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The Home Environment and Family Asthma Management Among Ethnically Diverse Urban Youth with Asthma

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Abstract

While the pediatric psychology literature underscores the importance of illness related aspects of the home environment for optimal family asthma management, little is known about the contribution of more global aspects of the home environment (e.g., family routines/schedule, quality of stimulation provided to child) to asthma management in ethnic minority and urban families. The goals of this study were to: 1) explore ethnic/racial group differences in global and specific dimensions of home environment quality among Latino, non-Latino white (NLW), and African American urban children with asthma; and 2) examine associations between the quality and quantity of support and stimulation within the home environment, as measured by the HOME Inventory, and family asthma management in this sample. Urban, low-income children (N=131) between the ages of 6 and 13 with asthma and a primary caregiver participated in a multi-modal assessment including an in home observation and semi structured interviews to assess aspects of home environment quality and family asthma management practices. While controlling for poverty, no ethnic group differences were found in the global home environment; however, there were significant differences in specific dimensions (e.g. Family Participation in Developmentally Stimulating Experiences, and Aspects of the Physical Environment) of home environment quality. Across the whole sample, home environment quality predicted family asthma management. When examining this association for specific ethnic groups, this finding did not hold for the Latino subsample. The results highlight the need to consider ethnic group differences in non-illness specific aspects of the home environment when addressing families' asthma management strategies.

Disparities in Pediatric Asthma Prevalence and Outcomes

Despite evidence-based guidelines for effective asthma management, disparities in childhood asthma prevalence, treatment and morbidity persist among low-income and ethnic minority youth (Akinbami, Moorman, Garbe, & Sondik, 2009). Latino and African American children are at increased risk for lifetime asthma diagnosis when compared to non-Latino white (NLW) children (Lara, Akinbami, Flores, & Morgenstern, 2006). Puerto

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Rican children are 2.4 times and African American children are 1.6 times more likely than NLW children to have current asthma (Akinbami et al., 2009). Latino and African American children fare worse in terms of asthma morbidity, with higher rates of hospitalizations, emergency department visits, and functional limitation (Akinbami et al., 2009).

Asthma Management in the Family Context: Increased Challenges for Urban Families

Several reports have described disparities in pediatric asthma outcomes as multi-determined (Canino, Koinis-Mitchell, Ortega, McQuaid, Fritz, & Alegria, 2006). For example, poor illness management (e.g., missing medications, inadequate or incorrect use of inhalers, lack of follow-through on recommendations for environmental control of allergens, etc.) and lesser access and usage of pediatric asthma specialty care are thought to contribute to pediatric asthma disparities (Jandasek et al., 2011; McQuaid et al., 2012). Given that the family plays a central role in promoting children's effective asthma management (e.g., by helping the child to avoid triggers, take asthma medications, monitor symptoms; McQuaid, Walders, Kopel, Fritz, & Klinnert, 2005), caregiver and family-based processes may contribute to differences in asthma health outcomes among children from various ethnic groups. For example, a higher level of concern about the use of daily asthma medications (McQuaid, Vasquez, Canino, Fritz, Ortega, et al., 2009) and a tendency to use alternative treatment approaches (e.g., home remedies) to treat asthma symptoms (Koinis-Mitchell, McQuaid, Friedman, Colon, Soto et al., 2008) have been found among Latino caregivers of children with asthma. Further, ethnic minority children with asthma are more likely to live in urban settings, where asthma prevalence rates are high (Crain et al., 1994). For many families, managing asthma in the context of urban poverty can be challenging given the complex demands of the disease (Koinis Mitchell, McQuaid, Seifer, Kopel, Esteban, et al., 2007). Urban families may encounter socio-contextual risks including financial challenges (e.g., poverty, inadequate insurance coverage) and neighborhood stressors such as poor housing conditions, high crime rates, and exposure to violence that may compromise asthma management and outcomes (e.g., high crime rates may affect safe transportation to office visits) (Sternthal, Jun, Earls, & Wright, 2010).

The important contribution of the family's management of asthma to children's asthma morbidity has been demonstrated across families from diverse backgrounds (Celano, Klinnert, Holsey, & McQuaid, 2009; Fiese, Wamboldt & Anbar, 2005; McQuaid, Koinis-Mitchell, Walders, Nassau, Kopel et al., 2007). More effective family asthma management has been found to predict lower levels of functional impairment due to asthma (McQuaid et al., 2005) and has been associated with less parenting stress and better family functioning in low-income, African-American children (Celano et al., 2009). Additionally, caregivers' perception of burden related to asthma management has been associated with decreased child quality of life (Fiese, Winter, Anbar, Howell, & Poltrock, 2008).

The Home Environment and Asthma Management in Urban Youth

There is a need for research considering non-illness-specific aspects of the home environment (e.g., family routines/schedule, quality of stimulation provided to child) that may be relevant for the management of pediatric asthma. This is underscored by previous studies linking such aspects of the general home and family environment with children's psychosocial competence and developmental outcomes across a number of samples, including children with lead exposure, developmental disabilities, language delay, and visual, hearing, and orthopedic impairment (Affleck, McGrade, Allen, & McQueeney, 1985). In addition to attending to modifiable aspects of family asthma management, identifying specific aspects of the general family and home environment that are modifiable

and are associated with optimal asthma management can inform targeted interventions for urban and poor children with asthma.

