



Published in final edited form as:

*J Nerv Ment Dis.* 2010 April ; 198(4): 272–279. doi:10.1097/NMD.0b013e3181d61271.

## Child and Family Psychiatric and Psychological Factors Associated With Child Physical Health Problems:

### Results From the Boricua Youth Study

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### Abstract

To examine associations among Puerto Rican children's physical health problems and children's internalizing disorders, parental psychopathology and acculturative stress, and family factors. A population-based probability sample of 2491 Puerto Rican children, aged between 5 and 13 years, and caregivers from the South Bronx and the U.S. Commonwealth of Puerto Rico participated in this study. The parent version of the Diagnostic Interview Schedule for Children-IV was used to assess children's internalizing disorders. Children's anxiety disorders, parental psychopathology, and acculturative stress were associated with childhood asthma, abdominal pain, and headaches. Children's depressive disorders, maternal acceptance, and family functioning were associated with abdominal pain and headaches. Parents of children living in Puerto Rico were more likely to report physical health problems in their children than in the Bronx. Children's internalizing disorders, parental psychopathology, and acculturative stress may be important areas to target among Puerto Rican children with physical health problems.

### Keywords

Abdominal pain; asthma; headaches; mental health; Puerto Rican

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Children with a variety of physical health problems and their parents appear to be at greater risk for internalizing symptoms and disorders (e.g., depression, anxiety). The consistency of

these findings is striking given that studies have focused on disorders that are considered functionally somatic (e.g., recurrent abdominal pain, tension headaches), as well as organic (e.g., asthma, migraine headache). Children's internalizing symptoms and disorders are associated with abdominal pain (Egger et al., 1999; Garber et al., 1990), headaches (Anttila et al., 2004; Egger et al., 1998), and asthma (Feldman et al., 2006; Goodwin et al., 2004; Katon et al., 2007). Parents of children with abdominal pain (Campo et al., 2007; Garber et al., 1990), headaches (Emiroglu et al., 2004), and asthma (Ortega et al., 2004) also have elevated levels of internalizing symptoms and disorders. Therefore, measuring both child and parent psychopathology can contribute to better understanding of children's physical health problems. The present study focuses on children's abdominal pain, headaches, and asthma to test hypotheses about children's physical health problems across both functionally somatic and organic disorders.

## **PARENTS' PAIN AND STRESS AND CHILDREN'S PHYSICAL HEALTH PROBLEMS**

Social learning theory postulates that children's perception of their physical symptoms can be altered via parental modeling (Bandura, 1977), which may affect the expression of pain and functionally somatic symptoms. Children of parents with chronic pain report more abdominal pain and use more medication than children of parents without pain (Jamison and Walker, 1992). Parents' reports of their own somatization symptoms are associated with self-reports among children with recurrent unexplained abdominal pain, but not among children with explained abdominal pain or healthy controls (Walker et al., 1991). Children with recurrent unexplained pain report more models and positive reinforcement for pain behavior than children with recurrent explained pain (Osborne et al., 1989). The potential for secondary gain via parental attention and the sick role may contribute to functional disability among children with chronic pain, and these effects are most pronounced among children with internalizing symptoms (Peterson et al., 2004; Walker et al., 2002).

Parental stress and psychopathology may also play a role in organic diseases, such as pediatric asthma. Maternal stress predicts wheezing in infants (Wright et al., 2002), and continuous maternal distress from birth to age 7 predicts the development of childhood asthma (Kozyrskyj et al., 2008). Children with asthma who are exposed to a negative family emotional climate report more depressive symptoms, which in turn, are associated with greater asthma morbidity (Wood et al., 2007; Wood et al., 2006). This pathway between depression and morbidity is mediated by emotional triggers of asthma (Wood et al., 2007).

## **FAMILY FUNCTIONING AND CHILDREN'S PHYSICAL HEALTH PROBLEMS**

Family factors, such as parenting styles and family functioning, may be linked with disability levels across children's physical health problems. However, this body of literature is limited by lack of clarity in distinguishing between individual parenting factors (e.g., parenting style), dyadic variables (e.g., parent-child communication), and family level variables (e.g., family functioning) (Palermo et al., 2005). Clinical studies of children with recurrent headaches and abdominal pain show that their parents report greater levels of family problems (Anttila et al., 2004; Emiroglu et al., 2004), marital problems (Zuckerman et al., 1987), divorce (Juang et al., 2004), child physical abuse (Juang et al., 2004), and child sexual abuse (Emiroglu et al., 2004) than controls. Conversely, functional family interactions and a positive support system may be protective and predict lower risk for having an atopic disease, including asthma, in early childhood (Gustafsson et al., 2002).

