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Validation of the Asthma Illness Representation Scale (AIRS©)

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Abstract

Background—Research has suggested a link between parents' illness representations (IRs), use of complementary and alternative medicine, inhaled/oral corticosteroids and leukotriene antagonists, and children's health outcomes. The Asthma Illness Representation Scale (AIRS©) provides a structured assessment of the key components of asthma IRs allowing the healthcare provider (HCP) to quickly identify areas of discordance with the professional model of asthma management.

Methods—These analyses extend the initial validation of the AIRS© and compares data from the original study conducted among a primarily white and African American sample in Rochester, NY (N = 228) with data obtained from a predominantly inner-city, ethnic minority sample (Puerto Rican, African American, and Afro-Caribbean) from the Bronx, New York (N = 109).

Results—A larger proportion of the Rochester sample was white and non-poor and had graduated high school. Bronx parents were more likely to perceive their child's asthma to be moderate or severe than the Rochester parents. Bronx children were older and had longer duration of asthma and reported more acute health care visits (past year). Bronx parents reported total AIRS© scores more closely aligned with the lay model than Rochester parents. The AIRS© instrument demonstrated acceptable internal reliability among the Bronx sample (total score α = 0.82) and the AIRS© subscale Cronbach's alpha coefficients were remarkably similar to those obtained from the original validation study (range = 0.54–0.83). Poor parents and those with less than a high school education had lower total AIRS© scores than their counterparts. White parents had AIRS© scores more closely aligned with the professional model compared to each of the ethnic subgroups. A perception of less severe asthma, fewer reports of asthma and somatization symptoms, and a positive HCP relationship were associated with IRs congruent with the

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professional model. IRs aligned with the professional model were associated with fewer acute asthma-related healthcare visits.

Conclusions—The AIRS© instrument exhibited good internal reliability, external validity, and differentiated parents based on ethnicity, poverty, and education. Assessment of asthma IRs during the healthcare visit will allow the HCP and parent to discuss and negotiate a shared asthma management plan for the child, which will hopefully lead to improved medication adherence and asthma health outcomes.

Keywords

asthma; illness representation; validation; instrument

Introduction

The past three decades have seen a shift in approaches to studying health and illness behavior from disease-oriented medical models to integrated bio-psycho-social models, yet little research has been conducted focusing on parents' cognitive representations of their child's asthma. Because parents are the gatekeepers for their children's healthcare and ultimately make the final treatment decisions, it is parents' representation of their children's illness that influences parents' treatment decisions, healthcare seeking behavior, and children's asthma health outcomes (1–3). As management of chronic illnesses has incorporated more self-management strategies, it is important to understand how the parent perceives his/her child's asthma so that effective communication regarding treatment expectations and symptom or disease resolution can occur. There is the potential to improve adherence to the prescribed medication regimens while remaining sensitive to the parents' ethnomedical beliefs. To elicit this information from parents, valid and reliable survey instruments are needed that can be utilized in clinical and research settings. It is important that these instruments be disease-specific to capture illness and medication beliefs that may be unique to a particular disease.

Research has suggested that there is a link between parents' illness representations (IRs), the use of complementary and alternative medicine (CAM), inhaled or oral corticosteroids and leukotriene antagonists, and children's health outcomes (3–18). The parent's IRs is critical in the decision to seek professional healthcare for the child, which is necessary to obtain the controller medications. Once the parent has made the decision to seek care, IRs also play a role in determining whether the parent follows through with the child's prescribed medication regimen–particularly important when managing a chronic illness that may require lifetime medication use.

Several studies have demonstrated that nonadherence is related to parents' concerns with daily medication use in children (3, 9, 19, 20). If the parent understands that medication is necessary to control the child's asthma symptoms but is concerned about potential side effects (e.g., daily inhaled controller medications for her child with asthma) or views asthma as an episodic rather than chronic illness, then the parent may consciously decide not to administer the medication. This has been labeled as “intelligent noncompliance” or

"volitional nonadherence" because nonadherence is the result of a rational decision on the part of the individual (20, 21).

It has also been shown that parents and healthcare providers (HCPs) think about asthma differently (3, 7, 22). The professional model of asthma management views asthma as a chronic illness and the disease is present even when symptoms are controlled and currently not apparent (23). Parents typically describe asthma as episodic, acute, and not readily controllable, or a combination of these, commonly referred to as "lay models" of illness management (3, 7, 22). It has been demonstrated that IRs that were congruent with the professional model were associated with a greater probability that the child was on an adequate medication regimen, a greater probability of controller medication use, and concurrent decrease in the probability of CAM use (3, 12). In the case of managing a chronic illness, such as asthma, these are important points to consider when examining adherence.

The analyses in the present study extend the initial validation of the English version of the Asthma Illness Representation Scale (AIRS©) (3, 11) by comparing data from the original study conducted in Rochester, NY, with data obtained from a sample of families living in the Bronx, NY. We also pooled the data from these two studies and ran subgroup analyses to examine whether there were differences in the AIRS© scores by ethnicity, poverty, and education. The addition of the Bronx site expanded the psychometric analyses of the AIRS© to an inner-city, ethnically minority sample comprised primarily of Puerto Rican, African-American, and Afro-Caribbean participants.