Only a handful of studies have examined the quality of the home with respect to childhood health and illness (LaVeck, Hammond, Telzrow, & LaVeck, 1983; Schwebel, Brezaussek, & Belsky, 2006; Watson, Kirby, Kelleher, & Bradley, 1996). The quality of the home has been primarily studied within the child development literature and is conceptualized as the quality of parent-child interaction, home organization, and the availability of cognitively stimulating activities (Bradley & Caldwell, 1984; Crespo, Carona, Silva, Canavarro & Dattilio, 2011). It has been negatively associated with asthma risk factors (i.e., presence of cat allergen, cockroach allergen, tobacco smoke), and this association varied by racial/ethnic group (i.e., NLW, African American, Latino), not controlling for SES (Klinnert, Price, Liu, & Robinson, 2002). A positive home environment has been associated with better quality of life for both children with asthma and their caregivers (Crespo et al, 2011). This suggests the usefulness of assessing aspects of the home environment that may be associated with asthma risk factors.

The HOME Inventory and pediatric asthma research

The HOME Inventory (Caldwell & Bradley, 2003) is a well-validated observational and interview-based measure that assesses the quality and quantity of support and stimulation available to a child in his or her home environment. It captures a number of dimensions of the home environment, encompassing concrete (e.g., routines) and more diffuse (e.g., emotional responsiveness) aspects of the home environment. It distinguishes environments that present a risk for developmental problems from those that provide adequate support for optimal development (Bradley, 1993; Bradley & Corwyn, 2005). A major strength of the HOME Inventory is that it combines an in-home observational component with semi-structured interview techniques involving the child and child's primary caregiver.

Scores on the HOME Inventory are affected by families' socioeconomic status (SES) and, potentially, their race/ethnicity; however, race/ethnicity tends to be confounded with SES and there is a need to disentangle these effects on child outcomes. Consistently, results have shown that SES is associated with HOME Inventory items reflecting access to material resources and quality of the physical environment (Bradley & Corwyn, 2005; Bradley, Corwyn, McAdoo, & Coll, 2001; Watson, et al., 1996). The influence of race/ethnicity on the HOME Inventory is less clear, in part because direct comparisons of racial and ethnic groups within the same study are rare. The available evidence suggests that NLW groups tend to score higher on some dimensions of the HOME Inventory than ethnic/racial minority groups, specifically African American and Latino families (Bradley et al., 2001). For example, when examining the impact of both SES and ethnicity on HOME Inventory scores, Bradley and colleagues (2001) found that the magnitude of the effect for poverty was greater than ethnicity (children living in poverty had lower HOME Inventory scores), but that even when poverty was taken into consideration ethnic group differences remained: NLW mothers tended to read to their children more often and display more overt affection, and NLW households tended to more often contain materials for learning and recreation.

While measures of family asthma management (e.g., Family Asthma Management System Scale [FAMSS]) can help to identify illness-specific modifiable targets of intervention (e.g., becoming aware of signs of asthma exacerbation, adhering to controller medication regimen), there is a need to assess non-illness-specific dimensions of the home and family environment (e.g., using the HOME Inventory) because these may also represent useful targets of intervention. For example, because a home environment characterized by a regular and predictable daily schedule may support a family's ability to adhere to a scheduled medication regimen (Fiese, et al., 2005), assessing whether there is a predictable routine and

daily schedule within the general home environment may help to guide intervention efforts. Illness-specific targets of intervention and targets within the broader home environment likely represent different, though intersecting, areas for intervention and may require different behaviors and resources to address them. Non-illness-specific measures such as the HOME Inventory may capture aspects of the child's general home environment (e.g., structure of home environment, parent-child interaction, encouragement of maturity) that are relevant for urban children with asthma but are not directly assessed via asthma-specific measures. Therefore, in addition to asthma-specific measures of the family environment, the assessment of multiple dimensions of the broader home and family environment offers the opportunity to identify additional aspects of the family context that may be within the family's control to change, in order to enhance children's asthma management.

In comparison to previous research, one advantage of this study is the combined use of semi structured interviews targeting *both* the broader home environment (via the HOME Inventory) and family asthma management (via the FAMSS) in order to better understand how quality and quantity of support and stimulation within the home environment may be related to family asthma management. For example, previous research conducted by Klinnert and colleagues (2002) included measurement of the HOME Inventory in low-income children ages 9 to 24 months, but this study did not include measurement of family asthma management. Similarly, other research explored relationships between self-report measures of the family environment and parent/child quality of life in children ages 8 to 18, but this study did not measure dimensions of family asthma management (Crespo et al., 2011).

