How Do Ethnicity and Primary Language Spoken at Home Affect Management Practices and Outcomes in Children and Adolescents With Asthma?

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Background: Lower rates of preventive medication use and higher rates of hospitalization and emergency department use have been documented among Latino children and adolescents with asthma. However, little is known about how language barriers influence asthma management practices and outcomes.

Objective: To examine the effects of language on asthma management practices and asthma-related outcomes.

Design: Cross-sectional survey of asthma management practices, perceived efficacy, asthma knowledge, family functioning, and health-related quality of life in 405 white non-Latino, African American non-Latino, and Latino children and adolescents from English- and Spanish-speaking homes.

Results: Latino children and adolescents from Spanish-speaking homes had lower rates of goal setting and peak flow monitoring, poorer asthma knowledge, and greater negative family impact than white children and adolescents (P < .05 for all). Although Latino children and adolescents from English-speaking homes did worse than their non-Latino white peers, the decrements were modest and not statistically significant (P > .16 for all). Management practices and outcomes for non-Latino African American children and adolescents closely approximated those of white children and adolescents.

Conclusions: Language barriers seem to contribute to poorer asthma management practices and knowledge among Latino children and adolescents. Efforts to increase knowledge in this group may enhance asthma self-care and limit the morbidity associated with asthma.

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Children and adolescents of Latino origin are one of the most rapidly growing groups in the United States, estimated to reach 14.9 million or 21% of the US population younger than 18 years by 2010.1 Many of these children and adolescents likely live within homes where Spanish is the primary language spoken, given that 28 million respondents in the 2000 census reported speaking Spanish at home. Although many individuals from Spanish-speaking homes are also fluent English speakers, a substantial proportion (28%) either did not speak English well or did not speak English at all.2

Limited English proficiency can impair access to quality health care for Latino children and impede parents' ability to effectively manage their child's illnesses.3,4 In fact, language barriers have led to medical errors with potentially adverse clinical consequences in pediatric samples.3,5 While these studies effectively highlight the wide-ranging health consequences of language barriers, a condition-specific assessment would be helpful for understanding how language affects quality of care.

Asthma is ideal for studying language effects because it is highly prevalent among Latino children and requires sustained management practices that are susceptible to miscommunications during the physician-patient encounter. While studies have documented higher prevalence, greater morbidity, poorer preventive medication use, and more hospitalizations and urgent care use for Latino children with asthma,7-12 little is known about the role of language barriers on the poorer asthma outcomes among these children. We aim to better understand how language affects asthma management practices and asthma-related outcomes by separately examining these outcomes for Latino children and adolescents from Spanish-speaking homes and Latino children and adolescents from English-speaking homes.
METHODS

STUDY DESIGN

Data came from cross-sectional surveys conducted as part of an evaluation of collaborative interventions to improve asthma care.13 Pediatric patients younger than 18 years were eligible for the study if they received asthma care during the prior 12 months from 1 of 13 US clinics (6 urban and 7 rural) participating in the evaluation. Eight clinics are in the East, 3 are in the West, and 2 are in the Northwest. Eleven clinics were Bureau of Primary Healthcare community clinics that primarily serve patients of low socioeconomic status who have no access to private sector health care services. The remaining 2 clinics primarily served privately insured patients.

Clinic personnel contacted parents or the legal guardian of eligible patients for permission to release the parents’ contact information and their child’s diagnosis to survey personnel. Verbal consent was obtained over the telephone from the parent or guardian most familiar with the patient’s medical history (N=511) to conduct a 40-minute interview. In addition, we obtained consent to conduct a 20-minute telephone interview with 145 adolescent patients (aged 12–17 years) about their asthma. Study participants were interviewed between March 13, 2001, and December 21, 2001, and paid $10 for each completed interview. Response rates, calculated according to specifications for response rate 4 from the American Association for Public Opinion Research,14 were 76.0% for parents and 75.2% for adolescents. Surveys were administered by trained telephone interviewers who demonstrated mastery of the study protocol in English or in English and Spanish. The consent process and the telephone interview were conducted in Spanish for Spanish-speaking respondents, while those who indicated Spanish and another non-English language were categorized as Spanish speakers.