Methods

Study Design

The data for these secondary analyses were derived from two studies: [1] a study that investigated the impact of parental beliefs about the nature of asthma and its treatment on the adequacy of the child's treatment regimen among a primarily white and African American sample, which resulted in the final refinement of the AIRS© instrument in Rochester, NY, and [2] as part of a larger study on children's patterns of asthma symptom perception and parental health beliefs carried out in Bronx, NY.

Sample and Procedures

Rochester Sample—The full details of the original study design and sample have been previously published (3) but will be summarized briefly here. The study sample consisted of 228 parents and their 5- to 12-year-old children with asthma recruited from six pediatric primary care practice sites in Rochester, New York. The sites included two pediatric clinics serving primarily urban minority families as well as four community pediatric practices serving predominantly middle-class families. Parents and children were invited to participate in the study if they met the following criteria: (a) the child was 5 to 12 years of age; (b) the family was English-speaking; (c) the child carried a diagnosis of asthma; and (d) the child had at least two asthma-related health care visits in the year before the interview. The University of Rochester Institutional Review Board approved the study protocol. Interviews

occurred over a 16-month period to capture seasonal variations in asthma. Three parents who reported their ethnic background as “Other” were omitted from these analyses yielding an analysis sample of 225.

Bronx Sample—The lifetime prevalence rate of asthma (12.0%) among individuals in New York City (NYC) is 29% higher than the national rate (9.3%) (24). In the year 2000, asthma hospitalization rates among children in NYC were 1.8 times higher than national rates. Within NYC, the Bronx is the borough with the highest prevalence and hospitalization rates for asthma among children (24).

Participants were recruited from pediatric asthma/allergy and general pediatric clinics and the emergency room at a public city hospital. Parents and children were invited to participate in the study if they met the following inclusion criteria: (a) children were 7 to 15 years of age, (b) the parent and child were English-speaking, (c) the child had received a diagnosis of asthma, which was confirmed by medical chart review, and (d) the child had experienced breathing problems in the past year. The adult informant was required to be a parent or caregiver of the child and must have lived with the child for at least 9 months out of the past year. Children were excluded from the study for severe cognitive learning disabilities. A total of 109 participants completed the English version of the AIRS© instrument and comprise the analysis sample from this site. The Institutional Review Board of Albert Einstein College of Medicine reviewed and approved this study and all parents provided informed consent for their and their child's participation.

Measures

Asthma Illness Representation Scale (AIRS©)—Section I of the 37-item AIRS© is comprised of five subscales and the total score. This instrument is designed to identify barriers and risk factors for under-utilization of controller medications that can be used in research and healthcare settings. The English version of the AIRS© tool was developed and validated among an ethnically diverse sample, primarily White, African American, and a small sample of Puerto Rican participants (11, 25, 26). In a study of Parental Illness Representation (3), the reliability analyses from the earlier development work were repeated and a slightly different factor structure was found. The new results yielded five final subscales for the AIRS© tool, in addition to an overall score. These sub-scales are [1] treatment expectations (8 items, $\alpha = 0.75$); [2] attitudes towards medication use (8 items, $\alpha = 0.78$); [3] facts regarding asthma (11 items, $\alpha = 0.69$); [4] the nature of asthma symptoms (5 items, $\alpha = 0.61$); and [5] emotional aspects of medication use (5 items, $\alpha = 0.55$). The Cronbach's alpha for the overall scale score was 0.84 (3). Each item is scored on a 5-point Likert-type scale from 1 (*strongly agree*) to 5 (*strongly disagree*). When necessary, items within each subscale are reverse scored so that higher values indicate closer alignment with the professional model for asthma management. The subscales and total score are calculated based on the mean of the non-missing items. A Spanish translation and validation study of the AIRS© instrument is currently underway. A sample of the items comprising each AIRS© subscale is provided below:

Treatment Expectations—"Children with asthma can expect to have symptoms several times a week"; "I expect that asthma will not affect my child's school attendance"; and "I believe that my child can be symptom-free most of the time."

Attitudes Toward Medication Use—"Children with asthma are taking too many inhaled steroids"; "I worry about the side effects of inhaled steroids"; and " Using inhaled steroids should be a last resort in treating asthma."

Facts Regarding Asthma—"Inhaled steroids work by fighting inflammation in the lungs"; "Asthma is caused by weak lungs"; and "If albuterol controls symptoms then antiinflammatory medications are not necessary."

Nature of Asthma Symptoms—"Asthma symptoms are unpredictable"; "It is hard to figure out how bad an attack is"; and "Asthma cannot be controlled."

Emotional Aspects of Medication Use—"Taking daily medication makes a child feel different from other children"; "My child is reluctant to use an inhaler in front of other children"; and "My child does not like the taste of inhaled steroids."