## ETHNICITY, CULTURE, AND REPORT OF SOMATIC SYMPTOMS

Epidemiological studies show that island Puerto Rican adults report higher rates of somatic symptoms than other ethnic groups, including Anglos, immigrant Mexican-Americans and Mexican-American natives (Canino et al., 1992; Escobar et al., 1989; Shrout et al., 1992). Few epidemiological studies have examined somatic symptom reports among Puerto Rican children. One study (Canino et al., 1999) examined somatic symptoms among a probability community sample of children who endorsed anxiety symptoms. Latino (mostly Puerto Rican) children had more cardiovascular somatic symptoms than Anglo and African-American children. However, this finding was confounded by lower parental income among Latino families and no longer significant after controlling for family income. Given this relationship between lower levels of socioeconomic status (SES) and greater risk for somatic symptoms (Santalahti et al., 2005; Taylor et al., 1996) and asthma (Claudio et al., 2006) in children, it is important to distinguish the effects of SES from ethnicity and culture. There is greater heterogeneity of SES found among Latinos living in their culture of origin (e.g., Puerto Rico, Mexico) than in the United States, where SES tends to be low among Latinos.

Comparing ethnic group members residing in the United States to members in their culture of origin is an effective methodology for teasing apart the independent effects of poverty and ethnicity (Canino, 2004). Using this methodology, a school-based study found that Mexican children living in Mexico and Mexican-American children in the United States reported more somatic symptoms of anxiety and related distress than Anglo children, independent of SES (Varela et al., 2004). The effects were largest in Mexican children, and these findings might be linked to aspects of Mexican culture, including collectivism, *simpatia* (i.e., empathy and respect for others), and authoritarian, overcontrolling parenting styles. Examples of overcontrol may include ending discussions with children when controversial topics are raised, demanding child acceptance of parents' values, and encouraging dependence of the child on the parent. Restricting a child's ability to communicate with parents when they disagree and express different cultural beliefs may contribute to higher levels of somatic symptoms.

Acculturative stress refers to distress that is associated with pressure to assimilate and accept new cultural values and beliefs. Acculturative stress is associated with mental disorders (Breslau et al., 2007) and poor perceived physical health in adults (Finch et al., 2003), and depressive symptoms in children (Romero et al., 2003). Both parent and child acculturative stress have stronger associations with Puerto Rican children's internalizing symptoms than levels of acculturation (Duarte et al., 2008). The stressful nature of integrating to a different culture, and potential conflicts within the family, may be important to children's physical health.

## RATIONALE FOR THE CURRENT STUDY

Most of the prior studies on children's physical health problems and psychological variables are limited by the use of convenience samples. The present study was a population-based, epidemiological design consisting of random, representative samples from 2 sites. The goals of the current study were 3-fold. The first goal was to examine associations between Puerto Rican children's physical health problems and children's internalizing disorders, parent, cultural, and family level factors. We hypothesized that children's internalizing disorders, parental psychopathology, and parental acculturative stress would have stronger associations with children's physical health problems than parenting styles and family level factors. The second goal was to examine whether the previously established link between children's internalizing disorders, parental psychopathology, and asthma (Ortega et al., 2004) is a specific one or generalizes to other physical health problems, including functionally somatic diseases. We expected to find consistent relationships across physical health problems. The final goal

(3) was to examine if headaches and abdominal pain are more prevalent among Puerto Rican children living in Puerto Rico or the South Bronx. Prior analyses from this data set showed that asthma was more prevalent in Puerto Rico than the South Bronx (Cohen et al., 2007), but other physical health measures have not been examined.

## METHODS

### Study Design and Participants

Data for this study are from the Boricua Youth Study, which examined antisocial behaviors and other psychiatric disorders (Bird et al., 2006). This study employed a multistage probability sample design to recruit participants. Primary sampling units were household clusters randomly selected from the South Bronx and the standard metropolitan areas of San Juan and Caguas in Puerto Rico. Household clusters were defined using the 1990 U.S Census and then later updated when the 2000 U.S. Census became available. Secondary sampling units were randomly selected households within the primary sampling units.

Participants were children between the ages of 5 and 13 years who were identified by their parents/caregivers as being of Puerto Rican background, and had lived in the household for at least 9 months of the past year. At least 1 of the child's parents/caregivers residing in the household had to self-identify as being of Puerto Rican background. Children were excluded if their parents identified them as being diagnosed with mental retardation or a developmental disability. A maximum of 3 eligible children per household were allowed to participate in the study. Random selection of children in the household was used for families with more than 3 eligible children. We used SUDAAN software to adjust standard errors for intraclass correlations induced by allowing up to 3 children per household to participate. Children were nested within households, and households were nested within primary sampling units.

