

Assessing Quality of Life in Mexican-American Children With Asthma: Impact-on-Family and Functional Status

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Objective: To assess the internal consistency reliability and construct validity of two questionnaires, the Impact on Family (IOF) and the Functional Status II (R) (FSIIR), in a Mexican-American population of children with asthma.

Methods: We interviewed 115 Hispanic parents of children with asthma and compared the IOF and FSIIR scores and reliability coefficients for the following subgroups: English or Spanish language and high or low educational level. We assessed the construct validity of the IOF Total score and FSIIR Illness score by examining the relationship between these scores and other health status variables.

Results: The IOF Total score and FSIIR Illness score demonstrated acceptable construct validity and reliability for language and education subgroups, although several of the IOF subscales had low reliability.

Conclusions: IOF Total score and FSIIR Illness score can be recommended for use by Spanish- and English-speaking Mexican-American respondents.

Key words: *health status; quality of life; child; morbidity; asthma; Mexican-Americans; Hispanic Americans; questionnaires.*

Asthma is the single most important cause of chronic morbidity in childhood in the United States (Taylor & Newacheck, 1992). Asthma affects 7% of children ages 5–14 years in the United States (Centers for Disease Control and Prevention [CDC], 1998) and results in 3.1 million patient visits for children under 15 years of age (Burt & Knapp, 1996). Despite many advances in the treatment of asthma, both asthma prevalence and mortality have increased in recent years (CDC, 1998).

The morbidity and mortality of asthma are affected by ethnicity, income level and other nonbiological factors (Weiss, Gergen, & Crain, 1992; Weitzman, Gortmaker, & Sobol, 1990). Hispanic children, one of the largest and fastest growing groups of children in the United States (Spencer, 1993), have a point prevalence rate of asthma of 3%–11% (Carter-Pokras & Gergen, 1993). Since Hispanic children are a rapidly growing population and many are significantly affected by asthma (Wood, Hidalgo, Prihoda, & Kromer, 1993), there is a need for reliable and valid instruments to measure patient outcomes in this population.

Questionnaires assessing functional status and

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the impact of the illness on the family may capture aspects of health that are missed in more traditional assessments of health status because they represent a patient's perspective of his or her quality of life (Rothman & Revicki, 1993). The measurement of quality of life in minority populations presents several challenges. Some investigators have found that minority groups are more likely to agree with statements than nonminority groups (Aday, Chiu, & Andersen, 1980; Ross & Mirowsky, 1984) and others report that minorities are less likely to use the extreme categories of a Likert scale (Flaskerud, 1988).

Data from studies involving a specific Hispanic subgroup should not be generalized to all Hispanics (Marin & Marin, 1991). Furthermore, any single Spanish language translation of a questionnaire must be used cautiously with culturally diverse groups such as Puerto Ricans, Mexicans, and Cubans (Berkanovic, 1980). In addition to differences in language use, different subgroups of the Hispanic population differ in health practices (e.g., smoking rates and use of home remedies), household composition, poverty levels, and insurance status (Garcia, 1993; Overpeck & Moss, 1991; Pachter, Cloutier, & Bernstein, 1995; Risser & Mazur, 1995). Although the Functional Status II-Revised (FSIIR) (Stein & Jessop, 1990) and the Impact-on-Family scale (IOF) (Stein & Riessman, 1980) are available in Spanish and were found to be reliable in a predominantly Puerto Rican population (Stein & Jessop, 1989), these questionnaires may not be reliable in other Hispanic populations. There is a need for reliable and valid instruments to measure quality of life in the Mexican-American population, who constitute 64% of Hispanics in the United States (Garcia, 1993).

Construct validity of a quality of life instrument can be examined by comparing questionnaire scores with other measures of health status and with variables that might affect health status, such as knowledge (Perrin, Maclean, Gortmaker, & Asher, 1992) and access to health care (Haas, Cleary, Guadagnoli, Fanta, & Epstein, 1994; Hayward, Bernard, Freeman, & Corey, 1991). Health status of children with asthma can be measured in several ways: physiological health (pulmonary function tests), utilization of medical services (hospitalizations and acute care visits), ability to perform usual activities (school attendance, impairment due to illness) and perceived severity of illness.

