also recognized that the hurricane affected their marital or partner relationship quality, there was not a relation between this and their child’s internalizing psychopathology from their perspective.

Parent–child relationship quality also affected risk for internalizing psychopathology post-disaster (Felix et al. 2013), and may have a role to play with *ataques*. Caregiver–child conflict, caregiver unavailability to talk about the hurricane, and children’s perceptions of caregiver’s hurricane-related distress, was related to children’s post-disaster traumatic stress symptoms beyond what was explained by hurricane exposure alone (Gil-Rivas et al. 2010). However, in another study of parent–child factors affecting mental health in Hurricane Katrina survivors,

parenting behaviors did not add to the variance accounted for above and beyond hurricane exposure amongst those displaced after the storm (Kelley et al. 2010).

Necessary components of effective parenting include parental monitoring (attention to and tracking of the whereabouts, activities, and adaptations of the child; Dishion and McMahon 1998), and discipline, with different styles of discipline are related to child adjustment and behavior (Baumrind 1966). Inconsistent discipline and lack of parental monitoring were related to problem behavior (Dishion and McMahon 1998; Patterson and Stouthamer-Loeber 1984) in non-disaster studies. Likewise, research is beginning to show a link between harsh, ineffective discipline and internalizing symptoms (Laskey and Cartwright-Hatton 2009). It is possible that the quality of parental discipline and parents' ability to monitor their child may decrease following a disaster because of the stress and time demands association with recovery and rebuilding. Thus, the current study explored the influence of frequency of use of discipline strategies that are positive (explaining what the child did wrong, removal of privileges) and negative (yelling, hitting). The behaviors characterized as negative discipline, such as hitting, if frequent enough, have been linked to increases in child aggressive behavior (e.g., Taylor et al. 2010). In our prior research, positive discipline was related to internalizing psychopathology, regardless of level of disaster exposure (Felix et al. 2013), but this has yet to be examined for *ataques*. This could be an addressable factor that differentiates children and youth who are resilient post-disaster to those at greater risk for psychopathology.

In sum, the extant research suggests that disaster exposure can affect family dynamics, and may account for variations in child post-disaster adjustment, beyond what can be explained by disaster exposure alone. This research has been conducted with measures of posttraumatic stress and symptoms of other internalizing disorders, but meditational models still need to be explored with culturally-relevant expressions of distress, such as *ataques de nervios*.

In September, 1998, Hurricane Georges made landfall in Puerto Rico as a category 3 hurricane on the Saffir-Simpson Hurricane Wind Scale. A category 3 hurricane rating indicates sustained winds of 111–130 mph, that devastating damage will occur, and a high risk of death and injury (National Hurricane Center n.d.). Indeed, many communities reported property damage, 416 government shelters were opened for approximately 28,000 persons, 700,000 persons were without water and 1,000,000 had no electricity for some time (Center for Disease Control and Prevention 1998). An epidemiological study of psychopathology in a random sample of the island's population of children and adolescents had already been planned and funded when Hurricane Georges made landfall. The

Hurricane Georges disaster provided the opportunity to study how aspects of the family environment influenced the disaster exposure-*ataques* relationship. The study aims were guided by the well-known conceptual model of children's post-disaster functioning (Silverman and La Greca 2002; Vernberg 2002) which proposed that aspects of the disaster experience present adaptational challenges to children, and that efforts to cope with these challenges shape the persistence of mental health symptoms. Family factors are proposed to play important roles in recovery, but most child-focused disaster research has relatively limited measurement of the family environment (Bonanno et al. 2010; Kilmer and Gil-Rivas 2010). We assessed youth and parent report of discipline, parental monitoring, parents' relationship quality, and whether the child or youth had a lifetime or past year experience of *ataques*. Parents provided information on their relationship quality with their child. Youth provided information on parent-child involvement. We used this information to address the hypothesis that family environment will mediate the relationship between hurricane exposure and past year and lifetime experience of an *ataque*. We expected that hurricane exposure would decrease the quality of relationships (e.g., parent-child relationship, parents'-relationship quality) and of parenting (e.g., discipline, monitoring) and that this would affect risk for *ataques*.