### Procedure

Parent consent and child assent (for children over 7 years) were obtained for all families. The adult informant was the child's biological mother in approximately 89% of the interviews. The other adult informants included grandmothers (4.5%), adoptive or stepmothers (2.8%), biological fathers (1.8%), and others (1.9%; e.g., adult siblings, aunts). Participants chose whether they preferred the interview in English or Spanish, and switching between languages was allowed during the interview. In the South Bronx, 75% of the parents and 97% of the children preferred English, and all participants in Puerto Rico chose Spanish. Different interviewers were used for the child and parent interviews, which were conducted separately and in private to the extent possible. All interviews were audiotaped, and 15% were reviewed for quality control purposes. The study was approved by the Institutional Review Boards at the University of Puerto Rico, Medical Sciences Campus and the New York State Psychiatric Institute.

### Measures of Children's Internalizing Disorders

The Diagnostic Interview Schedule for Children (DISC)-IV (Shaffer et al., 2000) (parent report of child) is a structured diagnostic interview used to assess children's DSM-IV disorders during the past year. The child version was not administered to children younger than 10 years, since reliability with this age group ranges from poor to fair (Schwab-Stone et al., 1994). Analyses are based only on parent reports to enable comparisons across the entire age range (5–13 years). The DISC impairment algorithm was used to ensure that psychiatric diagnoses met full DSM-IV criteria. Depressive disorders included major depressive disorder and dysthymia. Anxiety disorders included social phobia, panic, generalized anxiety, separation anxiety, and post-traumatic stress disorder. The Spanish version of the DISC-IV has good test-retest reliability, which is comparable with the English version (Bravo et al., 2001; Shaffer et al., 2000).

## Translation and Adaptation of Scales for the Current Study

If a previously validated assessment tool was not available for use with a Puerto Rican population, then the following procedure was followed. Scales were translated from English to Spanish, back-translated, and culturally adapted for use with Puerto Rican populations using state-of-the-art methods employed previously by the Puerto Rican team of investigators (Canino and Bravo, 1994; Matias-Carrelo et al., 2003). These methods ensured cross-cultural semantic equivalence (similar meaning of items in each culture), content equivalence (content is relevant for the population), and technical equivalence (original and translated versions must yield comparable data). Questionnaires were also reviewed to ensure that wording and complexity of the items were appropriate for subjects with low literacy levels.

## Children's Physical Health Measures

The assessment of children's physical health measures (parent report of child) included the following yes/no questions. "We are interested in any medical problems that your child has had. Has your child ever had frequent and strong stomach aches? Frequent headaches or migraines? Asthma?"

## Measures of Parental Factors

Lifetime history of parental psychopathology was assessed by parent self-report on the Family History Screen for Epidemiologic Studies (FHE) (Lish et al., 1995). The psychometrics of the FHE were established as part of the Methods for the Epidemiology of Child and Adolescent Mental Disorders (MECA) study, a collaborative study of 4 communities in the United States and Puerto Rico (Lahey et al., 1996). The results of this study showed that the FHE had good sensitivity (88.5) and specificity (73.3) for measurement of any lifetime psychiatric diagnosis. The FHE assesses depression, suicide attempts/suicide, mental illness, mental health treatment, and alcohol/drug problems. In addition, 1 item assessing lifetime history of *ataques de nervios* (nervous attacks) was added to the questionnaire. An *ataque de nervios* is a reaction to a stressful event that includes multiple behavioral (e.g., screaming, crying) and physical symptoms, and feeling out of control (Guarnaccia, 1993). It is a cultural-bound syndrome that has been widely documented among Puerto Ricans. A positive lifetime history of parental psychopathology was coded as positive if any of the above mental health problems were reported for the child's mother, father, or caregiver. This measure of parental psychopathology was associated with Puerto Rican children's asthma attacks, independent of children's internalizing disorders (Ortega et al., 2004).

Assessment of parenting styles was measured by 3 scales. The Parental Monitoring scale (Patterson et al., 1984) is a 9-item, parent and child self-report measure that assesses how closely parents keep track of children's whereabouts (e.g., "How often do you or your child's other caretakers know where your child is when he is not at home?") and control over activities (e.g., video games). Only children ages 10 and over completed this measure, as it is not age-appropriate for younger children. Responses are based on a 4-point Likert scale. The Parental Monitoring Scale has good test-retest reliability (0.77) and correlates with measures of delinquency, with good differentiation between moderate versus persistent delinquent offenders (Patterson et al., 1984). Both parent ( $\alpha = 0.55$ ) and child ( $\alpha = 0.51$ ) versions were administered with adequate internal consistency in this sample. Parent scores ranged from 3 to 18 and child scores ranged from 1 to 24 on the Parental Monitoring Scale. The Parental Discipline scale (Goodman et al., 1998) is a 6-item, parent and child self-report measure of coercive discipline and punishment (e.g., "When your child has done something wrong, or something that you do not approve of, how often do you yell or swear at him?"). Children with psychiatric disorders received greater levels of parental discipline on this scale as part of the MECA study (Goodman et al., 1998). Both parent ( $\alpha = 0.54$ ) and child versions ( $\alpha = 0.67$ ) of the scale had adequate internal consistency in this sample. Responses are based on a 4-point

