

Hispanic parents' reading language preference and pediatric oral health-related quality of life

Iffet Yazicioglu, DDS¹; Judith A. Jones, DDS, MPH, DScD²; Dharma Cortés, PhD³; Sharron Rich, MPH¹; Raul Garcia, DMD, M.Med.Sc.¹

1 Department of Health Policy and Health Services Research, Boston University Henry M. Goldman School of Dental Medicine, Boston, MA, USA

2 Department of General Dentistry, Boston University Henry M. Goldman School of Dental Medicine, Boston, MA, USA

3 Cambridge Health Alliance and Harvard Medical School, Cambridge, MA, USA

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Correspondence

Dr. Judith A. Jones, Boston University Goldman School of Dental Medicine, General Dentistry, Rm 612A, 100 East Newton, Boston, MA 02118. Tel.: 617-414-1065; Fax: 617-414-1060; e-mail: judjones@bu.edu. Iffet Yazicioglu, Raul Garcia and Sharron Rich are in the Department of Health Policy and Health Services Research, Boston University Henry M. Goldman School of Dental Medicine. Judith Jones is in the Department of General Dentistry, Boston University Henry M. Goldman School of Dental Medicine. Dharma E. Cortés is at the Cambridge Health Alliance and Harvard Medical School.

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Abstract

Objectives: This study compared scores and psychometric properties from self-identified Hispanic parents who completed Pediatric Oral Health-related Quality of life (POQL) parent report-on-child questionnaires in Spanish or English. The study hypothesized that there were no differences in psychometric properties or POQL scores by parent reading language preference, controlling for dental needs, child's place of birth, age, insurance and use of care.

Methods: POQL scores were computed, and the internal consistency, feasibility, factor structure and construct validity of the Spanish language version assessed.

Results: Hispanic parents ($N = 387$) of 8-14 year old children (mean age 10.2) completed the survey; 237 in Spanish and 150 in English. Internal consistency scores were higher (Cronbach α range = .86-.93) among Hispanic parents who completed the questionnaire in Spanish than in English (.66-.86). POQL scores from parents who completed questionnaires in Spanish were higher (worse) overall (6.03 vs. 3.82, $P = 0.022$), as were physical (11.61 vs. 6.54, $P = 0.001$) and role functioning domains (1.87 vs. 0.82, $P = 0.029$). Items for crying, pain, and eating were higher ($P < 0.05$) for the Spanish than the English completers. However, POQL scores were associated only with need for care ($P = 0.05$), parent reports of dental visit in the last year ($P = 0.05$) and worse oral health than a year ago ($P = 0.002$), controlling for reading language (not significant) and visit in last year in the final multivariate linear regression.

Introduction

More than half of the growth in the US population between 2000 and 2010 was attributed to population growth among Hispanics (1). The number of people in the United States who identify themselves as Hispanic grew from 35.3 million to 50.5 million over that time period. Moreover, 34.5 million persons ages 5 and above in the United States speak Spanish; and 10 million of the Spanish speakers speak English not well or not at all (2). Because of disparities in access to care, the rise in number of Spanish speakers will affect access to health care services (3). With the rising burden of oral health need in the minority populations, the need to determine the oral health status of Spanish speakers in their native language is important, especially because a significant proportion of Spanish speakers are not proficient in English (2).

The National Survey of Children's Health in 2007 showed that the prevalence of dental caries among Hispanic children was higher (28.1 percent) than non-Hispanic white children (16.2 percent), black non-Hispanic (20.2 percent), multicultural non-Hispanic (18.0 percent), and other non-Hispanic children (19.8 percent) (4,5). Data further suggest that Hispanic groups in the United States have less benefit from the fluoride tap water, independent of their socioeconomic status (3). According to Kristin *et al.*, Mexican-American mothers do not initiate oral hygiene practices in compliance with American Dental Association guidelines (6). Kristin *et al.* further suggest that their findings can be associated with educational or socioeconomic issues. The prevalence of untreated decay in primary teeth is higher in low-income children ages 2-9 (36.8 percent) compared with 17.3 percent of higher income children (3). Low-income

Mexican–American children aged 2 to 9 have the highest proportion of untreated decayed teeth (70.5 percent), followed by non-Hispanic black children (67.4 percent) (3). Low-income Mexican–American children between the ages of 2 and 9 also have the highest number of primary teeth affected with dental caries, a mean of 2.4 decayed or filled teeth, which is higher compared with low-income non-Hispanic black children (mean 1.5) and non-Hispanic white children (mean 1.9) (3). Racial and ethnic disparities are also present among those living above poverty level. For example, Mexican–American 2-9-year-olds living above the poverty level have the highest number of affected teeth (mean 1.8), followed by non-Hispanic black children (mean 1.3) and non-Hispanic white children (mean 1.0) (3). The Surgeon General's Report on Oral Health recommended that disparities in oral health, more common among low-income individuals and racial and ethnic minority groups, should be eliminated and/or prevented before they appear (3). The importance of this recommendation cannot be overstated, as dental caries is the most common chronic disease of childhood in the United States (3).

Health-related quality of life and oral health-related quality of life evaluate the effects of general and oral health and disease on daily life from the patient's perspective (7). With the existence of valid and reliable methods, it is possible to measure the effects of health conditions on well-being and functional status (8). A variety of measures have been developed to measure oral health-related quality of life in adults (9,10) and children (11-16). Much early development of the instruments began in the English-speaking countries; as a result, many of the current instruments are in English. English language instruments include the child oral health impact profile (COHIP) (11), early childhood oral health impact scale (12), child oral impacts on daily performance (13), child perception questionnaire (CPQ) (14), and child oral health-related quality of life (15). Recently, a pediatric oral health-related quality of life measure (the "POQL") was developed and validated by Huntington *et al.* (16). The POQL has ten items in four domains, including physical function, social function, emotional function, and role function. By comparison, it is simpler and shorter than other similar oral health-related quality of life measures. For example, Broder *et al.*'s COHIP has six subscales (17); Locker *et al.*'s CPQ is constituted of four domains like POQL but includes 50 items (14).