Study Aims

The goal of this study was to examine associations between the quality and quantity of support and stimulation provided for children within the home environment, as measured by the HOME inventory, and family asthma management among a sample of youth with asthma. Two specific aims were addressed. The first was to explore ethnic/racial group differences in the home environment (i.e., HOME Inventory total score and subscale scores) among a sample of Latino, NLW, and African American urban children with asthma. Given previous research indicating poverty is disproportionately present in ethnic minority households, we hypothesized that NLW children would score higher on the HOME Inventory total score than African American and Latino children (higher scores on the HOME Inventory represent greater quality and quantity of support and stimulation in the home environment). Further, given there has been limited research examining specific dimensions of home environment quality across ethnic groups, particularly children with asthma, we conducted exploratory analyses of potential ethnic/racial group differences on the subscales of the HOME.

The second goal of this study was to test the hypothesis that the home environment would predict family asthma management after controlling for poverty. This question allowed us to examine the potential importance of higher quality home environments for supporting pediatric asthma management within the family context. We hypothesized that after controlling for poverty, lower scores on the HOME Inventory would more strongly predict poorer family asthma management. Given differences in HOME scores described in the literature above, and higher levels of asthma morbidity in African-American and Latino children, we would expect this association to be more robust in the ethnic minority children of this sample.

Method

Participants

Data presented in this study are part of a larger study focusing on the identification of risk and protective factors associated with resilient asthma outcomes among inner-city children and their families (Koinis-Mitchell et al., 2012). Participants were 131 urban, low-income children between the ages of 6 and 13 with asthma and a primary caregiver. Based upon the self-identified racial/ethnic group of the primary caregiver, children were recruited from three ethnic groups: Latino, African-American, and NLW. Demographic characteristics of the sample appear in Table 1.

Design and Procedures

Participants were recruited through several avenues, including hospital-based asthma educational programs (n = 39; 30%), hospital-based ambulatory clinics (n = 25; 12%), community-based primary care clinics (n = 15; 12%), public schools (n = 11; 8%), and school-based community events (n = 42; 32%). For the remaining 6% of participants, the recruitment site was unknown due to missing data. Study eligibility criteria consisted of the following: 1) participating primary caregiver was the child's legal guardian; 2) child was between the ages of 6–13 years; 3) child had parent-report of physician-diagnosed asthma, was currently receiving asthma treatment, and reported breathing problems within the previous 12 months; 4) primary caregiver and child live in an urban environment, as verified by zip code; and 5) primary caregiver's self-report of ethnic identity was NLW, African-American, or Latino. Exclusion criteria for participating in this study included exercise-induced asthma, foster care placement, and moderate-to-severe cognitive delay as determined by school placement. Out of a total of 375 families that were contacted about this study, 35% were both interested and eligible. Twenty interested families did not meet inclusion/exclusion criteria and were excluded due to lack of an asthma diagnosis (n = 6), ethnicity (6), child age (1), location (3), cognitive delay as evidenced by school placement (2), or a combination of factors (2).

This study involved two sessions. The initial interview-based assessment was held in the family's home or in the lab. Children and their primary caregivers completed measures pertaining to basic demographics and other measures not included in this report. Two-weeks later, research assistants visited the family's home to complete the HOME Inventory and a semi-structured interview regarding family asthma management (i.e., FAMSS). These research assistants were selected to be bilingual (fluent in English and Spanish) and bicultural and were thoroughly trained in administration of the FAMSS and the HOME by the study PI and Co-I, the latter of whom developed the FAMSS (McQuaid et al., 2005). Training for interviewers and raters for the FAMSS has been previously described (McQuaid et al., 2005) and included training in the administration and scoring of the measure via consensus meetings in which staff reviewed audiotapes and transcripts (de-identified) of the measure, rated the measure across key dimensions, and then reviewed ratings in the meeting to discuss differing ratings and achieve consensus via systematic discussion of the interview content. The HOME Inventory was administered prior to the FAMSS. All research sessions were conducted in Spanish or English, according to participants' preference. Informed consent and child assent were obtained. Families received monetary compensation (\$25 total) for study participation. The study was approved by the Institutional Review Board of Hasbro Children's Hospital in Providence, Rhode Island.

Measures

To ensure cross cultural content, and conceptual equivalency, measures were translated into Spanish using an established process (Canino & Bravo, 1994; Canino, McQuaid, Alvarez,

Colon, Esteban et al., 2009). This process involves back translation methods, field testing of items, use of focus groups in both languages, and evaluation by bi-cultural experts to ascertain that the item meaning, validity of the constructs and reliability of the measures are acceptable (Canino & Bravo, 1994).

Demographic Questionnaire—Primary caregivers provided general demographic information, including child age, gender, family income, and child and parent ethnicity.

Controller Medication Use—As a proxy for persistent asthma status, information regarding parent-report of child's current prescription medications for asthma at the time of the study was collected. Children whose parents reported current asthma controller medications (e.g., fluticasone, budesonide, montelukast, fluticasone/salmeterol combination) were classified as having persistent asthma. Although asthma status was not classified by a clinician using the 2007 National Heart Lung and Blood Institute (NHLBI) guidelines, the use of an asthma controller medication is reflective of persistent versus non-persistent asthma status according to these guidelines.