Variables for Examining External Validity – Bronx Sample

Parent-Healthcare Provider (HCP) Relationship-AIRS© Section II—To assess the parent-HCP relationship, we used the parent-HCP relationship section from the AIRS© instrument. This section is not included in the total AIRS© score. Parents were asked 10 questions covering topics such as continuity of care provider, shared communication with the provider regarding worries about asthma and medications, understanding the impact of asthma on the child's and family's lives, and instructions about medication use. Questions are scored on a 5-point Likert-type scale with responses ranging from 1 (*strongly agree*) to 5 (*strongly disagree*). Examples are: "I am sometimes reluctant to discuss my worries about asthma medicines with my child's healthcare provider"; "My child's HCP understands how my child's asthma affects my child's day-to-day life"; and "I see a different HCP every time I go to the office." Several questions were reverse scored before aggregation so that higher scores represented a more favorable relationship with the HCP. The overall score was calculated as the mean of the non-missing items. The English version of this scale was developed and validated among an ethnically diverse sample (white, African American, and Puerto Rican) and has shown good internal consistency ($\alpha = 0.82$). This scale also significantly predicted IRs congruent with the professional model (3, 11, 25).

Beliefs About Contacting the HCP-AIRS© Section III—This scale contains items considered by the NAEPP Expert Panel (23, 27, 28) to indicate a lack of adequate symptom control (asthma symptoms more than two times/week; activity limitation; nighttime asthma symptoms more than two times/month; and use of albuterol more than 2 times/week). Parents were asked how much they agreed that they would contact the HCP if each of these situations occurred. Possible responses ranged from 1 (*strongly agree*) to 5 (*strongly disagree*). This section is part of the overall AIRS© instrument but not included in the total asthma IRs score. Items were reverse scored so that higher scores indicated concordance

with the NAEPP recommendations. The subscale score was computed as the mean of the non-missing items.

Illness Duration—We obtained information on how old the child was when his/her asthma was first diagnosed. Using the child's age at the time of the interview, illness duration was calculated by subtracting the age at diagnosis from the age at interview. This yielded the number of years which was converted to months. There were 3 parents who reported age at diagnosis as “since birth.” Asthma duration for these cases was coded as one month.

Perception of child's asthma symptom severity—Independently, parents and children were asked to classify, on a 5-point Likert-type scale, their interpretation of the severity of the child's asthma symptoms. Response ranged from 1 (*very mild*) to 5 (*very severe*).

Number of Acute Care Visits—The total number of acute clinic visits, emergency room visits, and hospitalizations in the past year were obtained from parent report.

Parent-Child Somatization Inventory (P-CSI)—Parents rated the frequency that their child experienced each of 35 symptoms, which are common in somatization disorder, in the last 2 weeks. Each item is scored using a 5-point scale ranging from 0 (*Not at all*) to 4 (*A whole lot*). A total score, obtained by summing the ratings, can range from 0 through 140. Three-month test-retest Pearson reliability for the CSI was reported to be 0.50 for well patients and 0.66 for patients with chronic pain syndrome (29). The parent form of the Children's Somatization Inventory includes the same symptoms as the CSI and was completed by parents with reference to their children. Concordance between parent and child was 0.47 for symptomatic children and 0.29 for well-children (30).

Symptom Interpretation—Interpretation of the child's symptoms by the parent was assessed using the Parent-Childhood Asthma Symptom Checklist (P-CASCL). The P-CASCL is a 47-item measure of the frequency that children experience physical symptoms, irritability, and panic-fear during asthma attacks (2). Items are scored on a 4-point scale with anchors of 1 (*never*) to 4 (*always*). Parent report across these three subscales of the P-CASCL has been associated with asthma morbidity (emergency room visits, hospitalizations, and medication regimen) among children 6 years of age and older (2).

Sociodemographic Variables for Sub-group Analyses of Pooled Data

Ethnicity—Parents self-identified their ethnic group as white, African American, Puerto Rican, Afro-Caribbean, or Other. The number of parents reporting “Other” was too small ($n = 3$) and diverse to allow for meaningful group comparisons, thus, these cases were omitted from these analyses.

Education—Parental education was reported as the years of completed education. A three-level categorical variable was created: 1 *(<high school graduate)*, 2 *(high school graduate)*, and 3 *(>high school graduate)*.

Poverty—The type of health insurance for the child was used as a marker for poverty because it was the only measure of poverty that was the same in both studies. Poverty was determined using Medicaid and State Children's Health Insurance Program (SCHIP) eligibility because these programs use Federal poverty guidelines. This was a dichotomous variable coded as 0 *(non-poor)* or 1 *(poor)*.

Data Analysis

The psychometric properties of the AIRS© instrument from the Bronx dataset were analyzed using standard psychometric techniques (item-total correlation analysis, internal reliability, factor analysis, and external validity). For the factor analysis, a minimum eigenvalue of 1 was set and varimax rotation specified. Items were allowed to load only on one factor and factor loadings had to be ≥0.40 to be included. Internal reliability was determined by examining the Cronbach's alpha coefficients and external validity through correlation analyses with the measures of perception of asthma symptom severity (parent and child), parental interpretation of child's symptoms, asthma duration, quality of the parent-HCP relationship, beliefs about contacting the HCP, and acute care visits. Descriptive statistics (means and standard deviations) were computed for each subscale and the total score and compared (using independent samples *t* tests) to those obtained from the original validation study. Because we know that certain subgroups differ in morbidity outcomes based on demographic and background characteristics (ethnicity, education, poverty), the data were pooled and analyses conducted to determine if these subgroups differed in their responses to the AIRS© questionnaire. Multivariate regression analyses were conducted to examine the independent contributions of ethnicity, education, and poverty on the total AIRS© score and the subscales. SAS V9.1 was used for all analyses.