We created 4 groups for our analysis: Latinos from Spanish-speaking homes, Latinos from English-speaking homes, African Americans from English-speaking homes, and whites from English-speaking homes. We excluded other ethnic groups to focus our comparisons on the #1 white, African American, and Latino children and adolescents. We excluded 6 more patients to restrict our analyses to those who speak either English or Spanish at home (n=405). Each group included patients from multiple clinics.

DEPENDENT VARIABLES

Asthma Management Practices

Pediatric patients or their parents were asked about recommended asthma management practices: peak flow monitoring (“Do you check your peak flows at home?”), goal setting (“Did you work with one of your asthma doctors or nurses to set personal goals for your asthma treatment?”), and presence of a written action plan (“Have your asthma doctors or nurses worked with you to develop an asthma action plan so that you know how to take care of your asthma?” and “Do you have a copy of this plan in writing?”).

Asthma Knowledge

We constructed a measure of asthma knowledge by summing the number of correct answers to 10 questions adapted from the National Asthma Education Program’s asthma knowledge questionnaire.15 Because parents are involved in the asthma care of younger children, while adolescents are more responsible for their own care, we used parent-reported responses for children aged 2 to 11 years and self-reported responses for adolescents (those aged ≥12 years).

Self-efficacy

For adolescents, self-efficacy for asthma exacerbation management was measured using an adapted version of 2 items from a previously validated asthma self-efficacy scale developed by Bursch et al16 (Cronbach α = .38). For parents of children aged 2 to 11 years, parent self-efficacy for asthma exacerbation management was measured using an adapted version of 3 items from a previously validated asthma self-efficacy scale developed by Bursch et al16 (Cronbach α = .66).

Quality of Life

We used the total score from the PedsQL (Pediatric Quality of Life Inventory) 4.0, SF15, a shortened version of the PedsQL 4.0 Generic Core Scale,17 to measure generic health-related quality of life and the asthma symptoms (11 items) and treatment problems scales (11 items) from the PedsQL 3.0 Asthma Module18 to assess asthma-specific health-related quality of life. Higher scores on these scales represent better health-related quality of life, fewer asthma symptoms, and fewer treatment problems, respectively. These scales have demonstrated reliability (Cronbach α = .70) and validity in previous analyses.19

Impact on Family Functioning

We measured the impact of asthma on family functioning by asking parents 9 questions from an impact-on-family scale.20

INDEPENDENT VARIABLES

Race/ethnicity and primary language spoken at home were the independent variables. Parents reported their child’s race/ethnicity as Latino, white, African American, Asian or Pacific Islander, or another race/multiracial. They also reported whether English, Spanish, or another language was usually spoken at home. If parents indicated that another language was spoken at home, they were asked to list the other language(s). Of these “other language” respondents, those who indicated English and another language, including Spanish, were categorized as English speakers, while those who indicated Spanish and another non-English language were categorized as Spanish speakers.
The adapted scale (Cronbach α = .77; score range, 24-96, consistent with the original scale) included 4 familial/social functioning items, 3 personal strain items, and 2 mastery items. Higher scores on the scale represent greater impact of asthma on family functioning.

Acute Unplanned Service Use

Parents were asked to report for the past 6 months the number of times their child went to an emergency department and the number of times their child spent 1 or more nights at the hospital. Acute-care service use was measured by adding hospitalization and emergency department use. We used the term acute to distinguish from planned ambulatory care follow-up visits, which theoretically should prevent acute-care service use. Although we relied on parent reports, strong agreement (>90%) has been observed between medical records and reports of hospitalizations and emergency department use.