Poverty Status—Poverty status was defined using an annually adjusted mean income-to-needs ratio (Duncan & Brooks-Gunn, 1997), a per capita index comparing household income to annual federal estimates of the minimum required expenses for shelter and food. For each family, a ratio was calculated by dividing yearly income by the poverty threshold for that size family during the year in which they participated in the study.

Home Environment—The Middle Childhood version of the HOME Inventory was used to assess the quality and quantity of support and stimulation available to children within the home environment, including social, emotional, and physical dimensions of the home (Bradley, Caldwell, Rock, Hamrick, 1988; Bradley & Corwyn, 2005). It includes a total of 59 items divided across 8 subscales, and is appropriate for children 6–10 years old. See Table 3 for a listing of these subscales, along with the number of items per scale and a sample item for each subscale. The HOME Inventory was administered in a semi-structured interview format during a 45-minute home visit that included the child and child's primary caregiver. Scoring involved both direct observation of parenting behaviors (while eating a snack and engaging in an activity) and a semi-structured interview with the family. Each item on the HOME Inventory receives a binary code (yes=1, no=0), yielding a total score out of 59, with higher scores indicating better home environment quality. It has established internal consistency reliability and predictive validity (Han, Leventhal, & Linver, 2004). Reliability of the HOME Inventory total score in this sample was good for each of the three ethnic groups: alpha = .80 for Latino subgroup, alpha = .86 for NLW subgroup, and alpha = .85 for African American subgroup.

Family Asthma Management—The FAMSS (Klinnert, McQuaid & Gavin, 1997; McQuaid et al., 2005) is a semi-structured interview that assesses child and caregiver asthma knowledge and family management practices. The FAMSS includes a series of open-ended questions relating to family asthma management over the past 12 months. The FAMSS total score includes the following subscales: Asthma knowledge (i.e., knowledge of function and use of asthma medication and basic anatomy of asthma), Symptom assessment (i.e., awareness of asthma symptoms including signs of asthma exacerbation, gradation of symptoms, and early warning signs), Response to symptoms and exacerbations (i.e., evidence of symptom monitoring and actions taken to manage symptoms and exacerbations), Environmental control (i.e., evidence and extent of exposure to environmental asthma triggers such as tobacco smoke), Medication adherence (i.e., adherence to controller medication, available and use of quick-relief medications),

Collaboration with health care provider (i.e., relationship with asthma care provider and evidence that provider follows guidelines for management and provides asthma action plan), and Balanced integration (i.e., balance of attention to other developmental/family issues, such as extracurricular activities, in addition to asthma management) (McQuaid et al., 2005). For the FAMSS adherence scale, families are asked to rate on a 5-point scale how difficult it is to keep track of their medicines, how frequently doses of controller medication are missed, and how frequently they do not have access to their quick-relief inhaler when they need it. They are also asked to describe their general strategies for keeping track of medications. The interviewer rating of this information is global and takes into account all information the interviewer gathers across the duration of the interview (e.g., the child knows medication is prescribed, the child has the medication, the medication is not expired). So, even if a child is not on a controller medication, the interviewer is still able to give rating of adherence based on medication access and use when needed.

Trained research assistants administer interviews to children and their parents. Interviews are audiotaped and then coded across each dimension using a standardized coding system (McQuaid et al., 2005). Each dimension is rated on a 9-point scale (1 = “ineffective or harmful management” to 9 = “highly adaptive management”), with higher scores reflecting better family management. The FAMSS is a well-established measure of illness management/adherence (Quittner, Modi, Lemanek, Ievers-Landis, & Rapoff, 2008) with evidence of validity and reliability (Klinnert et al., 1997; McQuaid et al., 2007). It has been validated with diverse families of children with asthma (Celano et al., 2009; Koinis-Mitchell, et al., 2007). Both the English and Spanish versions have demonstrated excellent internal consistency (Canino et al., 2009). In this study, 25% of the audiotapes ($n = 37$) were randomly selected and independently rated by the developers of the FAMSS, with ratings discussed and consensus established within the context of monthly phone conferences. Similar to previously reported values (e.g., McQuaid et al., 2007), the intraclass correlation across three raters ranged from 0.66 to 0.97, with the majority of ratings between 0.8 – 0.9. In the current study, alpha reliability of the FAMSS was good for each of the ethnic groups: $\alpha = .75$ for Latino subgroup, $\alpha = .89$ for NLW subgroup, and $\alpha = .79$ for African American subgroup.

Statistical Approach—Preliminary analyses were conducted to determine whether there were group differences on demographic variables (i.e., child age, gender, ethnicity, poverty status, controller medication use), and whether these participant characteristics were significantly related to the HOME Inventory total score or subscale scores, or the FAMSS total score. First, Chi-square tests examined potential ethnic group differences on the following categorical variables; poverty threshold, controller medication use, and gender. Univariate analysis of variance (ANOVA) was used to determine whether there were age differences by ethnic group. Next, t -tests were used to examine possible differences on the family asthma management variable (i.e., FAMSS total) and the home environment variables (i.e., HOME Inventory total, HOME Inventory subscales) based on demographic variables (i.e., poverty threshold, gender, controller medication use). Pearson correlations were used to examine associations with child age.