The purpose of this study was to assess the internal consistency reliability and construct validity of

two previously developed instruments in a Mexican-American population. We compared the reliability coefficients for English- and Spanish-speaking respondents and for high and low maternal education groups. In addition, we investigated the difference in response patterns of the IOF Likert scale between language groups. Finally, we assessed the construct validity of both the IOF Total Score and FSIIR Illness score by comparing these scores with other variables indicative of health status and quality of life.

Method

The Childhood Asthma Project (CAP) was funded at the University of Texas Health Science Center in San Antonio in 1990 by the National Heart, Lung, and Blood Institute to determine (1) if a focused educational intervention for Hispanic children with asthma and their families would result in decreased morbidity and improved quality of life and (2) if a physician education intervention would result in improved medical management for Hispanic children with asthma who receive medical care in an outpatient clinic (Hendricson et al., 1996). Of the 145 subjects enrolled, 115 (79%) were Hispanic, 15 (10%) were African American, 9(6%) were non-Hispanic white and 6(4%) were members of other ethnic groups. Only the Hispanic subjects are included in this report. All data for this study were collected at the time of enrollment and prior to any educational intervention. This study was approved by the Institutional Review Board of the University of Texas Health Science Center-San Antonio.

Study Population

We enrolled 115 Hispanic children between the ages of 6 and 18 years with asthma of moderate severity who received care in a university-affiliated pediatric continuity clinic. Moderate severity was defined as asthma that required daily asthma medication or that resulted in two or more acute care visits or one hospitalization in the past year. This operational definition of severity corresponds to the categories of moderate and severe asthma used in the 1991 National Asthma Education Program guidelines (National Asthma Education, 1991). Subjects were excluded if they were pregnant, or if they had immunodeficiency, significant cardiovascular disease, or chronic pulmonary disease other than

asthma. Subjects were enrolled between March 1992 and March 1993. One hundred nine (95%) of these 115 Hispanic subjects were Mexican-Americans.

Procedure

Existing clinic records were reviewed for eligible subjects who were contacted and invited to participate in the study. Of 271 individuals identified by review of medical records and clinic logs as potentially eligible for the study, 126 were not enrolled. Thirty-six individuals could not be contacted by letter or telephone; 26 indicated an interest but did not appear for the enrollment visit; 33 refused enrollment; and 31 were not enrolled for other reasons.

At the enrollment visit, a bilingual interviewer obtained the parent's informed consent and then administered the study questionnaires. Interviews were conducted in either Spanish or English depending on the stated preference of the parent. All questionnaires were read to the parent by a single trained research assistant. The child's pulmonary function was assessed by spirometry (following ATS standards) (American Thoracic Society [ATS], 1989) by a trained research nurse. Additional data were obtained by review of school attendance records and medical records.

Questionnaires

The 27-item IOF questionnaire, developed by Stein and Riessman (1980), assesses the burden of caring for a chronically ill child (Jessop & Stein, 1991; Stein & Jessop, 1989). Higher scores indicate greater impact of the illness on the family. This scale has acceptable internal consistency reliability and sufficient variability to differentiate subjects (Stein & Riessman, 1980). Since the questions posed relate to the impact of having an ill child, there are no normative data from studies involving well children. Impact-on-Family scores were reported to correlate ($r = -.44$) with scores on the FSIIR (Jessop, Riessman, & Stein, 1988).

The IOF questionnaire provides four subscale scores and a Total Impact score (Stein, 1981; Stein, 1983). The Financial Support (Financial) subscale (three items; reliability = .59) measures the economic burden of the illness. The General Impact (General) subscale (10 items; reliability = .83) measures the personal strain experienced by the primary caretaker. The Disruption of Social Relations

(Social) subscale (nine items; reliability = .82) measures the impact of the illness on social interactions both within and outside of the family. The Coping subscale (four items; reliability = .56) measures coping strategies employed by the family.

The Total Impact (Total) score (19 items; reliability = .88) includes items from each of the subscales except Coping. The Total Impact score has a potential range of 19–76, with a mean score of 48 in previous studies (Jessop et al., 1988; Stein, 1981). The IOF Total score was chosen for analysis because it provides a global measurement of the impact of the illness on the family and has been shown previously to have acceptable reliability.