COVARIATES

We controlled for the effects of the intervention and clinic site and for patient age, patient sex, parent annual income, parent’s level of education, parent asthma plan type, asthma severity, and number of comorbid conditions in the multivariate models. Parent’s annual income was categorized as follows: less than $15000, $15000 to $30000, $30001 to $50000, and more than $50000. Parental education was categorized as less than high school or high school graduate or greater. We controlled for health plan type because health care delivery characteristics can affect asthma care. Patients with health plans categorized as health maintenance organizations, preferred provider organization, fee-for-service, and none. Parents of children aged 2 to 11 years reported on their asthma symptoms, and adolescents self-reported on their asthma symptoms. Using this information, pediatric patients were then categorized as having mild intermittent, mild persistent, or moderate/severe persistent asthma according to guidelines from the National Heart, Lung, and Blood Institute.

We obtained data on comorbid conditions by asking parents if their child had a history of any of the following conditions: diabetes mellitus, chronic lung disease other than asthma, allergies/allergic rhinitis/hay fever, or other serious health problems.

ANALYSIS

We used analysis of variance and χ² tests to examine overall differences in sample characteristics. We performed pairwise tests if significant overall effects were found. We used multivariate linear and logistic regression models to examine the effects of race/ethnicity and primary language spoken at home on self-management practices, asthma knowledge and efficacy, and asthma impact on quality of life and family functioning. We modeled each dependent variable as a function of race/ethnicity and primary language spoken at home (Latinos from Spanish-speaking homes, Latinos from English-speaking homes, and African Americans from English-speaking homes, with whites from English-speaking homes as the reference group) and the covariates previously specified. We specifically compared Latinos and African Americans with whites. We also compared Latinos from Spanish-speaking homes with Latinos from English-speaking homes.

Because knowledge is likely to have a strong influence on asthma management behaviors, we examined whether race/ethnicity and language affect the likelihood of responding correctly to individual knowledge items through similar models.

We also explored the relationships between overall knowledge of asthma and self-management, perceived efficacy, and asthma impact on quality of life and family functioning, using multivariate models that included specified covariates, but not the race/ethnicity and language indicators.

For all regression models, we calculated standard errors using the Huber correction to account for clustering effects within sites. We estimated adjusted proportions and means for the 4 groups according to the method described by Graubard and Korn, using our sample as the standard population and variable estimates from our regression models. If significant knowledge effects were observed for an outcome that was affected by race/ethnicity or language, we also estimated the rates or levels of the outcome after equalizing the level of knowledge across the groups. Few missing values were observed among covariates, but we imputed values for 14 subjects missing parental income using the hotdeck procedure to limit data loss during analysis. Analyses were performed using computer software (Stata, version 7.0).

RESULTS

SAMPLE

Of the 405 asthmatic children and adolescents, 57.8% were boys, with a mean age of 9.5 years (Table 1). Socioeconomic status was generally modest, but only 7.7% did not have any health insurance. Asthma tended to be mild, but more than half had at least 1 comorbid condition. Age, sex, asthma severity, and overall disease burden were comparable across the 4 race/ethnicity and language groups (Table 1).

However, substantial differences in socioeconomic status were observed. A significantly higher proportion of white parents had an income of more than $30000 and at least some college education relative to African American parents and Latino parents from either English- or Spanish-speaking homes (P < .05). Income and educational attainment for African American parents were comparable with those of Latino parents from English-speaking homes, but their income was higher than that of Latino parents from Spanish-speaking homes. More Latino children and adolescents from Spanish-speaking homes were uninsured than white, African American, or Latino children and adolescents from English-speaking homes.

EFFECTS OF RACE/ETHNICITY AND PRIMARY LANGUAGE SPOKEN AT HOME ON ASTHMA MANAGEMENT AND OUTCOMES

Table 2 presents estimated means and percentages, after adjustment for covariates. Compared with whites, Latinos from Spanish-speaking homes had lower rates of goal setting and peak flow monitoring, poorer asthma knowledge, and higher negative family impact. Rates of goal setting were higher among African Americans relative to whites, but all other asthma management practices and outcomes for African Americans and Latinos from English-speaking homes did not significantly differ from those of whites (P > .13 for all). Compared with Latinos from English-speaking homes, Latinos from Spanish-speaking homes have poorer generic quality of life and...
were less likely to monitor their peak flows and have written action plans.