Results

Participants

Table 1 presents the demographic characteristics of the sample from each site. There were statistically significant differences between the two samples for all of the demographic characteristics examined. The majority of parents in the Bronx sample were ethnic minority (94.5% = Puerto Rican, African American, and Afro-Caribbean) compared to 45.3% ethnic minority (Puerto Rican and African American) for the Rochester sample. A greater proportion of parents in the Bronx sample were poor (85.8% versus 45.3%) and had less than a high school education (34.0% versus 13.3%) than their Rochester sample counterparts. Children in the Bronx sample were older (10.71 versus 8.97 years), had more asthma-related health care visits in the past year (6.84 versus 4.60), and greater self-reported disease severity (76.2% moderate/severe versus 26.3%) compared to children in the Rochester sample.

Psychometric Analyses-Bronx Sample

The psychometric analyses were conducted using data from the Bronx sample in order to compare the results with the original Rochester validation sample. All items from sections I, II and III of the AIRS© instrument were included. The original factor structure was not replicated with these data for the Bronx sample even when the solution was forced to seven

factors, which included the five factors comprising the total AIRS© score as well as the Parent-HCP Relationship scale and the Beliefs About Contacting the HCP scale. Three of the original factors did emerge from these analyses: Attitudes Towards Medication Use (Factor 1), Parent-HCP Relationship (Factor 2), and Emotional Aspects of Medication Use (Factor 6). Factor 3 contained three items from the original Nature of Asthma scale, two items from the Treatment Expectations Scale, and one item each from the Facts About Asthma and Emotional Aspects of Medication Use scales. The original Facts About Asthma scale emerged primarily as Factors 4 and 5 in this sample with no coherent or theoretical distinction between the two factors. Factor 7 was comprised of two items from the original Nature of Asthma scale, two items from the Beliefs About Contacting the HCP scale, and one item from the Facts About Asthma scale. The validity of the factor analysis is limited, however, because we had less than a 5:1 ratio of observations to items, the minimum ratio which has been suggested for factor analysis (31).

We next examined the Cronbach's alpha coefficients for the items based on the original subscale structure. These analyses revealed that with the exception of the Facts About Asthma subscale, the alphas were either consistent with the original or better, lending support to the notion that the inability to replicate the original factor structure may have been due to sample size limitations. As stated above, the original Facts About Asthma subscale items loaded onto two factors. When the items were forced into the original scale, the Cronbach's alpha coefficient was 0.48. Examination of the item-total correlation revealed that the item “Asthma is caused by exposure to drafts/wind” was negatively correlated with the other items. Removal of this item improved the alpha coefficient to 0.54. The Cronbach's alpha coefficients for the remaining subscales ranged from 0.62 to 0.83 compared to a range of 0.61 to 0.78 for the original subscales.

External Validity-Bronx Sample

Higher scores on the AIRS© instrument are indicative of beliefs that are congruent with the professional model of asthma management. The total AIRS© score demonstrated small to modest statistically significant negative correlations with child's perception of asthma severity ($r = -0.20$, $p = 0.04$), parent's perception of asthma severity ($r = -0.20$, $p = 0.03$), parent's report of child's somatization ($r = -0.24$, $p = 0.01$), and the P-CASCL general symptoms score ($r = -0.38$, $p < 0.0001$). There was a trend for fewer acute healthcare visits to be associated with higher AIRS© scores ($r = -0.16$, $p = 0.10$). Parents who reported a more favorable relationship with the HCP had higher AIRS© scores ($r = 0.30$, $p = 0.002$). These results indicate that a perception of less severe asthma, fewer reports of asthma and somatization symptoms, and a positive relationship with the HCP are associated with beliefs that are congruent with the professional model, and beliefs aligned with the professional model are associated with fewer acute asthma-related healthcare visits. There was no correlation with how many months the child had asthma or parents' beliefs about when to contact the HCP.

t test Differences in AIRS© Scores Based on Study Sample

Table 2 highlights the differences between the Rochester and Bronx samples on the AIRS© subscales and total scores based on independent sample *t* tests. Statistically significant

differences were observed between the samples for all scales except the Nature of Asthma Symptoms, Facts About Asthma, and Beliefs About Contacting the HCP. The mean scores for the Bronx sample were lower than the Rochester sample for all subscales and the total score, indicating beliefs that were less closely aligned with the professional model of asthma management among the Bronx sample.