The Functional Status Measure for school age children (FSIIR) is a 14-item instrument administered to parents to measure their child's capacity to perform age-appropriate roles and tasks in a variety of domains such as communication, mobility, mood, energy, sleeping, and eating (Stein & Jessop, 1990). Parents use a 3-point categorical scale to indicate the observed frequency of specific behaviors. When an impairment in child functioning is described, parents are asked to report whether each specific impairment is due to the child's illness. The Total Score is the sum of the scores, thus indicating the child's functional status without regard to whether or not observed impairment is due to the child's illness. The Illness Score is the sum of the scores indicating the child's functional status with deduction of points only for impairment related to the child's illness, thus often resulting in a score higher than the total score. Higher scores indicate better functional status.

The FSIIR is able to distinguish between children with and without chronic health conditions (Stein & Jessop, 1982), has acceptable internal consistency reliability (Cronbach's alpha = .78), and correlates with other indicators of illness such as utilization of medical services and illness-related absenteeism (Lewis, Pantell, & Kieckhefer, 1989; Stein & Jessop, 1990). The authors of the FSIIR recommend using the FSIIR Illness score because Illness scores, unlike the Total scores, are unaffected by maternal mental health (Dadds, Stein, & Silver, 1995). Potential scores (Total score or Illness score) range from 0 to 28. In a previous study of chronically ill children, the reported mean score was 25.5 (91.2% of a score indicating no impairment) (Dadds et al., 1995).

The Asthma Questionnaire is a 61-item instrument developed by the investigators and described

in detail elsewhere (Wood et al., 1993). For purposes of this study, only the questions about asthma knowledge, access to health care, child health status (including utilization of medical services), school attendance, impairment due to illness, perceived severity of illness, sociodemographic information, and language-based acculturation were analyzed. "High" and "low" scores for education were obtained by collapsing maternal education (low: less than high school graduate; high: high school graduate or equivalent).

A four-item language-based acculturation scale (Cronbach's $\alpha = .59$) (Deyo, Diehl, Hazuda, & Stern, 1985) was included as part of the Asthma Questionnaire. Specific questions address preferred language, language spoken in the home, first language as a child, and ability to read in English. Potential scores on the acculturation scale range from 0 (least acculturated) to 4 (most acculturated), and total score correlates with other measures of acculturation and with health behaviors.

Individual questions from the Asthma Questionnaire were combined to form two indices: parent knowledge about asthma and access to health care. For each index, individual items were summed and indexed from 0 to 1 to indicate the proportion of correct responses for each subject (knowledge index) and the proportion indicating access to health care (access index). The parent knowledge about asthma index (coefficient $\alpha = .16$) consisted of 11 questions about the physiology of asthma, asthma symptoms, and the health of children with asthma. These items were chosen by physicians who care for children with asthma and were designed to address basic knowledge about asthma. A principal components factor analysis of the 11 knowledge items with varimax rotation confirmed a 4-factor structure (communality > 1.0). The first factor (two items) had a coefficient alpha of .61. All other factors had coefficient alphas of .34 or less. Both the complete 11-item parent knowledge index and the 2-item (factor 1 only) parent knowledge index were used in further analyses.

The access to health care index (coefficient $\alpha = .47$) consisted of five items. Parent respondents were asked whether or not, in caring for their child's asthma, they had problems with transportation, appointment times, paying for visits, paying for medicines, and giving medicines in school. These items were chosen based on specific concerns voiced by the parents of children with asthma. Previous stud-

ies have shown that many obstacles affect access to health care and that lack of a regular source of care is a risk factor for not receiving recommended medical care (Hayward et al., 1991; Rask, Williams, Parker, & McNagny, 1994). The five individual items were summed and indexed from 0 to 1 to indicate the proportion of specific items for which parents indicated access (i.e., no problems.)