Method

Participants

This study used the island-wide epidemiological dataset collected by Canino et al. (2004). Children aged 4–17 years were selected from a probability household sample that included four strata: Puerto Rico's health reform areas, urban versus rural areas, participant age, and participant sex using US 1990 Census' block groups as primary sampling units. These units were classified according to economic level and size, grouped into block clusters, and further classified as urban or rural. Three hundred block clusters were randomly selected and then divided into two random replicates. A household was selected for inclusion in the study if it had children between the ages of 4–17 years. One child was selected at random from each household using Kish (1965) Tables adjusted for age and gender. Out of 2,102 eligible households, 1,890 children and 1,897 primary caretakers were interviewed forming 1,886 parent-child dyads for total completion rate of 90.1 % for parent-child dyads.

Interviews took place from September 1999 to December 2000 (50 % completed by late May, 2000). The sample was weighted to represent the general population in the

year 2000, which corrected for differences in the probability of selection because of the sampling design and adjusted for no response. Thus, the distribution by sex and age of the sample obtained is similar to that of the 2000 US census of the PR population, with 51.1 % male, 50.2 % age 4–10 years and 49.8 % age 11–17 years. In this study, we used only the subsample that had direct exposure to the hurricane. The demographics for this subsample of children are: (N = 582) with 51.0 % male; and for youth are (N = 569) with 51.8 % male. Over half the sample perceived they “lived well” (44.2 %), 34.1 % indicated they lived “check to check,” and 21.6 % said they “lived poorly.”

Procedure

Informed consent was obtained from the parent; children aged 6–17 years provided assent. The survey was performed from September 1999 through December 2000. The primary caretaker selected for the interview was based on who had close and regular contact with the child for the longest time during the last 6 months and was at least 18 years old (biological mother = 89.4 %). Many interviews took place in the home of a relative because many houses were destroyed by the hurricane. Different interviewers were used for parent and child, and the interviewers were blind to the results of each other’s interviews. Interviews were audio taped, and 15 % were spot checked for quality control purposes.

Measures

A multi-stage method was used for cross-cultural adaptation and translation of study measures (Bullinger et al. 1998). The result was a translated version of the instrument that tackles the major dimensions of cross-cultural equivalence: content, semantic, technical, criterion and concept equivalence (Canino and Bravo 1994; Bravo et al. 1991; Matías-Carrelo et al. 2003).

Ataques de Nervios

Since the interviews occurred between 12 and 27 months post-disaster, a past year time frame only may have missed cases of *ataques*. Therefore, participants were asked about lifetime and past year experiences of *ataques*. First, caregivers and youth were asked a single question about whether or not the participant ever had an *ataque*. This question has been used in studies with adults (Guarnaccia et al. 1993; Liebowitz et al. 1994). Participants were considered to have experienced *ataques* in their lifetime if either they or their caregiver endorsed that the child/youth had experienced an *ataque*. Participants and caregivers

who endorsed that the child/youth had experienced an *ataque* ever in their lifetime were then asked if the child/youth had experienced an *ataque* in the past year. Participants were considered to have experienced an *ataque* in the past year if either they or their caregiver endorsed the item.

Hurricane Exposure Questionnaire

Questionnaires for caretakers (19 items) and youth (six items; age 11–17 years) were adapted from earlier disaster studies (Bravo et al. 1990; Norris and Kaniasty 1992) and modified for children using the La Greca et al. (1996) hurricane exposure questionnaire as a guide. Items assessed direct exposure to the child and to the family as a unit. Items pertaining to child exposure include *life threat/loss* (physical injury to the child or a significant other, loss of a family member or a person close to him/her), *loss of material objects*, and *child’s disruption of everyday life* (separation from family, still living out of home at time of interview). Parents provided information about their *exposure to the hurricane* (feeling afraid of dying or being hurt, becoming ill or injured during the hurricane) or *loss or damage to their home*. A continuous measure was developed by summing the counts for specific exposure experiences across the child and family unit, with higher scores indicating more severe exposure (range 1–15). Cronbach’s alpha for the total sample from which the subsample for this study was drawn was acceptable at .72.

Family Environment

The diagonal in Table 1 shows the significant, positive correlations of parent and youth report for the measures described below.

Parental Monitoring (Patterson and Stouthamer-Loeber 1984) This 11-item questionnaire measures the extent of parental supervision and monitoring, with separate versions for children and adults. Items ascertain setting curfews, monitoring friends, supervision, and tracking of the child’s whereabouts after school. Higher scores indicate more monitoring. Scale reliabilities for the original instrument are .54 for White, .70 for African-American, and .72 for Hispanic participants. For the total sample, $\alpha = .64$ for parent and $\alpha = .66$ for youth.