Following preliminary analyses, ANOVAs were used to explore potential ethnic group differences in global home environment and each specific home environment dimension (e.g., pairwise comparisons were used to explore specific group differences). Finally, regression analyses were conducted to examine whether the global home environment (i.e., HOME Inventory total score) predicted family asthma management (FAMSS total score). This involved first examining the regression model for the entire sample. Then, given the focus of this paper on ethnic group differences, regression models were generated separately by ethnic group.

Results

Preliminary Analyses

Associations between key demographics and outcomes were assessed, in order to determine which variables to hold constant in subsequent analyses. As seen in Table 1, ethnic groups differences in poverty threshold were found, with a higher proportion of families from Latino backgrounds living below the poverty threshold (adjusted residual 2.7), and greater proportion of families from NLW backgrounds living above the poverty threshold (adjusted residual 3.3). Controller medication use, gender and age did not differ by ethnic group. There were no statistically significant differences by recruitment site for participant age, gender, poverty status or key study outcome variables (HOME Inventory total score and FAMSS total score).

Significant differences by poverty emerged on family asthma management, global home environment, and a subset of home environment dimensions (Table 2). Regardless of whether poverty threshold was controlled, family asthma management did not differ by ethnic group. Family asthma management and specific home environment dimensions did not differ by gender or controller medication use. Child age was related to Emotional and Verbal Responsivity, but was not related to any other home environment or family asthma management dimensions.

Ethnic Group Differences on the HOME Inventory

Next, we sought to examine whether there were ethnic group differences in HOME Inventory total score and the subscale scores. Table 3 provides means and standard deviations of the HOME Inventory total score and subscales, by ethnic group. Given the significant associations between poverty and the HOME Inventory total score and subscale scores (Table 2), poverty threshold was controlled in these analyses. Significant ethnic group differences were found on the Family Participation in Developmentally Stimulating Experience scale $F(2, 124) = 5.13, p < .01$. Pairwise comparisons revealed that NLW families had significantly higher levels of Family Participation in Developmentally Stimulating Experiences as compared to Latino families, $p < .01$ (NLW $M = 4.30$ $SD = 1.19$, Latino $M = 3.40$ $SD = 1.05$). Significant ethnic group differences also emerged on the Aspects of the Physical Environment scale, $F(2, 111) = 8.01, p = .001$. African American families received lower ratings than both Latino ($p = .001$) and NLW ($p = .01$) families on this scale (NLW $M = 5.79$ $SD = 2.20$, Latino $M = 5.38$ $SD = 2.14$, African American $M = 3.63$, $SD = 2.35$). No ethnic group differences were found on the HOME total score and remaining subscale scores. The Family Participation in Developmentally Stimulating Experiences subscale ($r = .29, p = .001$) and the Aspects of the Physical Environment subscale ($r = .35, p < .001$) subscale were both significantly related to the FAMSS total score. This is notable because, as seen in Table 3, these were the only two subscales that were associated with ethnicity, after controlling for poverty.

Associations between Home Environment and Family Asthma Management

Finally, a series of four regression models were employed to examine whether the home environment (i.e., HOME total score) predicted family asthma management (i.e., FAMSS total score) among our sample of urban families. Models involved an examination of the entire sample as a whole, as well as each of the three ethnic groups. Poverty status was included as a covariate in all regression analyses. Across the entire sample, the home environment significantly predicted family asthma management such that lower total scores on the HOME were associated with lower total scores on the FAMSS (Table 4). When each ethnic group was examined separately, lower home environment quality was associated with

less effective family asthma management for the NLW and African American groups, but not for the Latino families.

Discussion

The overall goal of this study was to examine associations between the overall and specific aspects of the home environment (e.g., emotional climate, active stimulation for child development) and family asthma management among a sample of urban, ethnically diverse school-age children with asthma. The HOME Inventory was selected for use in this study because it is a well-established measure of the quality of the home environment and it includes an in-home observational component. It allows for the assessment of aspects of the family context that may have relevance for asthma management among inner-city children with asthma.

Ethnic group differences in the home environment

After controlling for poverty status, ethnic group differences remained on two home environment dimensions. In our sample, children of families from NLW backgrounds had significantly higher scores on the Family Participation in Developmentally Stimulating Experiences subscale compared to Latino children and families. This is consistent with previous work suggesting that NLW school-age children are more likely to have access to developmentally stimulating experiences such as access to museums and participation in arts, music and other stimulating activities, as compared to their African American and Latino counterparts (Bradley, Caldwell, Rock, Ramey, Barnard, et al., 1989; Bradley et al., 2001). This subscale includes items such as whether a family member has arranged for the child to attend a musical performance. It is possible that some families of this sample resided in communities that put them at a disadvantage for accessing these types of available resources (Leventhal & Brooks-Gunn, 2000). For Latino families, the lower scores on this subscale may reflect language barriers or acculturation to a new environment, particularly for families that have recently emigrated.