Sub-group Differences on AIRS© Subscales and Total Score-Pooled Data

Two sets of regression analyses were conducted examining sub-group differences on the AIRS© scores: [1] the Bronx sample only and [2] pooled data from the original Rochester sample and the current Bronx sample. All analyses controlled for the parent's perception of the child's asthma severity.

Bronx Sample—The Bronx sample was relatively homogeneous with regards to minority ethnicity (94%) and poverty (86%), thus, few statistically significant differences in the AIRS© scores based on ethnicity, education, and poverty were observed within this sample. For the Nature of Asthma subscale, white parents reported higher scores (M = 3.54, SE = 0.30) than either African American (M = 2.91, SE = 0.12, p = 0.05) or Puerto Rican parents (M = 2.71, SE = 0.11, p = 0.01). Poor parents reported significantly lower scores on the Attitudes Towards Medication Use subscale than non-poor parents (M = 2.63, SE = 0.07 versus M = 3.16, SE = 0.18, p = 0.008, respectively). Compared to parents with less than a high school education, parents with greater than a high school education demonstrated significantly higher scores on the Facts About Asthma (M = 3.73, SE = 0.06 versus M = 3.92, SE = 0.06, p = 0.03, respectively) and Nature of Asthma subscales (M = 2.58, SE = 0.12 versus M = 3.12, SE = 0.11, p = 0.001, respectively). Parents with greater than a high school education also had significantly higher scores on the Treatment Expectations subscale compared to those parents who graduated from high school (M = 3.01, SE = 0.10 versus M = 2.64, SE = 0.13,p = 0.02, respectively). All of these findings are in agreement with those from the original study demonstrating that parents who were white and non-poor and had higher educational achievement held asthma illness beliefs congruent with the professional model.

Pooled Data—Because of the sample limitations from the original Rochester validation study (too few Puerto Rican parents) and those cited above for the Bronx sample, we pooled the data and re-ran the subgroup analyses. Table 3 above illustrates these results.

Poverty—Poor parents' scores on the AIRS© total score were significantly lower than non-poor parents indicating beliefs less congruent with the professional model of asthma management. It appears that this finding is due to the significant differences observed on the Treatment Expectations and Emotional Aspects of Medication Use subscales between poor and non-poor parents. Non-poor parents also reported more positive relationships with the HCP and appropriate beliefs about contacting the HCP than poor parents.

Ethnicity—White parents had significantly higher total AIRS© scores compared to the African American, Puerto Rican, and Afro-Caribbean parents signifying closer alignment with the professional model. Statistically significant differences were noted between white

parents and each of the ethnic minority subgroups for Attitudes Towards Medication Use, but only between white and African American parents for Facts About Asthma and white and Puerto Rican parents for the Nature of Asthma Symptoms. No differences based on ethnicity for the Treatment Expectations and Emotional Aspects of Medication Use subscales were detected. Within the ethnic minority subgroups, African American parents demonstrated higher scores on the Attitudes Toward Medication Use than the Afro-Caribbean parents. There were no differences in Beliefs About Contacting the HCP by ethnicity but differences were observed between white parents and Puerto Rican and Afro-Caribbean parents on report of HCP relationship. White parents rated the relationship more positive than either of the ethnic minority subgroups.

Education—Parents with greater than a high school education reported significantly higher scores than lesser educated parents (high school graduate or less) on the total AIRS© indicative of alignment with the professional model. Significant differences were also observed between parents with greater than high school education and those who did not complete high school on all scores except Emotional Aspects of Medication Use. High school graduates and those with greater than a high school education differed on Treatment Expectations, Facts About Asthma, and Nature of Asthma Symptoms scores, with high school graduates reporting lower scores, thus less congruent with the professional model. There were no statistically significant differences in reports of the Parent-HCP Relationship based on parental educational level. Interestingly, high school graduates reported more appropriate beliefs about contacting the HCP than did parents with higher education.

Limitations

There are several limitations to these analyses that need to be considered when interpreting these results. As stated earlier, the original factor structure was not replicated with the Bronx sample. It is not clear whether this was a sample size phenomenon or that this sample is truly different in their asthma IRs beliefs. Because the Cronbach's alpha analyses yielded results quite similar to those from the original study, we are inclined to believe that sample size was the issue.

In the original Rochester sample, we did not have objective measures of pulmonary function (e.g., peak flow meter readings [PEFR] or spirometry assessments [FEV1 or FEV1/FVC]). Correlation analyses using the Bronx sample revealed no significant correlations of the AIRS© total score with any of the objective pulmonary function test results. Given that the Bronx sample was fairly homogenous, the lack of correlation may be site-specific.

It is difficult to disentangle the effects of ethnicity and poverty and thus, we must be cautious in interpreting these findings as solely due to ethnicity. The first author, as part of her doctoral dissertation, examined this issue in-depth with the Rochester sample and found that it was the shared effects of ethnic group and poverty that were related to the outcomes under study (use of controller medications and complementary and alternative therapies).