Parental Discipline (Goodman et al. 1998) This 10-item measure for children and adults assesses discipline style when the youth misbehave. Items measure positive (e.g., removal of privileges, have youth explain what they did wrong) and negative discipline strategies (e.g., yelling, hitting). Higher scores indicate greater use of that discipline type. For the total sample, for positive discipline

Table 1 Correlations between family environment, exposure, and *ataque de nervios* for the Hurricane exposed group

	1	2	3	4	5	6	7	8
Youth sample (age 11–17; N = 569)								
1. Parent–child involvement	.18*	.33*	-.17*	.18*	.32*	-.03	.02	-.01
2. Positive discipline	.19*	.23*	.28*	.17*	.03	-.04	-.09*	-.12*
3. Negative discipline	.53*	.32*	.31*	.38*	-.17*	-.01	-.15*	-.13*
4. Parents’ relationship quality	.27*	-.03	-.24*	.36*	-.19*	-.09*	-.06	-.13*
5. Parental monitoring	.24*	.07*	-.08*	.16*	.17*	.05	-.08	.09
6. Hurricane exposure	-.01	-.02	-.02	-.03	-.03	–	.10*	.08*
7. Lifetime <i>ataque</i>	-.21*	-.08	-.15*	-.11*	-.03	.10*	–	.69*
8. Past year <i>ataque</i>	-.17*	-.08*	-.11*	-.06	.01	.08*	.69*	–
Children sample (age 4–10; N = 582)								
1. Parent–child involvement	–							
2. Positive discipline	.21*	–						
3. Negative discipline	.53*	.27*	–					
4. Parents’ relationship quality	.31*	-.02	.25*	–				
5. Parental monitoring	.25*	.17*	-.18*	.21*	–			
6. Hurricane exposure	.04	-.04	-.03	.02	.06	–		
7. Lifetime <i>ataques</i>	-.06*	-.08*	.08	-.11*	-.07	.13*	–	
8. Past year <i>ataques</i>	-.16*	-.08*	.05	-.11*	.07	.06	.76*	–

For youth sample, the top half of the table shows the correlation matrix for youth report and the bottom half is for adult report. Diagonals show the correlation between the youth and parent report versions

There is no correlation between parent and youth report for hurricane exposure, or either of the *ataques* variables because parent and youth report were combined into one variable for each of these variables

* $p < .01$

$\alpha = .51$ for parent and $\alpha = .58$ for youth, and for negative discipline $\alpha = .62$ for parent and $\alpha = .63$ for youth.

Parent–Child Relationship Quality (Smith and Krohn 1995) This 10-item scale measures the parent or primary caretaker’s perception of the affective component of the parent–child relationship, including parent–child warmth, liking, lack of hostility, and sense of parental approval. Higher scores indicate more positive parent–child relationship quality. The estimates of scale reliability range from .76 to .82. For the total sample, $\alpha = .73$.

Parent–Child Involvement (Loeber et al. 1998) This is a youth report measure of shared time (e.g., how often is your parent available to do things with you), support (e.g., help you with important decisions), and activities (e.g., play sports or games with you) with their parents or caregivers. Higher scores indicate greater involvement. A 12-item version of this scale has been used in prior research with Puerto Rican youth with good internal consistency ($\alpha = .85$) (Bird et al. 2006). Internal consistency for the 10-item version used in the total sample was acceptable ($\alpha = .79$).

Parents’ Relationship Quality (Marital Harmony and Discord Scale; Sharpley and Cross 1982) This is a 6-item short version of Spanier’s Dyadic Adjustment Scale (Spanier 1976). Respondents indicate the extent to