Other Asthma Questionnaire items were used individually: perceived severity of asthma ("How serious a problem is ___'s asthma?"; 3-point scale), parental report of the number of days impaired per week ("In a typical or average week, how many days does ___ have problems with asthma that interfere with his normal activities?"), and parental report of school attendance (previous academic year). School attendance data also were obtained from actual school records ($r = .62$ for correlation between parental report and school attendance data). Parents were asked to report the number of acute care visits and hospitalizations for asthma during the previous one year ($r = .31, p = .0007$ and $r = .67, p = .0001$, respectively, for correlation between parental report and medical record data).

Spanish Language Questionnaires

Spanish versions of the IOF and FSIIR were developed by Stein and her colleagues and have been used in Puerto Rican-American subjects (Stein & Jesop, 1989). These Spanish language versions were reviewed by three local bilingual speakers. Minor changes in wording were made in order to adapt the translation to local language use. The revised questionnaires were used in a pilot test involving 36 parent respondents of children with asthma (13 Spanish language respondents; 23 English language respondents) and in a study of 78 Mexican-American children with asthma of moderate severity (Wood et al., 1993). These adapted Spanish language versions are available on request from the authors.

The Asthma Questionnaire was translated by a bilingual local speaker. This translation was reviewed by two local bilingual speakers familiar with the questionnaire content, and minor changes in wording were made. The revised Spanish translation was back-translated independently by another local bilingual speaker. The back-translation was then compared to the original English language version to ensure comparability. The final Spanish lan-

guage version of the questionnaire was reviewed by the investigators, who included two bilingual speakers. This questionnaire was pilot-tested in the target population.

Spirometry

To provide an objective measure of physiologic (lung) health, forced vital capacity (FVC) maneuvers were performed using a dry rolling seal spirometer. Spirometry results were included in the analyses if a child completed at least one FVC maneuver that met the acceptability criteria of the American Thoracic Society (ATS, 1989). The percent of predicted spirometric variable values for gender and height were calculated using the equations for Mexican-American children (Hsu et al., 1979).

Statistical Methods

Differences in response patterns between English- and Spanish-speaking respondents for each question on the IOF were investigated using a chi-square statistic. Cronbach's alpha (Cronbach, 1951) was computed to estimate the internal consistency of the total scores and subscale scores of the IOF and FSIIR. Total scores, subscale scores, and Cronbach's alpha were calculated for the entire sample as well as for specific subgroups and results were compared between subgroups.

We completed subgroup analyses using the following variables: language of interview (Spanish; English) and maternal education (low: less than high school graduate; high: high school graduate or equivalent). Language-based acculturation was highly related to language of interview ($p < .001$ by Fisher's exact test) and language of interview provided the best split of the two measures, so language of interview was used for further analyses.

For IOF Total score, all IOF subscales except Financial, and for FSIIR Total score and FSIIR Illness score, power was $>.80$ for detecting a 10% shift from the mean for any subgroup, using a two-tailed t test with a significance level of $.05$. For IOF Financial subscale, power was $>.80$ for detecting a 20% shift from the mean for any subgroup. We compared subgroup scores using two-way analysis of variance (ANOVA) with interaction of the language and education effects. We used a chi-square test (Hakstian & Whalen, 1976) to detect differences in reliability (Cronbach's alpha) between subgroups.

The construct validity of the IOF Total score and FSIIR Illness score was determined by correlating each with (1) parental knowledge about asthma, (2) access to health care, (3) perceived severity of asthma, (4) number of days impaired per week, (5) school attendance as measured by parental report and by actual school records, (6) number of hospitalizations in the previous year (parent report and chart review data), (7) number of acute care visits for asthma in the previous year (parent report and chart review data), and (8) pulmonary function tests (PFT). Pearson product-moment correlations were used in this analysis. All significance levels are reported as two-tailed significance. Based on previous investigations, we expected poor quality of life (measured as high Impact-on-Family scores and low FSIIR Illness scores) to be correlated with: low parent knowledge, low access to health care, high perceived severity, high number of days impaired, high number of school days missed, high number of hospitalizations, high number of acute care visits, and low pulmonary function (Haas et al., 1994; Hayward et al., 1991; Lewis et al., 1989; Perrin et al., 1992; Stein & Jessop, 1990).