Further, in this study, African American children scored lower on the Aspects of the Physical Environment subscale than both Latino and NLW children, independent of poverty status. Several of the items on this subscale tap domains that are likely outside of families ability to control, such as whether the building has structural or health defects (e.g., falling plaster, rodents), whether the child has a safe outside play area, and the amount of living space per person in the home. This suggests that the lower scores on this subscale among African American children in this study may be reflective of disparities in the physical quality of the home environments of these children (poor housing conditions). It is worth noting that poverty status considered total family income from all resources and number of persons in the home. Although this may be highly correlated with the physical conditions of the home environment, many families resided in public housing where the physical conditions are quite poor.

Current theories point to the complex processes that contribute to ethnic and racial differences in child developmental outcomes, home environments and parenting practices (García Coll, Crnic, Lamberty, & Wasik, 1996; Gjerde & Onishi, 2000). Culture, other social factors (e.g., cultural stress, language barriers, discrimination, racism), and factors associated with poverty (e.g., neighborhood stress) contribute to ethnic group differences in levels of stress and home-based environmental conditions. These stressors can put ethnic minority families at a disadvantage for optimal child developmental outcomes (Bradley et al., 2001; García Coll et al., 1996). Some of these cultural risks (e.g., discrimination, acculturative stress) are known to contribute to asthma morbidity for African American and Latino children (Koinis-Mitchell, McQuaid, Kopel, Esteban, Ortega, et al., 2010).

The observed ethnic group differences in the home environments of urban children with asthma are important in light of what is known about pediatric asthma disparities. Urban African American and Latino children are more likely than NLW youth to be diagnosed with asthma and to have poorly controlled asthma, including greater levels of emergency health-care utilization (Quinn, Shalowitz, Berry, Mijanovich, & Wolf, 2006). Aspects of the home (e.g., housing deterioration) and community (e.g., exposure to violence) environments are related to increased risk for childhood asthma and asthma morbidity (Franco Suglia, Duarte, Sandel, & Wright, 2010). However, less is known about how non-illness specific aspects of the home and family environment may be linked to pediatric asthma outcomes. For example, a highly structured and supportive home environment, with routines and expectations for the child, may facilitate the family's ability to manage asthma, and adherence to daily asthma medication (Fiese et al., 2005).

Home environment predicts family asthma management—Results based on the entire sample suggest that after controlling for poverty, lower quality and quantity of support and stimulation within the home environment (HOME Inventory total score) predicted less effective family asthma management (FAMSS total score). However, results only partially supported our hypothesis with respect to ethnic groups. Specifically, while less stimulating and supportive home environments predicted less effective family asthma management for urban NLW and African American families participating in this study, this association did not remain for the Latino families. The observed association for African American and NLW children in this study is consistent with previous research suggesting that childhood asthma management is embedded within the context of parent-child relationships and family interaction patterns (Klennert, & Bender, 2002; Wamboldt, Wamboldt, Gavin, Roesler, & Brugman, 1995; Wood, Lim, Miller, Cheah, Simmens, et al., 2007). For example, high expressiveness and cohesion, and low conflict are related to better family asthma management (Celano et al., 2009), whereas high levels of parental criticism and negative affect are associated with poor asthma management (e.g., medication compliance) and greater asthma morbidity (Shalowitz, Berry, Quinn, & Wolf, 2001).

One potential explanation for the lack of association between the home environment and family asthma management for the Latino families may stem from the fact that the HOME may not be as sensitive a measure of the home environment for Latino families. One of the reasons that we chose to utilize the HOME in this study was to assess the extent to which this measure may be consistent with the beliefs, behaviors, and characteristics of families from specific ethnic groups. Indicators on the HOME are based largely on a historical/ethnic context grounded in Western thought (García Coll, & Magnusson, 1999), and the subscales reflect more of a mainstream, traditional value system (e.g., individualist vs. collective). These scales likely do not fully account for the acculturation experiences of Latino families or other risk factors (e.g., family poverty, urban stress) that Latino families may face. In addition, this measure may not have adequately captured risk factors or supportive resources that are meaningful and reflective of Latino culture. There are important resources within Latino families (e.g., family cohesion/connectedness) that support children's social-emotional growth (e.g., social problems solving, self-efficacy) and overall development (Fuller & García Coll, 2010; Leidy, Guerra, & Toro, 2010). Dimensions of the home environment, such as family cohesion, which have been found to be associated with fewer ED visits in Latino children born to Latino-born caregivers (Koinis-Mitchell, Sato, Kopel, McQuaid, Seifer, et al., 2011), may be directly associated with effective Latino family asthma management but are not captured by the HOME Inventory. Observational assessments need to be expanded to include these aspects of family life.

Previous research suggests that the FAMSS total score is related to SES, but not related to racial/ethnic minority status (McQuaid et al., 2005). Researchers have noted that economic

hardship (e.g., resulting in inadequate housing or access to health care) may present more of a challenge to effective family asthma management than cultural factors (McQuaid et al., 2005). The current study builds upon this suggesting that, even after considering economic disparities, the quality and quantity of support and stimulation a child receives within the home has direct relevance for effective family asthma management. This is important given the links between family asthma management and asthma morbidity (McQuaid et al., 2007).