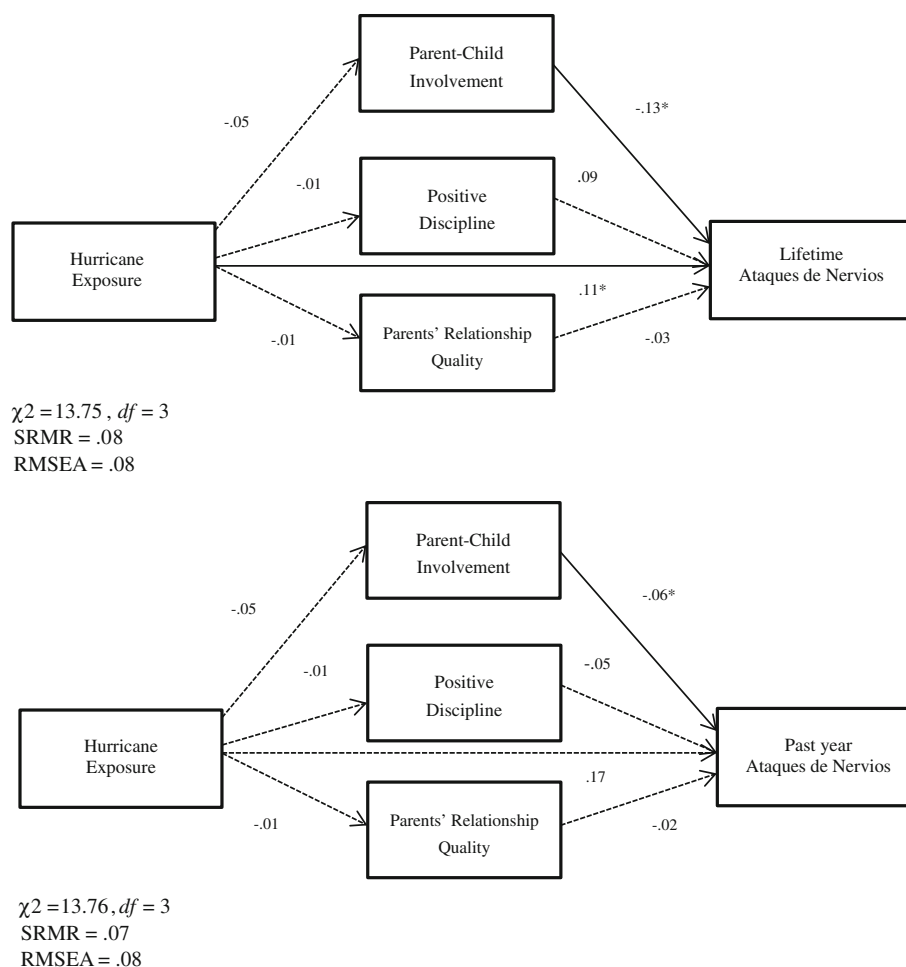
which they and their spouse/partner agree on a philosophy of life, work and spend time together, agree on life goals and aims, and discuss and exchange ideas. Parents were also asked whether or not they ever hit each other when they quarrel. Higher scores indicate a more harmonious relationship. There is a nine-item child version that assesses the child’s perception of conflict between parents. For the total sample, $\alpha = .83$ for parent and $\alpha = .76$ for youth, indicating acceptable internal consistency.

Data Analysis

Correlations by age were conducted to show the inter-relationships among study variables. Given the large developmental span covered in the sample, we separated children (ages 4–10 years; $N = 582$) and youth (ages 11–17 years; $N = 569$) to explore potential differences. We could not divide the sample further due to loss of statistical power (Felix et al. 2011). In addition, methodologically, this was a sensible division, as only youth age 11 years and older were interviewed in addition to the parent. As youths’ perceptions of parent–child relationships were likely to differ from their parents’, as indicated by the low correlations obtained, we analyzed parent and youth report separately.

We used structural equation modeling (SEM) to analyze the complex interplay among family environment variables on the relationship between disaster

Fig. 1 Final models of the family microsystem influence on the exposure—*Ataques de Nervios* relationship for children ages 4–10 years (N = 582)



exposure and lifetime or past year experience *ataques* (see Fig. 1). The continuous disaster exposure variable (range 1–15) was used. This method of analysis of disaster exposure has been used in numerous studies and is a well-recognized method of determining the influence of severity of exposure (North and Norris 2006). All procedures were performed using Mplus (Muthén and Muthén 2003). After preliminary analysis, only those family variables with statistically significant effects on the outcome were retained to achieve a parsimonious model. For evidence of a mediating effect, both the path from a hurricane exposure to a family environment variable and the path from a family variable to *ataques* should be significant. Standardized coefficients are reported and are useful to determine whether a one standard deviation change in one independent variable produces more of a change in relative position than a one standard deviation change in another independent variable, when both of them are significant. The magnitude of standardized coefficients is not related to the significance of the variable.