Results

Study Population

One hundred fifteen Hispanic caretakers (108 mothers, 4 fathers, 2 grandmothers, and 1 aunt) of children with moderate to severe asthma participated in this study. Sixty-five (56.5%) of the children were male and 50 (43%) were female. The average age was 10.2 years ($\pm SD 2.7$). Most of the children (70%) lived in two-parent households, and 82 (71%) of families reported an annual income of $\leq \$12,000$ per year. Seventy-six percent had no medical insurance, 17% reported Medicaid, and only 7% had private insurance. Seventy-four percent reported that their child had been hospitalized for asthma at least once. Of the 115, 73 (63.5%) responded in English and 42 (36.5%) in Spanish. As expected, English and Spanish language respondents differed significantly in mean acculturation score and level of maternal education (Table I). There were no differences between English and Spanish language groups in mean age of the child, number of household members, marital status, household income, or health insurance.

Table I. Comparison of English and Spanish Language Respondents

Variable	Language Group		<i>p</i>
	English	Spanish	
Gender (% male)	56%	57%	1.0
Acculturation score	2.5 (0.9)	1.2 (0.9)	<.0001
Age of child (years)	10.4 (2.7)	9.9 (2.8)	.30
Maternal education (years)	10.4 (2.1)	7.8 (3.4)	<.0001

n = 73 for English language group; *n* = 42 for Spanish language group.

p value is calculated from chi-square test for gender or from *t* test for other variables.

Continuous variables are shown as mean (*SD*).

Acculturation score is shown as mean (standard deviation); potential range: 0 (least acculturated) to 4 (most acculturated).

Reliability

Impact-on-Family. Response patterns between English- (E) and Spanish-speaking (S) respondents were compared using a chi-square test to determine whether or not there was a response bias in the Likert format of the IOF individual items. Response patterns varied significantly ($p < .05$) for 6 of the 27 items (Table II). The trend of the differences was that Spanish-speaking respondents were less likely to select "strongly agree" and more likely to select "disagree" than English-speaking respondents.

The reliability for some IOF subscales (General; Social) was lower than that found in previously published studies. Reliability for the two language versions and for the two education subgroups was very similar except for the IOF Total subscale (.88 high education vs. .76 low education, $p < .025$), IOF Social subscale (.78 high education vs. .58 low education, $p < .025$), and IOF Coping subscale (.67E vs. .11S, $p = .004$) (Hakstian & Whalen, 1976) (Table III).

The means and standard deviations for IOF Total score and for most of the IOF subscale scores were comparable between language and education subgroups (Table III). By two-way ANOVA (language, education), the effect of language on IOF Total score approached significance ($p = .0534$). IOF Social and IOF Coping subscale scores were significantly higher (worse) in the Spanish-speaking group than in the English-speaking group ($p = .014$ and $p = .033$, respectively), and there was no interaction between language and education.

Functional Status IIR. Both the Total score and the Illness Score of the FSIIR had acceptable reliability in all subgroups (Table IV). By two-way ANOVA (language, education), FSII(R) Total score was higher in the Spanish language group ($p = .0321$) and there

was a significant interaction between language and education ($p = .0013$). For FSIIR Illness score, there were no significant main effects of language or education, but there was a significant interaction between language and education ($p = .0091$). For both FSIIR Total score and Illness score, the Spanish-speaking, low education group had the highest scores.

Validity

Impact-on-Family. IOF Total score was significantly correlated with access to health care and parental knowledge (two items) (Table V). Within the Spanish-speaking subgroup and the high education subgroup, IOF Total scores correlated with both PFT measures. IOF Total scores were correlated with number of days impaired and school attendance in a variable pattern across subgroups. All correlations except the spirometry variable, acute care visits (low education subgroup), and hospitalizations (Spanish language subgroup) were in the expected direction. IOF Total score was not correlated significantly with reports of health care utilization except for parent report of acute care visits (low education group) and chart review data on hospitalizations (Spanish language subgroup).

FSIIR. Higher FSIIR Illness scores (higher functional status) were significantly correlated with higher parental knowledge, lower perceived severity of asthma, and fewer days impaired per week in almost all subgroups (Table VI). Higher functional status was correlated with fewer days of school missed (parent report) in the total sample, in the English-speaking subgroup, and in the low education subgroup. Better functional status correlated with better access to health care in the total sample and in the high education subgroup. All correlations were in the expected direction. FSIIR Illness scores did not correlate with PFT measures in any subgroup. FSIIR Illness scores did not correlate significantly with parent reports or chart review data on acute care visits and hospitalizations. IOF Total and FSIIR Illness scores were correlated with each other in the expected direction ($r = -.243$, $p = .0089$).