Table 3 presents estimated percentages of a correct response to specific knowledge items, after adjustment for covariates. Knowledge about inhalers, lung monitoring, and whether asthma attacks occur suddenly was low across all groups. However, knowledge about asthma management was particularly poor among Latinos from Spanish-speaking homes. Relative to whites, Spanish-speaking Latinos were significantly less likely to know about correct inhaler use, monitoring lung function, controlling asthma, and exercising, although they were significantly more likely to know about allergens. Latinos from English-speaking homes were significantly less likely than whites, but significantly more likely than Latinos from Spanish-speaking homes, to answer the question on exercise correctly. The knowledge of Latinos from English-speaking homes on many items was also intermediate between non-Latinos and Latinos from Spanish-speaking homes, but these differences were generally not statistically significant. African Americans exhibited knowledge comparable to whites, except for the item on controlling asthma, on which they performed significantly worse.

### ASTHMA KNOWLEDGE AND ASTHMA MANAGEMENT

Greater knowledge is associated with important asthma management practices. For example, each additional correct answer was positively associated with a greater likelihood of peak flow monitoring (adjusted odds ratio, 1.25; 95% confidence interval, 1.06-1.48) \((P < .01)\) and higher perceived self-efficacy for managing asthma exacerbations (adjusted difference, 0.12; 95% confidence interval, 0.04-0.20) \((P < .01)\). Those with greater knowledge were also more likely to have a written action plan (adjusted odds ratio, 1.21; 95% confidence interval, 1.01-1.45) \((P = .04)\). Knowledge was not significantly related to the other outcomes.

### COMMENT

We found substantial language effects on asthma management practices and outcomes. Across the groups examined in this study, Latino children and adolescents from Spanish-speaking homes had the poorest asthma management practices and outcomes, while African American and Latino children and adolescents from English-speaking homes more closely approximated those of their white peers.

Active management is important for limiting morbidity in children and adolescents with asthma.\textsuperscript{25} Yet, lower rates of preventive medication use and higher rates of hospitalizations and emergency department visits have been observed among Latino children and adolescents with asthma.\textsuperscript{9-12} Our study suggests that language barriers likely contribute to the lower levels of asthma knowledge and recommended asthma management practices among Lati-