Discussion

Among the group of children with moderate to severe uncontrolled asthma, it is important to understand how a parent perceives his/her child's asthma (asthma IRs) so that effective communication regarding symptoms, medication use, treatment expectations, and symptom or disease resolution can occur. To elicit information about asthma beliefs from this specific group of children and their families, valid and reliable survey instruments are needed that can facilitate these discussions during the office visit. The AIRS© instrument demonstrated good internal reliability as well as the ability to detect differences in asthma IRs scores based on ethnicity, poverty, and education among a diverse sample of parents.

Significant asthma health disparities exist between African American and Puerto Rican children and other ethnic groups. Genetic, environmental, healthcare system, and provider factors cannot totally explain these differences in asthma health outcomes. Previous research has demonstrated that African American and Puerto Rican parents have health beliefs that are discordant with the professional model. Little research has been conducted examining asthma among Afro-Caribbean children, and no studies were found that explored IRs among this subgroup. A search of the literature revealed one population-based study conducted in England on self-reported health status and health services utilization among ethnic minority adults and children (32). This study found that Afro-Caribbean children had one of the highest prevalence rates for asthma (17.7%), reported worse health, and were less likely to be referred to secondary care than the general population. The results from this study suggest that the Afro- Caribbean parents hold different beliefs about asthma and its management than African American, Puerto Rican, and white parents. It is clear that future research needs to include larger samples of diverse ethnic minority groups to further our understanding of their asthma beliefs and where these beliefs are discordant with the professional model.

The AIRS© instrument provides a structured assessment of the key components of asthma illness beliefs, which will allow the HCP to quickly identify areas of discordance with the professional model of asthma management. The HCP and parent can then discuss and negotiate a shared asthma management plan for the child, which will hopefully lead to improved medication adherence and asthma health outcomes.

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References

1. Sidora-Arcoleo K, Yoos HL, McMullen A, Kitzman H. Complementary and alternative medicine use in children with asthma: Prevalence and sociodemographic profile of users. Journal of Asthma. 2007; 44:169–175. [PubMed: 17454333]
2. Fritz GK, Overholser JC. Patterns of response to childhood asthma. Psychosom Med. 1989; 51:347–355. [PubMed: 2734427]
3. Yoos HL, Kitzman H, Henderson C, McMullen A, Sidora-Arcoleo K, Halterman JS, Anson E. The impact of the parental illness representation on disease management in childhood asthma. Nursing Research. 2007; 56:167–174. [PubMed: 17495572]

4. Diaz T, Sturm T, Matte T, Bindra M, Lawler K, Findley S, Maylahn C. Medication use among children with asthma in east harlem. Pediatrics. 2000; 105:1188–1193. [PubMed: 10835056]
5. Cornelius LJ. Barriers to medical care for white, black, and hispanic american children. J Natl Med Assoc. 1993; 85:281–288. [PubMed: 8478969]
6. Mansour ME, Lanpear BP, DeWitt TG. Barriers to asthma care in the urban children: Parent perspectives. Pediatrics. 2000; 106:512–519. [PubMed: 10969096]
7. Chambers CV, Markson L, Diamond JJ, Lasch L, Berger M. Health beliefs and compliance with inhaled corticosteroids by asthmatic patients in primary care practices. Respir Med. 1999; 93:88–94. [PubMed: 10464858]
8. Farber HJ, Capra AM, Finkelstein JA, Lozano P, Quesenberry CP, Jensvold NG, Chi FW, Lieu TA. Misunderstanding of asthma controller medications: Association with nonadherence. J Asthma. 2003; 40:17–25. [PubMed: 12699208]
9. Callery P, Milnes L, Verduyn C, Couriel J. Qualitative study of young people's and parents' beliefs about childhood asthma. British Journal of General Practice. 2003; 53:185–190. [PubMed: 14694693]
10. Conn KM, Halterman JS, Fisher SG, Yoos HL, Chin NP, Szilagyi PG. Parental beliefs about medications and medication adherence among urban children with asthma. Ambul Pediatr. 2005; 5:306–310. [PubMed: 16167856]
11. Peterson-Sweeney K, McMullen A, Yoos HL, Kitzman H. Parental perceptions of their child's asthma: Management and medication use. J Pediatr Health Care. 2003; 17:118–125. [PubMed: 12734458]
12. Sidora-Arcoleo, K. Variations in Parental Illness Representations of Children with Asthma: The Impact on the Use of Complementary&Alternative Medicine and Symptom Severity [PhD]. Rochester, New york: University of Rochester, School of Medicine & Dentistry; 2006.
13. Burchard EG, Ziv E, Coyle N, Gomez SL, Tang H, Karter AJ, Mountain JL, Perez-Stable EJ, Sheppard D, Risch N. The importance of race and ethnic background in biomedical research and clinical practice. N Engl J Med. 2003; 348:1170–1175. [PubMed: 12646676]
14. Cloutier MM, Wakefield DB, Hall CB, Bailit HL. Childhood asthma in an urban community: Prevalence, care system, and treatment. Chest. 2002; 122:1571–1579. [PubMed: 12426255]
15. Pachter LM, Weller SC, Baer RD, de Alba Garcia JE, Trotter RT II, Glazer M, Klein R. Variation in asthma beliefs and practices among mainland puerto ricans, mexican-americans, mexicans, and guatemalans. J Asthma. 2002; 39:119–134. [PubMed: 11995676]
16. Pachter LM. Culture and clinical care folk illness beliefs and behaviors and their implications for health care delivery. JAMA. 1994; 271:690–694. [PubMed: 8309032]
17. Ledogar RJ, Penchaszadeh A, Garden CC, Iglesias G. Asthma and latino cultures: Different prevalence reported among groups sharing the same environment. Am J Public Health. 2000; 90:929–935. [PubMed: 10846511]
18. Wood PR, Hidalgo HA, Prihoda TJ, Kromer ME. Hispanic children with asthma: Morbidity. Pediatrics. 1993; 91:62–69. [PubMed: 8416506]
19. Horne, R. Representations of medications and treatment: Advances in theory and measurement. In: Petrie, KJ.; Weinman, JA., editors. Perceptions of Health and Illness. Netherlands: Harwood Acadmeic Publishers; 1997. p. 155-188.
20. Weintraub M. Compliance in the elderly. Clin Geriatr Med. 1990; 6:445–452. [PubMed: 2331663]
21. Graves MM, Adams CD, Bender JA, Simon S, Portnoy AJ. Volitional nonadherence in pediatric asthma: Parental report of motivating factors. Curr Allergy Asthma Rep. 2007; 7:427–432. [PubMed: 17986372]
22. Leickly FE, Wade SL, Crain E, Kruszon-Moran D, Wright EC, Evans R III. Self-reported adherence, management behavior, and barriers to care after an emergency department visit by inner city children with asthma. Pediatrics. 1998; 101:E8. [PubMed: 9565441]
23. U.S. Department of Health & Human Services: National Asthma Education Program. Expert Panel 3 Report: Guidelines for the Diagnosis and Management of Asthma. Bethesda, MD: U.S. Department of Health & Human Services; 2007.
24. Garg, R.; Karpati, A.; Leighton, J.; Perrin, M.; Shah, M. Asthma facts. New York City: Department of Health and Mental Hygiene; 2003.