Likert scale and mean values ranged from 0 to 3. Parents also completed a 13-item Maternal Acceptance and Warmth scale (parent self-report), which was adapted from Hudson's Index of Parental Attitudes (Hudson, 1982; Smith et al., 1995), with adequate internal consistency ( $\alpha = 0.68$ ) in this sample. This measure includes items about trust, understanding, closeness, and feelings between mother and child (e.g., "How often do you feel proud of your child?"). Higher scores on this scale are associated with decreased risk for youth delinquency and greater perception of family involvement among Puerto Rican children in New York (Smith et al., 1995). Responses are based on a 4-point Likert scale, and mean scores ranged from 0.54 to 3.00.

### Acculturative Stress

Parental acculturative stress (parent self-report) was assessed using a 26-item scale adapted from the Hispanic Stress Inventory, which correlates with indices of psychological distress and has good test-retest reliability (Cervantes et al., 1990). This scale had good internal consistency ( $\alpha = 0.83$ ) in the current sample. Responses are based on a 3-point Likert scale, and mean scores ranged from 0 to 1.46. The scale was originally developed for Mexican Americans, and was adapted for use among Puerto Rican populations using the methods described above. The items on this scale assess stress that is associated with the process of acculturation, including family conflicts about cultural customs (e.g., "You have had arguments with other members of your family because your lifestyle and their lifestyles are different."), difficulty in mixing both cultures, and feelings of not belonging to either culture. Given the political status of the island (US territory), and its high levels of back and forth migration of the population to the United States, the scale was also administered in Puerto Rico in its original form. We acknowledge that some items of the scale (i.e., ethnic discrimination) may not have the same meaning at the 2 sites. However, we decided to include the entire scale in these analyses given the fact that in our initial results of the study, we found the scale to be correlated with disruptive behavior disorders, particularly at the Puerto Rico site (Bird et al., 2006).

### Family Level Measures

Family functioning was assessed by parent self-report on the Family APGAR (adaptability, partnership, growth, affection, and resolve) (Good et al., 1979), which is a 5-item measure of parents' satisfaction with family support, communication, and time spent together. The measure was used in a previous child psychiatric epidemiology study in Puerto Rico (Bird et al., 1988), and was significantly associated with caregiver psychopathology (Canino et al., 1990). The Family APGAR has moderate construct and discriminant validity (Good et al., 1979). This scale had good internal consistency ( $\alpha = 0.91$ ) in the current sample. Scores on this measure ranged from 0 to 10. Parent-child interaction was measured by child self-report on the 12-item Parent-Child Involvement scale (Loeber et al., 1998; Smith et al., 1995), which assesses communication, activities, and quality of the relationship between child and parent (e.g., "How often do your parents pay attention to your opinion or what you say?"). The Parent-Child Involvement scale is associated with delinquency, parental monitoring, and parent-child attachment in samples of Puerto Rican children from New York (Smith et al., 1995). Responses are dichotomous ("never or very rarely" or "often"), and mean scores ranged from 0 to 1 in the present study. Internal consistency ( $\alpha = 0.75$ ) was adequate in the present sample. The Parental Disciplines Practice Scale (Goodman et al., 1998) was adapted to create a child self-report measure of lifetime child neglect (e.g., medical neglect, left alone when an adult should have been present), physical abuse (e.g., being hit, beaten, or hurt badly), and verbal/psychological abuse (e.g., parent cursed at child on more than one occasion). Responses on this measure are dichotomous. The internal consistency of the scale in the current sample ( $\alpha = 0.67$ ) was adequate. Neglect and abuse were coded as positive if the child endorsed experiencing at least one item from each of these 3 domains. This measure has been tested as part of the MECA

study, and other analyses from the present data set show associations between child physical abuse and child alcohol use and depressive symptoms (Wu et al., 2006).

### Socio-Demographic Factors

Parent report of socio-demographic variables included maternal education, household constellation, household income, child's age, and gender.

### Data Analysis

Both samples were weighted to represent the age and gender distribution for the population of Puerto Rican children in the South Bronx and the standard metropolitan areas of Puerto Rico according to 2000 US Census Data. SUDAAN software was used to conduct analyses and to adjust standard errors for intraclass correlations induced by multistage sampling.