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**Table 1. Sample Characteristics by Race/Ethnicity and Primary Language Spoken at Home**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total Sample (n = 405)</th>
<th>White and English-Speaking (n = 122)</th>
<th>African American and English-Speaking (n = 145)</th>
<th>Latino and English-Speaking (n = 53)</th>
<th>Latino and Spanish-Speaking (n = 85)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child age, mean (SD), y</td>
<td>9.5 (3.5)</td>
<td>10.1 (3.5)</td>
<td>9.2 (3.5)</td>
<td>9.3 (3.9)</td>
<td>9.3 (3.2)</td>
</tr>
<tr>
<td>Male child</td>
<td>57.8</td>
<td>62.3</td>
<td>53.8</td>
<td>54.7</td>
<td>60.0</td>
</tr>
<tr>
<td>Parent income, $‡</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 15 000</td>
<td>26.6</td>
<td>16.7</td>
<td>32.1</td>
<td>26.4</td>
<td>32.1</td>
</tr>
<tr>
<td>15 000-30 000</td>
<td>39.6</td>
<td>29.2</td>
<td>37.9</td>
<td>49.1</td>
<td>52.6</td>
</tr>
<tr>
<td>30 001-50 000</td>
<td>23.5</td>
<td>33.3</td>
<td>22.9</td>
<td>15.1</td>
<td>15.4</td>
</tr>
<tr>
<td>&gt; 50 000</td>
<td>10.2</td>
<td>20.8</td>
<td>7.1</td>
<td>9.4</td>
<td>0</td>
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<tr>
<td>Parent education‡</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; High school</td>
<td>34.8</td>
<td>15.6</td>
<td>23.5</td>
<td>50.9</td>
<td>71.8</td>
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<tr>
<td>High school graduate</td>
<td>33.1</td>
<td>32.0</td>
<td>49.0</td>
<td>26.4</td>
<td>11.8</td>
</tr>
<tr>
<td>Some college</td>
<td>25.2</td>
<td>35.3</td>
<td>25.5</td>
<td>17.0</td>
<td>15.3</td>
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<td>College or more</td>
<td>6.9</td>
<td>17.2</td>
<td>2.1</td>
<td>5.7</td>
<td>1.2</td>
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<tr>
<td>Patient health plan‡</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>None</td>
<td>7.7</td>
<td>4.9</td>
<td>6.9</td>
<td>3.8</td>
<td>15.3</td>
</tr>
<tr>
<td>HMO</td>
<td>47.2</td>
<td>48.4</td>
<td>53.8</td>
<td>54.7</td>
<td>29.4</td>
</tr>
<tr>
<td>FFS</td>
<td>21.7</td>
<td>27.1</td>
<td>18.6</td>
<td>13.2</td>
<td>24.7</td>
</tr>
<tr>
<td>PPO</td>
<td>23.5</td>
<td>19.7</td>
<td>20.7</td>
<td>28.3</td>
<td>30.6</td>
</tr>
<tr>
<td>Asthma severity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild intermittent</td>
<td>58.0</td>
<td>61.5</td>
<td>60.0</td>
<td>47.2</td>
<td>56.5</td>
</tr>
<tr>
<td>Mild persistent</td>
<td>21.2</td>
<td>15.6</td>
<td>21.4</td>
<td>26.4</td>
<td>25.9</td>
</tr>
<tr>
<td>Moderate or severe persistent</td>
<td>20.7</td>
<td>23.0</td>
<td>18.6</td>
<td>26.4</td>
<td>17.7</td>
</tr>
<tr>
<td>Has a comorbid condition</td>
<td>57.3</td>
<td>61.5</td>
<td>54.5</td>
<td>58.5</td>
<td>55.3</td>
</tr>
</tbody>
</table>

Abbreviations: FFS, fee-for-service; HMO, health maintenance organization; PPO, preferred provider organization.

*Data are given as percentage of each group unless otherwise indicated. Percentages may not total 100 because of rounding.

††If a respondent indicated that English and another language were spoken at home, the respondent was categorized as coming from an English-speaking household, which may diminish the differences between English and the other language subgroups.

‡‡ \(P < .01\) for the global test of group difference.
nos from Spanish-speaking homes. Furthermore, it seems that knowledge deficits about appropriate asthma treatment and management may be one reason for the lower rates of peak flow monitoring observed in our asthmatic sample. A linguistically and culturally tailored asthma education program was shown to increase asthma knowledge, decrease environmental triggers, and increase controller use in Latino families with an asthmatic child.29 Similar programs may be effective for reducing the gaps in asthma management practices and outcomes observed in our study.

That language differences would lead to gaps in knowledge about asthma and appropriate management strategies is expected. However, despite a lower overall level of knowledge, more Latinos from Spanish-speaking homes correctly answered the item on avoiding allergens and were comparable with whites on other questions about environmental triggers. The high rates of correct re-
sponse to these items could reflect experiential learning
that took place as asthmatic children and adolescents
within Spanish-speaking households were repeatedly ex-
posed to allergens and other environmental triggers. Al-
though we did not assess exposure to household aller-
gens, the Spanish-speaking children and adolescents in
our study had a low socioeconomic status and likely re-
resided in poor housing that may regularly expose house-
hold members to allergens. In fact, a recent study of 1319
children in the East Harlem neighborhood of New York
City found that Puerto Rican children with asthma were
more likely than other children with asthma to live in
homes with higher indoor environmental risk factors for
asthma.30 These results suggest that, while providers play
a crucial role in educating asthma patients about their
condition and its management, sources outside the health
care system, such as personal experience, can influence
patient knowledge and self-care behaviors.