Clinical Implications

Overall, results from this study confirm that the home environment matters in family asthma management, even after accounting for socioeconomic disadvantage. Specifically, it appears that more effective family asthma management may be more likely to take place in home environments that are more structured and supportive, have higher level of resources, encourage the child's development of maturity, etc. This is consistent with previous suggestions that psychology interventions should include attention to the family system as part of successful pediatric asthma management (McQuaid et al., 2005). Clinically, it may be helpful for providers to attend to aspects of the home environment that are not specific to asthma but have relevance for optimizing asthma treatment strategies (e.g., use of medications). For example, a provider could learn more about the child's home environment by directly asking the child and caregiver about the child's experience with self-care routines (e.g., whether the child is responsible for non-asthma self-care routines such as bathing and brushing teeth, as these daily self-care behaviors may provide a foundation from which to build asthma-specific self-care via medication adherence) or by asking the child and caregiver about qualities of the parent-child relationship (e.g., whether the child experiences their parent as supportive overall). Such questions may be reflective of levels of stress and organization in the overall home environment, which may have a bearing on consistent asthma management behaviors. In this way, a greater understanding of the home environment may be useful as part of a comprehensive approach for achieving optimal family asthma management and, potentially, reducing pediatric asthma morbidity and disparities. In addition, this study suggests that there are aspects of the home environment that are affected by poverty and may be beyond families' abilities to control. Controlling for poverty highlighted that access issues (disparities) differentially affect the quality of the home environment (e.g., availability of developmentally stimulating resources) between ethnic groups, therefore putting children in ethnic minority families at a disadvantage.

Strengths, Limitations, and Future Directions

The use of a multi-method procedure combining an in-home observational assessment of the home environment with a well-validated, semi-structured interview of family asthma management is a strength of this study. Observational assessments are rarely utilized with urban children with asthma. However, they provide an opportunity to sensitively understand aspects of the home context that contribute to family asthma management.

While this study adds to the pediatric asthma disparities literature by examining the home environment as a predictor of family asthma management, study findings should be considered in light of several limitations. First, in this study asthma morbidity was not directly assessed. Previous research has shown a strong link between the FAMSS and asthma morbidity in children (McQuaid et al., 2005). This study used a simplified assessment of persistent asthma status (i.e., parent report of child being on a controller medication). Although this is a clinically meaningful and valid proxy for persistent asthma, often used for classification of asthma severity, clinician assessment of asthma severity was not utilized (NHLBI; EPR-3, 2007). It should also be noted that, since this study was not designed to stratify persistent asthma status by recruitment venue, we did find significant differences by recruitment site for parent report of whether the child was currently on an

asthma controller medication. Among participants recruited via community-based primary care clinics there were a disproportionately larger number of youth who were not using an asthma controller medication. In contrast, among participants recruited via hospital-based asthma educational programs, there were a disproportionately larger number of participants who endorsed currently using an asthma controller medication.

It is important to acknowledge that the same informant (i.e., parent) completed both the FAMSS and HOME Inventory. Also, it is possible that observations of families' behavior and responses to the HOME may have influenced the FAMSS ratings. For example, observations or knowledge of many positive aspects of the home environment could influence a rater to attend to more positive aspects of family asthma management, whereas a rater with negative perceptions of the home environment could be cued to attending to less desirable aspects of family asthma management. These measures tapped similar features of the home environment. For example, both measures assessed the physical environment of the home, albeit in different ways, the HOME Inventory measured the broader physical environment, while the FAMSS measured only asthma-specific aspects.

In terms of statistical considerations, it should be noted that three HOME Inventory scales showed notable skewness (Emotional Responsivity, Encouragement of Maturity, Emotional Climate). However, we believe that the combination of the study sample size and the fact that the HOME total score was not skewed suggests that the analyses we conducted are robust to violations to the assumption of normality. Still, due to skewness, some caution is warranted for interpretation of these scales. Finally, the limited number of participants in each of the ethnic groups also presents a limitation, in terms of statistical power to detect effects.

Future research with larger samples size is needed to more fully explore the contribution of the global home environment to family asthma management among ethnic/racial minority children with asthma. Finally, although the majority of families approached about this study were interested, refusal rates were not systemically tracked. This hinders the generalizability of study findings to other samples of urban youth with asthma and study findings should be interpreted with this in mind.

Future research using both multi-method and multi-informant approaches is needed to disentangle associations between the home environment, family asthma management, poverty, race/ethnicity and morbidity in urban youth. Given the HOME Inventory is not tailored for specific ethnic groups and most of the research utilizing the HOME Inventory has been with younger children (i.e., infants, preschoolers) (Bradley & Corwyn, 2005), less is known about how well the middle childhood version of the HOME Inventory applies across racial/ethnic groups. Our finding that the HOME Inventory total score predicted family asthma management for African American and NLW youth, but not Latino children, raises the question of whether this measure adequately captures culturally-salient aspects of the home environment and parenting practices for Latino families. Future research is needed to examine whether the middle childhood version of the HOME Inventory functions in a similar manner across different ethnic groups (Han et al., 2004) and, potentially, to tailor the measure for specific groups.