We conducted *chi square* analyses for categorical measures and *t*-tests for continuous measures to examine between-group differences (e.g., South Bronx, Puerto Rico) on measures. Logistic regression models were used to assess potential predictors (children's internalizing disorders, parent, cultural, and family factors) of children's physical health problems (asthma, abdominal pain, headaches). Child and parent measures were examined as separate variables in all analyses in this study. We report the adjusted odds ratios, after accounting for study site, child's age, child's gender, and propensity score, which was estimated using maternal education and age, and household income. A propensity score is recommended (D'Agostino, 1998) to reduce bias that may result from demographic differences between groups (South Bronx, Puerto Rico), and it reduces biases beyond controlling for covariates.

## RESULTS

The final sample of participants included 1138 child-parent dyads in the South Bronx and 1353 child-parent dyads in Puerto Rico for a total of 2491 children from 1643 households. Families with 1 child ( $n = 1009$ ), 2 children ( $n = 420$ ), and 3 children ( $n = 214$ ) participated in the study. In the South Bronx, 80.5% of eligible child-parent dyads completed the interview and an 88.7% completion rate was obtained in Puerto Rico ( $\chi^2 [1, N = 2943] = 39.43, p < 0.0001$ ).

### Study Site Differences: South Bronx and the US Commonwealth of Puerto Rico

Table 1 displays the sample characteristics for each site. Children living in Puerto Rico were more likely to have asthma, abdominal pain, and headaches than children living in the South Bronx (Goal 3). Mothers in Puerto Rico had higher educational levels than mothers in the South Bronx. Children in Puerto Rico were more likely to live in a 2-parent household than children in the South Bronx. No differences were found for household income, child's age, or gender.

Table 2 shows site differences for children's internalizing disorders, parent, cultural, and family factors. No site differences were found for children's depressive or anxiety disorders. Parents in Puerto Rico had higher rates of lifetime psychopathology than parents in the South Bronx. Parents in the South Bronx reported higher levels of acculturative stress, although the effect size was small. Parents in Puerto Rico reported less parental monitoring, but their children reported greater parental monitoring than children in the South Bronx. Children in the South Bronx reported greater parent-child involvement than children in Puerto Rico. More children in the South Bronx reported a lifetime history of physical and verbal abuse than island Puerto Rican children.

### Associations With Children's Physical Health Problems (Goals 1 and 2)

Table 3 shows that children's physical health measures had the strongest associations with children's internalizing disorders and parental acculturative stress. Children with anxiety

disorders were more likely to have parent-reported asthma, abdominal pain, and headaches than children without anxiety disorders. Although children's depressive disorders had larger associations with abdominal pain and headaches than anxiety disorders, the association between depressive disorders and asthma was not significant. Parental acculturative stress was associated with increased likelihood of asthma, abdominal pain, and headaches among children. The largest odds ratio was found for abdominal pain. Children of parents with psychopathology were more likely to have all 3 physical health problems than children of parents with no history of psychopathology.

Fewer associations were found between children's physical health problems and other parent and family level factors. Greater maternal acceptance and good family functioning were associated with lower odds for abdominal pain and headaches. Parent and child reports of parents using coercive discipline were each associated with headaches and asthma, respectively. Parents who reported greater monitoring of their children were less likely to report that their children experienced abdominal pain. Unadjusted and adjusted analyses showed similar associations. Females were less likely to have parent-reported asthma. Older children were less likely to have asthma, but more likely to have abdominal pain and headaches.

## DISCUSSION

This study showed that children's internalizing disorders, parental psychopathology, and parental acculturative stress were associated with Puerto Rican children's physical health problems. These factors may play an integral role in the expression of physical symptoms among Puerto Rican children. In general, parenting styles and family level factors were not consistently associated with children's physical health measures. These findings also suggest that the previously established link between children's internalizing disorders, parental psychopathology, and asthma (Ortega et al., 2004) is not a specific one, but rather generalizes to abdominal pain and headaches. Finally, children living in Puerto Rico appear to be at greater risk for physical health problems than Puerto Rican children living in the South Bronx.

### Emotions and Physical Health Problems

Children's anxiety disorders, parental psychopathology, and acculturative stress may be particularly salient factors in the relationship between emotions and physical health problems given the consistency of associations across all 3 disorders. Childhood depressive disorders were not as prevalent (1%) as anxiety disorders (4%), although depressive disorders had stronger associations with headaches and abdominal pain than anxiety disorders. Parents' psychopathology and acculturative stress may influence children's expression of both psychological and somatic symptoms via social learning theory (Bandura, 1977). Traditional parenting styles in Latino cultures, which emphasize strict child acceptance of parental beliefs with limited opportunities for discussion of child beliefs, may also lead to childhood anxiety and somatization (Canino, 2004; Varela et al., 2004). This aspect of the parent-child relationship may have been better captured by the measure of parental acculturative stress than measures of parenting styles.