Our results suggest that language substantially af-
facts asthma management practices and outcomes. How-
ever, other factors may play a role in some differences.
For example, we found that, compared with their white
counterparts, the families of Latino children from En-
lish- and Spanish-speaking homes were less likely to
know that asthmatic children may exercise. Because En-
lish-speaking Latino families also demonstrate lower
knowledge on this item, it is unlikely that this gap is due
to language differences. However, poor provider-
patient communication can also stem from incompat-
ible communication styles and incongruent “explana-
tory models of sickness,”31(p1947),32 and it is possible that
these communication differences contributed to the lower
knowledge on this item among the Latino families in our
study.

Our study raises the question of the extent to which
language effects, often unmeasured, may have affected
the results from earlier studies of ethnic variations. If
language effects were not explicitly measured, but cap-
tured under ethnicity, then the proportion of Spanish to
English speakers would directly affect the magnitude of
the “Latino” effect, because aggregation of variations
within populations can obscure real differences and cre-
date differences where none exist.33 For example, 44% of
the 313 Latino parents in the study by Lieu and col-
leagues30 reported speaking English at home while 54%
reported speaking Spanish. It is unclear how a higher or
lower proportion of Spanish-speaking households would
have affected their results.

There are several limitations to this study. First, al-
though we controlled for some factors, such as parental
income and education, the data are observational and our
results may be influenced by unmeasured variables. Sec-
ond, some respondents who selected the Spanish cate-
gory may not be monolingual. Furthermore, where data
on multiple languages were available, any participant who
indicated English and another language was categorized
as English-speaking. As a result, our comparisons may
underestimate differences between monolingual En-
glish and monolingual Spanish households. Direct mea-
surements of English proficiency would provide a more
accurate examination of language effects than the pri-
mary language spoken at home indicators and should be
used for future studies. Third, we do not have informa-
tion on the language capabilities of treating clinicians.
Treatment by language-concordant providers may re-
sult in better adherence to self-care practices and out-
comes. Earlier studies of urban clinics serving many La-
tino patients indicated that 32% of adult and 50% of
pediatric patients with limited English proficiency did
not receive care from a Spanish-speaking clinician.34
Fourth, we do not have data on the citizenship status or
the number of years patients have been in the United
States, which is likely related to the primary language
spoken at home.

Fifth, several aspects of our study could potentially bias
our findings. Our analyses are based on parent and pa-
tient reports, which are prone to recall and other re-
spone biases. Our telephone survey would miss house-
holds without a telephone. However, we are able to esti-
mate an upper bound of the households missed because of lack
of a telephone. From the patient list provided by the sites,
11% could not be tracked for any reason. This suggests
that most of our target sample did have telephones and
that the impact of telephone administration is likely to be
limited. Because our participants are drawn from patient
lists provided by our sites, our sample consisted mainly
of patients with established relationships with their clinic
or health care provider (physicians, nurse practitioners,
etc). It is possible that the language effects we found may
be exacerbated in patients who lack a regular source of care,
because language barriers would not be moderated by a
stable provider-patient relationship.

Finally, data for these analyses included clinics that
were participating in a quality improvement collabora-
tive. These quality improvement efforts could either re-
duce or exacerbate subgroup differences that naturally
exist in routine practice settings. For example, while ef-
forts to enhance patient education may reduce differ-
ences across English-speaking groups by increasing
asthma knowledge in groups with low initial knowl-
edge, these same efforts might exacerbate differences for
English and non-English speakers if the patient educa-
tion was offered only in English. Future quality improve-
ment efforts may need to include strategies to accom-
modate the needs of special populations, such as children
of recent immigrants and parents with low literacy.

In conclusion, language barriers seem to contribute
to poorer asthma management practices and outcomes
among Latino children and adolescents, likely by lower-
ing knowledge about asthma management. Efforts to
increase asthma knowledge on self-care in this group may
improve asthma management practices and limit the mor-
bidity associated with asthma. Future studies should ex-
amine whether the language effects observed in this study
vary by Latino subgroups.

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