25. Yoos HL, Kitzman H, McMullen A. Barriers to anti-inflammatory medication use in childhood asthma. Ambul Pediatr. 2003; 3:181–190. [PubMed: 12882595]

26. Yoos HL, Kitzman H, McMullen A, Sidora K. Symptom perception in childhood asthma: How accurate are children and their parents? J Asthma. 2003; 40:27–39. [PubMed: 12699209]

27. U.S. Department of Health & Human Services: National Asthma Education Program. Expert panel report: Guidelines for the diagnosis and management of asthma update on selected topics. J Allergy Clin Immunol. 2002; 110:s141–219. [PubMed: 12542074]

28. U.S. Department of Health & Human Services: National Asthma Education Program. Expert panel II report: Guidelines for the diagnosis and management of asthma. US Department of Health and Human Services; Bethesda, MD: 1997. NIH publication 97-4051

29. Garber J, Walker LS, Zeman J. Somatization symptoms in a community sample of children and adolescents: Further validation of the children's somatization inventory. Psychol Assess: J Consult Clin Psychol. 1991; 3:588–595.

30. Garber J, Van Slyke DA, Walker LS. Concordance between mothers' and children's reports of somatic and emotional symptoms in patients with recurrent abdominal pain or emotional disorders. J Abnorm Child Psychol. 1998; 26:381–391. [PubMed: 9826296]

31. Gorsuch, RL. Factor Analysis. 2d. Hillsdale, NJ: Lawrence Erlbaum; 1983.

32. Saxena S, Eliahoo J, Majeed A. Socioeconomic and ethnic group differences in self reported health status and use of health services by children and young people in England: Cross sectional study. BMJ. 2002; 325:1–2–6. socioeconomic, ethnic group, health status. [PubMed: 12098707]

Table 1

Demographic characteristics of study participants from each site.

Characteristic	Rochester (*N* = 225) no. (%)	NYC (*N* = 109) no. (%)	X^2 (*p* value)
Relationship to child			3.76 (0.58)
Mother	200 (88.9)	95 (87.2)	
Father	11 (4.9)	3 (2.7)	
Grandmother	8 (3.6)	6 (5.5)	
Grandfather	1 (0.4)	0	
Adoptive/Step-mother	2 (0.9)	4 (3.7)	
Other	3 (1.3)	1 (0.9)	
Ethnic group			135.2 (<0.0001)
White	123 (54.7)	6 (5.5)	
African American	84 (37.3)	36 (33.0)	
Puerto Rican	18 (8.0)	44 (40.4)	
Black Caribbean	0	23 (21.1)	
Poor			48.7 (<0.0001)
No	123 (54.7)	15 (14.2)	
Yes	102 (45.3)	91 (85.8)	
High School graduate			19.2 (<0.0001)
No	30 (13.3)	36 (34.0)	
Yes	195 (86.7)	70 (66.0)	
Parent perception of asthma severity			97.9 (<0.0001)
Very mild	129 (57.3)	6 (5.5)	
Mild	37 (16.4)	20 (18.3)	
Moderate	47 (21.0)	51 (46.8)	
Severe	12 (5.3)	32 (29.4)	
	Rochester	NYC	*t* (*p* value)
	Mean (SD)	Mean (SD)	
Child's age	8.97 (2.27)	10.71 (2.31)	−6.52 (<0.0001)
No. asthma duration (mos)	67.16 (36.07)	91.60 (40.35)	−5.55 (<.0001)
# Health Care Visits (acute, ED, hospital) past year	4.60 (4.69)	6.84 (7.09)	−3.00 (0.003)

Table 2

Unadjusted differences in AIRS© scores between Rochester and Bronx samples.