Discussion

We set out to determine if the IOF and the FSIIR were reliable and valid in a Mexican-American population. There were some minor differences in response pattern between English and Spanish lan-

Table II. Impact-on-Family Items With Different Response Patterns Between English (E) and Spanish Speaking (S) Respondents

Item	<i>p</i>	Subscale	Direction of difference
People in the neighborhood treat us specially because of my child's illness.	.019	Social, Total	S less likely than E to select "strongly agree"; more likely to select "disagree"
We have little desire to go out because of my child's illness.	.002	Social, Total	S less likely than E to select "strongly agree"; more likely to select "disagree"
My relatives have been understanding and helpful with my child.	<.001	General	S less likely than E to select "strongly agree"; more likely to select "disagree"
We have to treat my child as if she/he were a normal child.	.004	Coping	S less likely than E to select "strongly agree"; more likely to select "agree"
Traveling to the hospital is a strain on me.	.018	General, Total	S more likely than E to select "disagree"
Sometimes I feel like we live on a roller coaster: in crisis when my child is acutely ill, OK when things are stable.	.046	General, Total	S less likely than E to select "agree"

p value is calculated from chi-square test.

Six of 27 items are significantly different. By the binomial test, *p* < .002 for 6 of 27 items being significantly different by chance.

Table III. Reliability of Impact-on-Family Within Subgroups

Subscale	Total	Subgroup			
		Language		Education	
		English	Spanish	High	Low
Total Score (19 items)					
Alpha	.84	.85	.81	.88	.76*
Mean (SD)	46.3 (5.9)	45.4 (6.3)	47.8 (4.8)	45.7 (7.0)	46.8 (4.7)
Financial (3 items)					
Alpha	.67	.68	.67	.72	.58
Mean (SD)	8.9 (1.8)	8.8 (1.8)	9.1 (1.6)	8.7 (2.0)	9.1 (1.5)
General (10 items)					
Alpha	.77	.78	.71	.81	.70
Mean (SD)	24.0 (3.5)	23.5 (3.7)	25.0 (2.8)	23.6 (3.8)	24.5 (3.1)
Social (9 items)					
Alpha	.71	.72	.63	.78	.58*
Mean (SD)	19.5 (2.6)	19.0 (2.8)	20.3 (2.1)	19.3 (3.0)	19.7 (2.1)
Coping (4 items)					
Alpha	.62	.67	.11**	.56	.67
Mean (SD)	7.8 (1.3)	7.5 (1.5)	8.2 (0.8)	7.6 (1.4)	7.9 (1.3)

Total *n* = 115; *n* = 73 for English language group; *n* = 42 for Spanish language group; *n* = 55 for high education group; *n* = 60 for low education group.

**p* < .025 for differences between education subgroups.

***p* = .004 for differences between language subgroups.

guage respondents. These differences reflect a tendency of Spanish language respondents to avoid using extremes of the Likert scale, as previously noted by Flaskerud (1988). However, despite these minor differences, the mean scores and reliability coefficients were not significantly different for the two language groups (except for the IOF Coping subscale).

Although IOF Total scores and FSIIR Illness scores were comparable across subgroups, some minor differences were noted. After adjusting for edu-

cation, Spanish-speaking respondents, compared to English speakers, had slightly higher (worse) scores on the IOF Social and Coping subscales. There was a significant effect of the interaction between language and education on FSIIR Illness scores, with higher (better) scores in the Spanish-speaking, low education group.