Model Evaluation and Missing Data

Results show that data were multivariately kurtose; all analyses were based on robust statistics. When data are non-normally distributed, maximum likelihood estimation can produce distorted results (Curran et al. 1996). The Satorra–Bentler scaled statistic (S–B χ^2) was used because it provides a correction to test statistics and standard errors when data are non-normally distributed. The data model fit was evaluated using the combinational rule recommended by Hu and Bentler (1999): standardized root-mean-square residual (SRMR) and root-mean-square error of approximation (RMSEA). To obtain unbiased estimates of the parameters of interest despite the incomplete data, this study used full information maximum likelihood (FIML) estimation.

Results

This study examined how hurricane exposure and characteristics of the family environment are related to past

year and lifetime rates of *ataques de nervios* among children and youth directly exposed to Hurricane Georges. Among those exposed, approximately, 8.9 % of the youth and 11.2 % of the adolescent sample had a lifetime experience of an *ataque* and 5.3 % of the youth and 5.6 % of the adolescent sample had an *ataque* in the past year.

Table 1 shows the correlations among study variables by age group, and for youth by informant (parent report in the bottom half and youth report in the top half). The diagonal shows the correlations between parent and youth report. Parent and youth report were significantly, positively correlated with one another ($r = .17-.36$). However, as the magnitude of the correlations was small, we analyzed parent and youth report separately. In addition, there were some differences in the pattern of correlations between parent and youth report; for example, parent-child involvement and past year *ataques* was negatively correlated per parent report, but it was not significantly correlated per youth report. Likewise, there were some age differences, which supported our decision to examine the models separately by age group. For children, parents' relationship quality was negatively correlated to past year *ataques*, but for youth it varied by informant. Per youth report, there was negative correlation for past year *ataques*, but per parent report there were not.

We tested the family environment variables as mediators between hurricane exposure and *ataques*. To test the significance of mediating effects, we used the bootstrapping method outlined by Shrout and Bolger (2002). Using Preacher and Hayes's (2008) nonparametric bootstrapping approach, we tested whether there was a significant indirect effect from hurricane exposure to *ataques* through the family variables. This method utilizes repeatedly sampling from the data set and estimating the indirect effect in each resampled data set. This approach is recommended over the traditional Sobel test since it makes no assumptions regarding the shape of the sampling distribution of the indirect effect (Hayes 2009).

For children aged 4–10 years, the fit of the models was deemed acceptable in terms of SRMR and RMSEA. The parameter estimates for the hypothesized models are presented in Fig. 1. For children aged 4–10 years, hurricane exposure had a significant, direct effect on lifetime ($\beta = .11$) experience of *ataques*, however not for past year experience of *ataques*. Parent-child involvement was negatively related to past year experience of *ataques* ($\beta = -.06$) and to lifetime experience of *ataques* ($\beta = -.13$). However, none of the family variables had a significant mediating role in the relation between hurricane exposure and either past year or lifetime experience of *ataques*.

For youth aged 11–17 years, both parent and youth report are available. The parameter estimates for the hypothesized models are presented in Figs. 2 and 3. The fit of the models was deemed acceptable in terms of SRMR and RMSEA. Across both informants, hurricane exposure did not have a significant, direct effect on either lifetime and past year experience of *ataques* when the influence of family environment was considered. Hurricane exposure did influence family dynamics per youth report, but not from the parents' perspective.