	Rochester mean (SD) (range 1–5)	Bronx mean (SD) (range 1–5)	Mean diff	95% CI	*t* value	*p* value
AIRS© section I:						
Attitudes towards medication use	3.23 (0.63)	2.71 (0.73)	0.52	0.36, 0.67	6.66	<0.0001
Treatment expectations	3.23 (0.67)	2.86 (0.65)	0.37	0.22, 0.53	4.84	<0.0001
Facts about asthma	3.91 (0.39)	3.85 (0.40)	0.06	−0.03, 0.15	1.22	0.22
Nature of asthma symptoms	3.01 (0.64)	2.87 (0.74)	0.14	−0.01, 0.30	1.81	0.07
Emotional aspects re medication use	3.32 (0.65)	3.03 (0.76)	0.28	0.12, 0.44	3.31	0.001
Total score	3.44 (0.37)	3.11 (0.41)	0.33	0.24, 0.41	7.29	<0.0001
AIRS© section II:						
Parent-healthcare provider relationship	4.11 (0.50)	3.94 (0.58)	0.16	0.04, 0.28	2.62	0.009
Beliefs about contacting healthcare provider	3.70 (0.83)	3.73 (0.77)	−0.04	−0.22, 0.15	−0.37	0.71

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Table 3

Pooled data subgroup differences in AIRS© scores by poverty, ethnicity, and education controlling for parent-reported symptom severity.

	Poverty		Ethnicity†				Parental Education†		
Subscale	**Poor *N* = 193 mean (SE)**	**Non-poor *N* = 138 mean (SE)**	**(1) African American *N* = 120 mean (SE)**	**(2) white *N* = 129 mean (SE)**	**(3) Puerto Rican *N* = 62 mean (SE)**	**(4) Afro-Caribbean *N* = 23 mean (SE)**	**(1) <High school grad *N* = 66 mean (SE)**	**(2) High school grad *N* = 94 mean (SE)**	**(3) >High school grad *N* = 171 mean (SE)**
AIRS© section I:									
Attitudes toward medication use	2.83 (.06)	2.98 (.07)	3.00 (.06)[a,c]	3.22 (.07)[a,d,e]	2.83 (.09)[d]	2.57 (.14)[c,e]	2.79 (.09)[b]	2.91 (.07)	3.01 (.06)[b]
Treatment expectations	2.96 (.05)	3.21 (.06)*	2.99 (.05)	3.15 (.06)	3.00 (.07)	3.20 (.12)	3.03 (.07)[b]	2.99 (.06)[d]	3.23 (.05)[b,d]
Facts about asthma	3.84 (.03)	3.85 (.04)	3.75 (.04)[a]	3.94 (.04)[a]	3.83 (.05)	3.85 (.08)	3.73 (.05)[b]	3.82 (.04)[d]	3.98 (.03)[b,d]
Nature of symptoms	2.84 (.06)	2.94 (.07)	2.89 (.06)	2.96 (.07)[d]	2.71 (.09)[d]	3.00 (.14)	2.67 (.08)[b]	2.87 (.07)[d]	3.13 (.06)[b,d]
Emotional aspects of	3.07 (.06)	3.32 (.07)*	3.20 (.07)	3.26 (.07)	3.09 (.09)	3.23 (.15)	3.10 (.09)	3.25 (.08)	3.23 (.06)
AIRS© total score	3.20 (.03)	3.33 (.04)*	3.24 (.03)[a]	3.41 (.04)[a,d,e]	3.17 (.05)[d]	3.22 (.07)[e]	3.15 (.04)[b]	3.24 (.04)[d]	3.39 (.03)[b,d]
AIRS© section II:									
Parent/HCP relationship	3.94 (.05)	4.07 (.05)*	4.06 (.05)	4.15 (.05)[d,e]	3.92 (.07)[d]	3.89 (.12)[e]	3.98 (.07)	4.05 (.06)	3.98 (.05)
Beliefs about contacting the HCP	3.55 (.07)	3.86 (.08)*	3.79 (.08)	3.73 (.08)	3.76 (.11)	3.55 (.18)	3.78 (.11)	3.80 (.09)[d]	3.55 (.08)[d]

* = $p < 0.05$

† Contrast of 3 and 4 level categorical variables at $p < 0.05$:

[a] = 1 vs 2;

[b] = 1 vs 3;

[c] = 1 vs 4;

[d] = 2 vs 3;

[e] = 2 vs 4;

[f] = 3 vs 4.