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Table 1

Frequencies or Mean Values for Demographic Variables for the Total Sample and as a Function of Ethnicity

Variable	Total ^{††} N= 131	Latino ^{††} n= 52	Non-Latino white ^{††} n= 47	African American ^{††} n= 34	[†] $\chi^2(2)$ or F
Child age (in years), <i>M (SD)</i>	9.83 (1.61)	10.10 (1.58)	9.62 (1.69)	9.73 (1.53)	1.19
Gender					0.64
% Male	56%	61%	53%	55%	
Poverty Threshold					12.44 ^{**}
Above Threshold	53%	40%	72%	44%	
Below Threshold	47%	60%	28%	56%	
Controller Med Use					1.24
Yes	68%	67%	72%	59%	
No	32%	33%	28%	41%	

[†] F-test used for age variable; chi-square test used for all other variables.^{††} Some analyses involved fewer cases due to missing data on selected variable

* p<.05;

** p<.01

Table 2

Home Environment and Family Asthma Management Differences Between Individuals Above and Below the Federal Poverty Line

	Above Poverty Line	Below Poverty Line	
	<i>M (SD)</i>	<i>M (SD)</i>	$\hat{\tau}_t$
FAMSS Total Score	5.42 (1.05)	4.40 (1.04)	5.57***
HOME Total Score	44.08 (6.60)	38.16 (6.41)	5.06***
Emotional and Verbal Responsivity	9.23 (1.15)	9.21 (1.22)	.11
Encouragement of Maturity	5.78 (1.19)	5.35 (1.55)	1.74
Emotional Climate	6.01 (1.27)	5.94 (1.55)	.49
Growth Fostering Materials and Experiences	5.27 (1.30)	4.44 (1.41)	3.47**
Provision for Active Stimulation	4.72 (1.80)	4.03 (1.31)	2.49*
Family Participation in Developmentally Stimulating Experiences	4.19 (1.17)	3.54 (1.11)	3.24**
Paternal Involvement	2.85 (1.50)	1.64 (1.56)	4.50***
Aspects of the Physical Environment	6.10 (2.00)	4.03 (2.24)	5.22***

$\hat{\tau}_t$ *df* vary due to missing data.

* $p < .05$;

** $p < .01$;

*** $p < .001$

Table 3

HOME Inventory: Means and Standard Deviations by ethnic group on the HOME Total and Subscale Scores

Variable (Total Score & Subscales)	Items	Item Example	Latino		NLW		Af. American	
			<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
HOME Total Score	59		40.04 (6.09)	43.47 (7.74)	39.87 (7.16)			
Emotional and Verbal Responsivity	10	Family has a fairly regular and predictable daily schedule for child (e.g., meals, bedtime)	9.07 (1.28)	9.41 (1.17)	9.18 (1.03)			
Encouragement of Maturity	7	Family requires child to carry out certain self-care routines (e.g., makes bed, bathes self)	5.67 (1.53)	5.31 (1.52)	5.80 (.85)			
Emotional Climate	8	Parent has not lost temper with child more than once during previous week	6.04 (1.54)	5.99 (1.34)	5.98 (1.32)			
Growth Fostering Materials	8	Child has free access to musical instruments	4.43 (1.23)	5.35 (1.35)	4.85 (1.55)			
Provision for Active Stimulation	8	Family encourages child to develop hobbies.	4.02 (1.23)	4.90 (1.83)	4.23 (1.67)			
Family Participation in Dev. Stimulating Experiences	6	Family visits with relatives or friends at least once every other week.	3.40 (1.05) ^a	4.30 (1.19) ^a	4.00 (1.14)			
Paternal Involvement	4	Child spends time with father four days a week.	2.04 (1.71)	2.74 (1.50)	2.00 (1.63)			
Aspects of the Physical Environment	8	Building has no potentially dangerous structural or health defects (e.g., rodents, etc.)	5.38 (2.14) ^b	5.79 (2.20) ^c	3.63 (2.35) ^{b,c}			

Note: Values with the same superscript are significantly different from one another;

^a $p < .01$;^b $p = .001$;^c $p = .01$.

Table 4

Regression Analysis Summary for Home Environment Predicting Family Asthma Management for the Entire Sample and By Ethnic Group, Controlling for Poverty

Variable	B	SEB	β
Entire Sample (N=124)			
Poverty Threshold	-.61	.19	-.27**
HOME Total Score	.06	.01	.36***
Latino (n = 48)			
Poverty Threshold	-.23	.33	-.11
HOME Total Score	.03	.03	.19
Non-Latino White (n = 44)			
Poverty Threshold	-.77	.41	-.26
HOME Total Score	.08	.02	.46**
African American (n = 32)			
Poverty Threshold	-1.01	.26	-.52**
HOME Total Score	.05	.02	.37*

*
p<.05;

**
p<.01;

p<.0