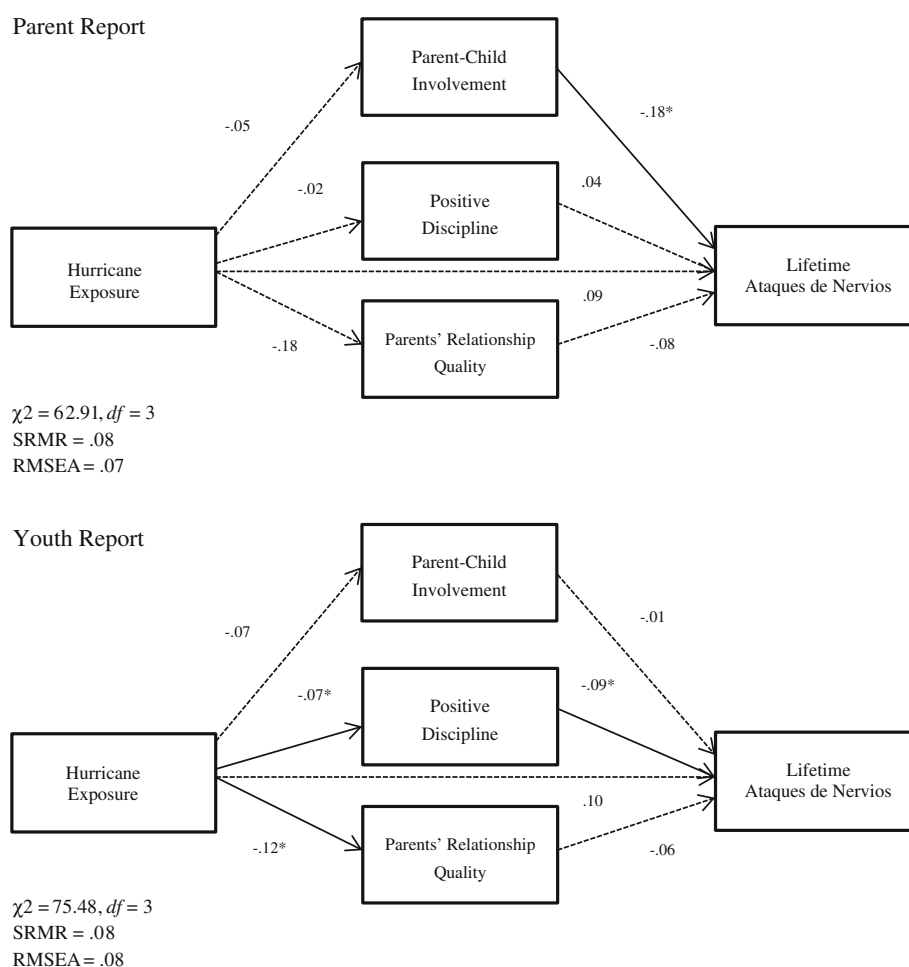
For lifetime experience of *ataques*, per youth report, positive discipline mediated the relationship between hurricane exposure and *ataques*. Hurricane exposure decreased positive discipline, and positive discipline decreased risk for lifetime experience of *ataques*. For past year *ataques*, per youth, there was also a relationship between hurricane exposure and positive discipline, but positive discipline was not related to *ataques*. Parents' relationship quality mediated the relationship between hurricane exposure and past year *ataques*. Hurricane exposure decreased parents' relationship quality, and parents' relationship quality decreased risk for *ataques* in the past year. In contrast, per parent report, there was no relationship between hurricane exposure and positive discipline or between positive discipline and past year or lifetime *ataques*.

Although there was not mediation, there were other interesting, significant relations to note. Per youth report, whether considering current or lifetime *ataques*, hurricane exposure was significantly, negatively related to parents' relationship quality. However, parents' did not perceive that the hurricane exposure influenced their relationship with their spouse or partner. In addition, per parent report, parent-child involvement decreased risk for past year or lifetime *ataques*, but this was not found when examining youth report.

Discussion

A growing body of research suggests that disasters put families at risk for future problems, possibly through changing interpersonal dynamics (Bonanno et al. 2010). Approximately 18 months after Hurricane Georges made landfall in Puerto Rico, we examined how aspects of the family environment related to past year and lifetime experience of *ataques de nervios* among children and youth. The family environment factors examined in this study are ones that may give clues as to what may promote resilience and recovery in children and youth post-disaster. Although we expected family environment to mediate the relationship between exposure and *ataques*, we found only partial support for this. Instead, the relations among

Fig. 2 Final models of the family microsystem influence on the exposure—lifetime *Ataques de Nervios* relationship for youth ages 11–17 years (N = 569)