Treatment of psychiatric disorders in both parents and children may be critical for reducing functional disability among Puerto Rican children with physical health problems. It is important for clinicians to consider emotional factors among Puerto Rican children with somatic complaints, regardless of whether the symptoms may be considered organic (e.g., asthma, migraine headache) or functionally somatic (e.g., recurrent abdominal pain, tension type headache). Experimental manipulations of parents' interactions with their children (e.g., attention, distraction) during pain induction tasks can alter child report of pain (Walker et al., 2006). Conversely, it is also important to consider the added stress that having a chronic,

physical health problem in childhood can have on both the child's and parents' emotional well-being.

### **Parenting Styles and Family Factors**

Parenting styles and family factors did not demonstrate consistent associations with children's physical health problems. The general absence of significant findings for parenting and family factors is not consistent with some clinical studies (Anttila et al., 2004; Emiroglu et al., 2004). This contradiction might be explained by the type of samples studied, as the present study used a probability, population-based sample of Puerto Rican families. The prior literature has also been limited by lack of clarity in measuring and integrating parenting and family factors in the same study (Palermo et al., 2005). Inadequate internal consistency of instruments used to measure certain parenting styles, such as parental monitoring and coercive discipline, may also have contributed to the lack of significant findings in the present study. Nevertheless, maternal acceptance/warmth was associated with decreased risk for abdominal pain and headaches, which may be a protective buffer against Puerto Rican children's physical health problems. Although good family functioning was also associated with decreased risk for abdominal pain and headaches, these findings were only marginally significant. Therefore, child and parent psychiatric symptoms and parent acculturative stress may be more salient to physical health problems for Puerto Rican children than the parenting and family factors in this study.

### **Differences Between the US Commonwealth of Puerto Rico and the South Bronx**

Children living in Puerto Rico had higher levels of parent-reported asthma, abdominal pain, and headaches than Puerto Rican children in the Bronx. This site difference is consistent with the adult literature showing that island Puerto Ricans have the highest rates of somatic symptoms across racial/ethnic groups (Canino et al., 1992; Escobar et al., 1989; Shrout et al., 1992). Differences in acculturation and exposure to parents who are more likely to somatize may contribute to these differences between island and mainland Puerto Rican children on functionally somatic disorders, such as tension headaches and recurrent abdominal pain. Our findings also indicate that parental psychopathology is more prevalent among parents in Puerto Rico. This difference may be related to a reporting style in which emotional and physical symptoms are not seen as undesirable among traditional Puerto Rican families as compared with other ethnic groups (Guarnaccia et al., 1990). This reporting style may be attenuated in the Bronx because Puerto Rican parents are more acculturated. Clinicians should be aware to assess these factors among parents, and their potential links with children's physical health problems in Puerto Rico and the mainland US.

### **Study Limitations and Future Directions**

There are limitations that should be considered when interpreting these results. Reports of children's physical health problems and internalizing disorders were based only on adult informants. Therefore, associations between parental psychopathology, children's internalizing disorders, and children's physical health measures may be biased by maternal emotional distress (Garber et al., 1998). However, maternal emotional distress may be an integral component that affects children's expression of emotional and physical symptoms. Additionally, the DISC does not contain a probe flowchart to inquire about physical symptoms, and whether they are medically explained or not. Another limitation is that asthma, headaches, and abdominal pain were each assessed by single item questions, and not confirmed by objective measures. Research is needed on validated questionnaires that assess a wider range of children's physical health problems. Nevertheless, similar single-item assessments of asthma among adults show good discriminant validity (Toren et al., 1993). Parent report of children's asthma symptoms is a better predictor of health care use and functional health status than

pulmonary function tests (Sharek et al., 2002). However, the cross-sectional nature of our data prevents conclusions concerning directionality.

Future studies should include child and parent report of their own physical symptoms and measures of frequency, duration of illness, severity, and functional impairment. Longitudinal research is needed to address temporal relationships and potential mechanisms. This will aid the development of culturally relevant interventions for families that address emotional and physical symptoms. This research is critical given that children's internalizing disorders are often not detected in pediatric settings (Katon et al., 2006), and they predict somatic complaints across time (Mulvaney et al., 2006).