Stein and Jessop (1989) reported that Hispanic mothers, regardless of language use, reported greater impact of the illness on the family and lower functional status. They also reported differences be-

Table IV. Reliability of FSIIR Within Subgroups

Subscale	Total	Subgroup			
		Language		Education	
		English	Spanish	High	Low
Total Score					
Alpha	.80	.79	.77	.80	.80
Mean	22.7	22.0	24.0	22.6	22.8
SD	3.7	3.9	3.2	3.7	3.8
Illness score					
Alpha	.85	.86	.82	.84	.86
Mean	24.8	24.3	25.8	24.6	25.1
SD	3.6	3.9	2.9	3.5	3.7

Total $n = 115$; $n = 73$ for English language group; $n = 42$ for Spanish language group; $n = 55$ for high education group; $n = 60$ for low education group.

tween Spanish-speaking Hispanic mothers and non-Spanish-speaking mothers in reported functional status of the child. However, in their study, all differences among subgroups disappeared after controlling for background characteristics (marital status, family type, maternal education, and welfare status). In our study, English and Spanish language groups did not differ significantly in other background characteristics. Differences in mean scores between language groups may reflect true differences in quality of life or differences in how Spanish-speaking respondents interpret the questions. In the absence of a "gold standard" by which to measure quality of life, the effects of language and education and their interaction on mean scores must be interpreted with caution.

Our findings underscore the importance of investigating subscale reliability within a specific study population and subgroups of interest rather than relying on published data from other populations. Although the reliability of the IOF Total score was high for both language groups and across low and high education subgroups, other subscales (e.g., IOF Coping) did not perform as well in our study population. We do not believe that these differences were due to differences in the idiomatic quality of the two language versions or to an interviewer effect (Berkanovic, 1980). Both IOF and FSIIR instruments had been carefully reviewed by local bilingual speakers for language equivalence, and all interviews were conducted by a single bilingual research assistant. Low reliability of any subscale (e.g., Coping) attenuates the association of that subscale with all other measured variables (Fuller, 1987).

Based on our findings, we recommend using the IOF Total score and avoiding the use of other IOF

subscales unless they have acceptable reliability in the population of interest. The FSIIR Illness score had high reliability ($\geq .82$) in either language and in high and low education subgroups. Reliability coefficients were in the same range as reported previously by other investigators (Lewis et al., 1989; Stein & Jessop, 1989).

There are no "gold standard" methods for measuring quality of life and morbidity in children with asthma. Therefore, we determined construct validity by correlating the IOF Total score and the FSIIR Illness score with a broad range of variables and scales obtained by parental self-report, pulmonary function studies, and by review of school and hospital records. All correlations, except for the correlations between IOF Total score and pulmonary function (Spanish language and high education subgroup) and two of the subgroup correlations of health care utilization with IOF Total score, were in the expected direction.

One limitation of our study is that most of the variables and scales used to assess construct validity were obtained by parent self-report. Other objective measures of health status are difficult to obtain. The finding that parent reports of school absenteeism and health care utilization correlated significantly with objective data from school records and medical records suggests that parents can provide reliable information about their child's health.

Impact-on-Family Total scores were correlated most strongly with parental knowledge and access to health care. Correlations of IOF Total scores with number of days of impairment and other health status variables were lower and varied across subgroups. It seems, therefore, that the perceived impact of the illness on the child's family may correlate more strongly with modulating factors (e.g., knowledge; access to care) than with the degree of day-to-day impairment of the child.

In contrast, FSIIR Illness scores correlated most strongly with number of days per week with impairment, knowledge, and perceived severity. Therefore, based on parent report variables, the FSIIR Illness scores appear to provide a valid measure of the day-to-day functioning of the child.

Correlation of objective measures of health status and health care utilization with FSIIR Illness scores and IOF scores would have provided additional evidence for construct validity. However, the lack of correlation is not unexpected. Sly, Landau, and Weymouth (1985) found that spirometry results were not correlated with subjective reports of

Table V. Correlation of Impact-on-Family Total Score With Other Variables by Subgroups

Variable	Total	Subgroup			
		Language		Education	
		English	Spanish	High	Low
Parental knowledge (11 items)	-.28**	-.26*	-.28	-.33*	-.20
Parental knowledge (2 items)	-.37***	-.37**	-.34*	-.46***	-.32*
Access to health care	-.32***	-.27*	-.40**	-.42**	-.16
Perceived severity of asthma	.16	.21	.23	.19	.14
No. of days impaired/week	.26**	.38***	.15	.29*	.25
School days missed (parent)	.15	.22	.02	.30*	-.00
School days missed (school)	.11	.25*	-.07	.15	.07
No. hospitalizations/yr (parent)	.09	.19	-.15	.07	.10
No. hospitalizations/yr (chart)	.04	.19	-.34*	-.04	.17
No. acute visits/yr (parent)	-.12	-.12	.12	.26	-.36**
No. acute visits/yr (chart)	-.00	.05	-.13	-.05	.03
MMEF (FEF 25-75)	.22*	.16	.45**	.32*	.14
FEV ₁	.21	.12	.51**	.37*	.04