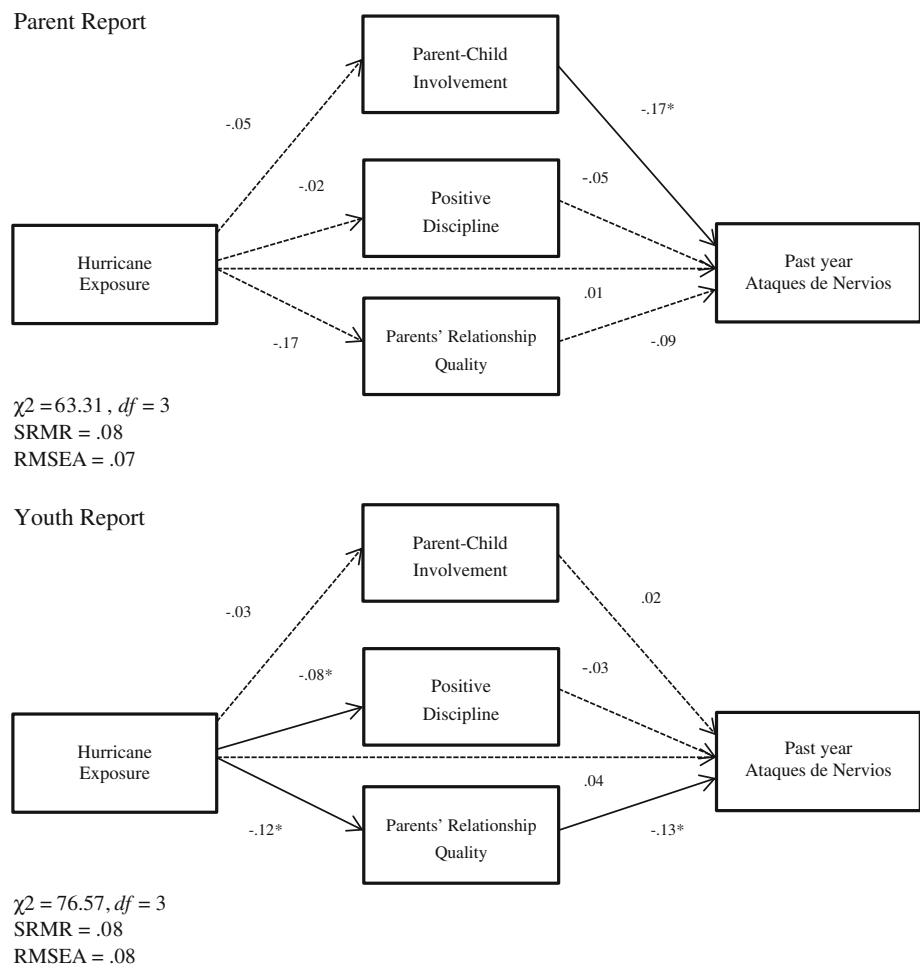
hurricane exposure, family environment, and *ataques* varied depending on the aspect of the family environment being studied.

For children aged 4–10 years, hurricane exposure had direct effects on lifetime *ataques*, but not for past year experience of *ataques*. Parent–child involvement was associated with decreased risk for both past year and lifetime experience of *ataques*. This finding for parent–child involvement also emerged among youth from the parents’ perspective, and hypotheses to explain this relationship are discussed below. Overall, these findings are consistent with prior research with this sample of children when the outcome was rates of internalizing psychopathology post-disaster (Felix et al. 2013). However, none of the family variables had a significant mediating role in the relation between hurricane exposure and either past year or lifetime experience of *ataques*.

For youth aged 11–17 years, both parent and youth report were obtained and interesting similarities and differences were discovered. Correlations between parent and youth report were low, but positive, which is consistent with prior trauma and disaster research (e.g., Rowe et al.

2010; Valentino et al. 2010). This indicated the need to examine models separately, as youth may have a different view from adults. For both parent and youth report, when family factors were considered, hurricane exposure did not have a direct effect on either lifetime and past year *ataques*. However, hurricane exposure was related to family dynamics. Per youth report, whether considering current or lifetime *ataques*, there was a significant, negative relationship of hurricane exposure to parents’ relationship quality. Parents’ relationship quality mediated the relationship between hurricane exposure and past year experience of *ataques*. Thus, parents may be experiencing stress in the recovery and rebuilding that is negatively affecting the quality of their relationship with their partner. An extensive review supports that disasters affect family relationships, and family conflicts and a negative family home environment can increase distress among youth post-disaster (Bonanno et al. 2010). It is interesting, however, that from the parents’ perspective, they did not perceive the hurricane experience as affecting their relationship quality with their spouse or partner, nor did they see this as affecting their child’s mental health. This supports that

Fig. 3 Final models of the family microsystem influence on the exposure—past year *Ataque de Nervios* relationship for youth ages 11–17 years (N = 569)



parents and youth may have different opinions about family dynamics, and thus both perspectives need to be obtained when planning post-disaster mental health services.

Per youth, hurricane exposure significantly decreased positive discipline. Positive discipline mediated the relationship between hurricane exposure and lifetime experience of *ataques*, but did not for past year *ataques*. Positive discipline had no significant relations in the parent report models. Parents and youth may have different opinions on the appropriateness and effectiveness of this discipline strategy. Some items of the positive discipline scale involved parents telling and explaining to their child what they did wrong. It could be that youth with lifetime *ataques* were more likely to perceive they were disciplined frequently or were more sensitive to this type of discipline. It also could be that youth who were more distressed elicited more attention from parents (Wilson et al. 2010), including discipline.