## CONCLUSIONS

The present study was able to extend the prior epidemiological literature linking internalizing disorders, abdominal pain, and headaches among adolescents to a younger and Puerto Rican sample of children. The present study used a large, population-based design to tease apart the role of child, parent, family, and cultural factors across physical health problems in Puerto Rican children living on the island of Puerto Rico and in the South Bronx. These findings suggest an integrative model focused on children's internalizing disorders, parental psychopathology, and acculturative stress may be critical toward understanding stress-related physical health problems, and may be key areas to target in psychological interventions designed for Puerto Rican children with physical health problems.

## Acknowledgments

The authors thank Dr. Rafael Ramirez for conducting the analyses and offering statistical consultation.

Supported by the following grants: R01 MH069849 (to G.C.), R01 MH56401 (to H.B.), and 5P60 MD002261-02 (to G.C.).

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TABLE 1

## Sample Characteristics by Site

	Total <i>n</i> (Mean/% ± <i>SE</i> )	South Bronx <i>n</i> (Mean/% ± <i>SE</i> )	Puerto Rico <i>n</i> (Mean/% ± <i>SE</i> )	<i>p</i> <sup>a</sup>
Maternal education				<0.001
Less than high school, %	836 (43.0 ± 1.8)	512 (46.5 ± 2.1)	324 (24.4 ± 2.4)	
High school diploma, %	1033 (43.2 ± 1.7)	478 (43.2 ± 2.0)	555 (43.2 ± 2.4)	
More than high school, %	568 (13.8 ± 1.8)	117 (10.3 ± 1.3)	451 (32.4 ± 2.5)	
Household constellation				<0.001
Two-parent family, %	1570 (57.4 ± 1.7)	609 (54.6 ± 2.0)	961 (72.2 ± 2.3)	
Single-parent family, %	908 (42.6 ± 1.7)	518 (45.4 ± 2.0)	390 (27.8 ± 2.3)	
Household income				0.190
≤\$13,999, %	1356 (54.8 ± 2.0)	585 (54.2 ± 2.4)	771 (57.8 ± 2.5)	
\$14,000–\$34,999, %	689 (29.5 ± 1.6)	317 (29.6 ± 1.9)	372 (28.9 ± 2.0)	
\$35,000–\$74,999, %	310 (14.4 ± 1.2)	160 (15.0 ± 1.5)	150 (11.4 ± 1.3)	
≥\$75,000, %	38 (1.3 ± 0.4)	13 (1.2 ± 0.4)	25 (1.9 ± 0.6)	
Child age, yr	2491 (9.2 ± 0.7)	1138 (9.2 ± 0.8)	1353 (9.2 ± 0.8)	0.525
Child gender				0.925
Female, %	1207 (49.1 ± 1.1)	549 (49.1 ± 1.3)	658 (48.9 ± 1.5)	
Male, %	1284 (50.9 ± 1.1)	589 (50.9 ± 1.3)	695 (51.1 ± 1.5)	
Child asthma, %	958 (36.8 ± 1.4)	401 (35.9 ± 1.6)	557 (41.7 ± 1.7)	0.018
Child abdominal pain, %	401 (12.1 ± 0.8)	122 (10.6 ± 1.0)	279 (20.3 ± 1.1)	<0.001
Child headaches, %	480 (15.1 ± 0.8)	164 (13.9 ± 0.9)	316 (21.5 ± 1.2)	<0.001

Percentages are weighted.

<sup>a</sup> *t* test for continuous measures and *chi square* for categorical measures.