Total *n* = 115; *n* = 73 for English language group; *n* = 42 for Spanish language group; *n* = 55 for high education group; *n* = 60 for low education group.

All correlation coefficients are expressed as Pearson's *r*.

MMEF is the maximum mid-expiratory flow rate and FEV₁ is the forced expiratory volume in 1 second from spirometry.

**p* < .05.

***p* ≤ .01.

****p* ≤ .001.

Table VI. Correlation of FSII R Illness Score With Other Variables by Subgroups

Variable	Total	Subgroup			
		Language		Education	
		English	Spanish	High	Low
Parental knowledge (11 items)	.34***	.36**	.41**	.42**	.29*
Parental knowledge (2 items)	.40***	.57***	.19	.51***	.37**
Access to health care	.20*	.20	.30	.35**	.06
Perceived severity of asthma	-.32***	-.30**	-.31	-.39**	-.28*
No. of days impaired/week	-.44***	-.43***	-.32*	-.45***	-.41**
School days missed (parent)	-.24**	-.27*	-.08	-.21	-.29*
School days missed (school)	-.10	-.18	.14	-.18	-.02
No. hospitalizations/yr (parent)	.00	-.00	-.00	-.08	.07
No. hospitalizations/yr (chart)	-.06	-.16	.11	.05	-.19
No. acute visits/yr (parent)	-.16	-.15	-.04	-.13	-.20
No. acute visits/yr (chart)	.00	-.02	.11	.05	-.02
MMEF (FEF 25-75)	.04	.11	-.19	.00	.06
FEV ₁	.01	.07	-.07	.02	.01

Total *n* = 115; *n* = 73 for English language group; *n* = 42 for Spanish language group; *n* = 55 for high education group; *n* = 60 for low education group.

All correlation coefficients are expressed as Pearson's *r*.

MMEF is the maximum mid-expiratory flow rate and FEV₁ is the forced expiratory volume in 1 second from spirometry.

**p* < .05.

***p* ≤ .01.

****p* ≤ .001.

asthma symptoms. Other authors have reported that disease-related characteristics are not associated consistently with psychological adjustment to chronic illness (Thompson, Gustafson, Gil, Godfrey, & Murphy, 1998; Wallander & Varni, 1998).

The correlation between pulmonary function and IOF Total scores in the Spanish-speaking and high education groups was in a direction opposite to the expected direction. We cannot explain this finding. Spirometry was used to measure lung func-

tion at a single point in time and may not have provided the best assessment of physiological status over time. The relationship between physiological status and reported quality-of-life is a complicated issue and deserves further study.

With the exception of one subgroup correlation, which was in the direction opposite to expected, neither FSIIR Illness scores nor IOF total scores correlated significantly with objective measures of health care utilization. Acute care visits and hospitalizations are affected by many factors, such as access to health care, in addition to the health status of the child. Health care utilization often reflects episodic events and may not provide a very accurate measure of day-to-day quality of life.

Based upon these findings, we believe that the IOF Total score and FSIIR Illness score have acceptable reliability and construct validity in this population of Hispanic subjects. Our finding that the two instruments have different patterns of correlations and are significantly, but weakly, correlated with each other suggests that the two instruments provide different, but complementary, perspectives on the health status and quality of life of a child and her family. Other authors have pointed out the importance of carefully adapting health-related quality of life instruments for use with other language and cultural groups (Guillemin, Bombardier, & Beaton, 1993). Even if these recommendations are fol-

lowed, certain instruments or subscales may lack reliability or validity in certain populations. It is therefore essential to document reliability and validity of instruments for each specific study population and to choose instruments that measure several different aspects of quality of life.

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