Our findings support parent–child involvement as a protective influence, as parent–child involvement decreased risk for lifetime and past year *ataques*, per parent

report. Prior research has shown caregiver unavailability to talk after a hurricane was related to posttraumatic stress symptoms after a hurricane (Gil-Rivas et al. 2010), suggesting that lack of involvement may be a risk factor. Interestingly, this protective relationship was not found among youth report. Overall, this pattern of a significant relationship per parent, but not youth report, was also found in our prior research on internalizing psychopathology post-disaster (Felix et al. 2013). This highlights that child outcomes may depend on who you ask. Parents and adolescents may have very different views of family dynamics and what contributes to the child’s well-being.

Negative discipline and parental monitoring were not included in our final SEM models because of a lack of significant relations. Although these two variables had significant correlations with either family environment or *ataques* experiences across youth and children sample, when included in the model with other family variables, negative discipline and parental monitoring did not emerge as significant predictors. In a community study of distant exposure to the September 11, 2001 terrorist attacks, parental discipline also did not emerge as significantly

related to posttraumatic stress symptoms (Wilson et al. 2010). In our study, when examining frequencies we discovered that parents were much less likely to say they engaged in the behaviors composing the negative discipline scale. This may have limited variation to detect findings for that discipline subtype. It is possible parents may have been less likely to endorse negative discipline scale items due to self-presentation bias. Observational research of parenting could potentially reduce this problem. Rowe et al. (2010) found that low parental monitoring was related to parent and adolescent reported posttraumatic stress in a clinical sample following Hurricane Katrina. Thus, parental monitoring may have more of an influence in clinical subsamples of youth.

Public mental health efforts post-disaster must attend to issues of cultural diversity in the populations affected, particularly by being sensitive to cultural expressions of distress in mental health screening efforts. This study fills an important gap in the existing research by exploring the role of family environment on rates of *ataques de nervios* following a disaster among Puerto Rican children and youth. The rigorous research design, sampling strategy, and interview methodology is an improvement over many prior disaster studies that often rely on convenience samples, and strengthens the conclusions that can be drawn from this study.

Nonetheless, there are limitations to consider that should be addressed in future research. Like most disaster studies, we do not have pre-hurricane information on family dynamics or mental health that can help determine causality. Second, although measures were selected from those with established psychometrics in the late 1990s, and were pilot-tested prior to data collection in Puerto Rico, a few of our family environment measures had lower internal consistency with this sample, which could affect the ability to detect significant results. There are likely more culturally and linguistically appropriate measures to select from now. Third, to both methodologically and statistically test mediation, studies need three time points of data to understand the causal relationships among constructs. With hurricane exposure as one time point, and our assessment as the second time point, we still do not have enough measurement time points to fully assess for true mediation. This is a needed area of research to better understand the post-disaster recovery process. Fourth, our interviews were conducted approximately 18 months after the disaster. Some family factors that were non-significant in this study may have a stronger role to play in the first year of recovery. Finally, we assessed the family environment through surveys, and studies employing observational methods may have different results. Observational studies can overcome some of the limitations of parent and child report, by noting the types and frequency of transactions

that occur that contribute to perceptions about the quality of relationships, discipline, and monitoring.

In sum, this study contributed to the growing body of literature examining cultural issues in the expression of distress, particularly in the post-disaster recovery of Latino children and youth. Our findings supported that disasters can increase risk of experiencing both lifetime and past year *ataques* through their impact on family relationships for youth. However, for children, hurricane exposure had a direct relationship to *ataques*, regardless of family factors. This indicates that disaster responders should screen for *ataques*, among other mental health symptoms, among Latino children and youth. The fact that we can see increased risk for *ataques* at approximately 18 months or more post-disaster speaks to the need to support survivors for the long term. Clinicians serving children, youth, and families with on-going post-disaster distress should assess, monitor, and address the quality of family relationships and parenting, and provide needed therapeutic supports to parents who are struggling. Some of the differences between parent and youth report of how discipline and parents' relationship quality affected the youth indicates that clinicians should interview both parents and youth for their perspective on family dynamics post-disaster. The overall results of this study also suggest that culturally-sensitive family therapy may be an important additional treatment modality for children and youth showing evidence of distress post-disaster, in conjunction with individually-focused interventions.

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