TABLE 2

## Children's Internalizing Disorders, Parent, Cultural, and Family Factors by Site

	Total <i>n</i> (Mean/ % ± <i>SE</i> )	South Bronx <i>n</i> (Mean/% ± <i>SE</i> )	Puerto Rico <i>n</i> (Mean/% ± <i>SE</i> )	Effect Size <sup>a</sup> OR <sup>b</sup> (95% CI) or Cohen's <i>d</i>
Children's internalizing disorders				
Any child depressive disorder, %	48 (1.4 ± 0.3)	16 (1.2 ± 0.3)	32 (2.1 ± 0.4)	1.67 (0.90, 3.10)
Any child anxiety disorder, %	115 (4.3 ± 0.5)	48 (4.2 ± 0.6)	67 (4.8 ± 0.8)	1.17 (0.75, 1.82)
Parent factors				
Any parental psychopathology, %	1112 (40.8 ± 1.6)	454 (39.5 ± 1.8)	658 (47.9 ± 1.8)	1.43 (1.15, 1.78)**
Parental monitoring (parent report)	2483 (14.08 ± 0.08)	1132 (14.16 ± 0.09)	1351 (13.63 ± 0.11)	0.20***
Parental monitoring (child report)	1251 (16.39 ± 0.18)	581 (16.22 ± 0.21)	670 (17.31 ± 0.20)	0.24***
Coercive discipline (parent report)	2491 (0.50 ± 0.02)	1138 (0.50 ± 0.02)	1353 (0.51 ± 0.02)	0.02
Coercive discipline (child report)	2475 (0.37 ± 0.02)	1131 (0.38 ± 0.02)	1344 (0.36 ± 0.02)	0.04
Maternal acceptance/warmth (parent report)	2455 (2.37 ± 0.01)	1111 (2.38 ± 0.01)	1344 (2.35 ± 0.01)	0.09
Cultural factor				
Acculturative stress (parent report)	1265 (0.19 ± 0.01)	592 (0.19 ± 0.01)	673 (0.16 ± 0.01)	0.14*
Family factors				
Good family functioning (parent report)	2469 (7.97 ± 0.08)	1118 (7.93 ± 0.09)	1351 (8.17 ± 0.14)	0.09
Parent-child interaction (child report)	2464 (0.76 ± 0.01)	1123 (0.77 ± 0.01)	1341 (0.71 ± 0.01)	0.29***
Lifetime neglect, % (child report)	269 (11.0 ± 0.9)	117 (10.9 ± 1.0)	152 (11.3 ± 1.0)	1.03 (0.76, 1.38)
Lifetime physical abuse, % (child report)	393 (17.9 ± 1.0)	205 (18.5 ± 1.2)	188 (14.5 ± 1.1)	0.75 (0.59, 0.95)*
Verbal/psychological abuse, % (child report)	378 (19.2 ± 1.1)	241 (21.0 ± 1.2)	137 (9.9 ± 0.9)	0.42 (0.32, 0.54)***

Percentages are weighted.

<sup>a</sup> *t* test conducted for continuous measures and Cohen's *d* reported; *chi square* conducted for categorical measures and unadjusted odds ratio reported.

<sup>b</sup> South Bronx was the reference group (OR = 1.00).

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

\*\*\*  $p < 0.001$ .

TABLE 3

## Adjusted Odds Ratios of Asthma, Abdominal Pain, and Headaches

	Asthma OR (95% CI)	Abdominal Pain OR (95% CI)	Headaches OR (95% CI)
Female gender	0.69 (0.54, 0.88)**	1.18 (0.85, 1.63)	1.17 (0.90, 1.52)
Age	0.94 (0.90, 0.98)**	1.10 (1.03, 1.17)**	1.18 (1.11, 1.26)***
Children's internalizing disorders			
Any child depressive disorder	2.16 (0.93, 5.0)	4.93 (2.03, 11.94)***	3.85 (1.56, 9.48)**
Any child anxiety disorder	2.44 (1.65, 3.61)***	3.33 (1.92, 5.79)***	3.12 (1.71, 5.66)***
Parent factors			
Any parental psychopathology	1.43 (1.12, 1.83)**	1.69 (1.22, 2.33)**	1.74 (1.34, 2.25)***
Parental monitoring (parent report)	1.02 (0.98, 1.06)	0.91 (0.85, 0.97)**	0.99 (0.94, 1.03)
Parental monitoring (child report)	1.00 (0.97, 1.04)	0.98 (0.95, 1.02)	0.99 (0.96, 1.03)
Coercive discipline (parent report)	0.97 (0.79, 1.18)	1.30 (0.98, 1.73)	1.45 (1.14, 1.85)**
Coercive discipline (child report)	1.27 (1.04, 1.54)*	1.09 (0.86, 1.39)	1.14 (0.86, 1.51)
Maternal acceptance (parent report)	0.77 (0.55, 1.10)	0.63 (0.42, 0.93)*	0.46 (0.30, 0.68)***
Cultural factor			
Acculturative stress (parent report)	2.02 (1.08, 3.77)*	3.36 (1.33, 8.46)*	2.39 (1.07, 5.32)*
Family factors			
Good family functioning (parent)	0.97 (0.94, 1.01)	0.94 (0.90, 0.99)*	0.94 (0.90, 0.98)**
Parent-child interaction (child)	0.99 (0.58, 1.71)	1.36 (0.61, 3.03)	0.74 (0.36, 1.53)
Lifetime neglect (child report)	1.35 (0.91, 2.01)	1.51 (0.97, 2.36)	1.15 (0.72, 1.85)
Lifetime physical abuse (child)	1.10 (0.78, 1.54)	1.29 (0.89, 1.89)	1.14 (0.77, 1.69)
Verbal/psychological abuse (child)	0.85 (0.63, 1.15)	1.06 (0.71, 1.59)	1.24 (0.86, 1.78)

Odds ratios are adjusted for study site, child's age, child's gender, and propensity score (estimated using maternal education, maternal age, and household income). Unadjusted odds ratios are reported for gender and age.

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

\*\*\*  $p < 0.001$ .