As noted earlier, determining oral health outcomes and measuring the oral health needs of children belonging to racial and ethnic minorities are essential in order to measure and eliminate the disparities in oral health and oral health-related quality of life. Various quality of life tools that have been adapted to different health conditions like heart diseases, obesity, and asthma (18-20) have also been developed for non-English-speaking children (20). We used a compre-

hensive adaptation methodology (21-23) to develop the POQL_S (Spanish) version that is easy-to-use and linguistically and conceptually equivalent to the English POQL for Spanish speakers of diverse national origins. As such, a linguistically and conceptually equivalent instrument available in two languages should render similar psychometric findings across linguistically different groups (24). The purpose of this research is to test the internal consistency, feasibility, factor structure, and validity of the POQL completed by parents in Spanish and English among a self-identified Hispanic population. A priori, we hypothesized that there would be no difference in POQL total and subscale scores by parent reading language preference, controlling for need for care, child's place of birth, age, insurance, and use of care, reasoning that the most important determinants of POQL scores would be disease and perceived treatment needs.

Methods

This cross-sectional study examined the effects of parental reading language preference on internal consistency, feasibility, factor structure, validity, and parent-reported oral health-related quality of life in children as reported by parents who self-identified as Hispanic. The study was approved by the Institutional Review Boards of Boston University Medical Center and its associated clinics, the Cambridge Health Alliance, and the schools where the study was conducted. Parents gave written informed consent. Data collection occurred between July 2006 and March 2008.

Sample

Pediatric oral health-related quality of life questionnaires [parent report on child (PRC) version] were administered to 531 parents of 8-14-year-old children from public schools in Chelsea, Massachusetts (Berkowitz, Hooks, Kelly, and Sokolowski Elementary Schools; and Browne, Clark Avenue, and Wright Middle Schools) and Framingham, Massachusetts (Barbieri Elementary School); and from dental clinics in Chelsea, Massachusetts, South Boston, Massachusetts, the South End (Boston, Massachusetts), and the Cambridge Health Alliance (Windsor St. Clinic). For the current analyses, we used data from 387 parents where the parent self-identified as Hispanic (Figure 1). Parents were given the choice of language in which to complete the survey; 237 parents completed the POQL questionnaire in Spanish (Spanish Selecting Parents, SSP) and 150 in English (English Selecting Parents, ESP).

Measures

The POQL is a ten-item instrument designed to measure oral health-related quality of life in children from both the child's

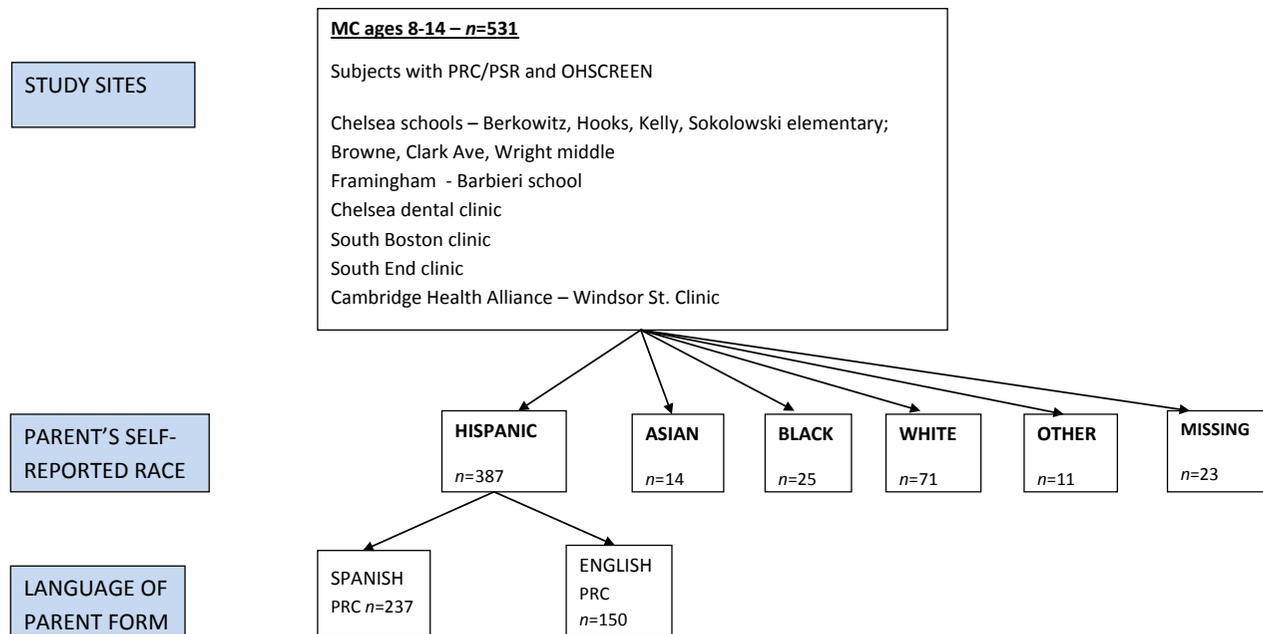


Figure 1 Study sites, self-reported race of parent, language of parent, and child forms. MC, middle childhood; PRC, parent report on child; PSR, parent self-report; OHSCREEN, oral health screening exam.

and their parents' perspectives (16). Items were developed separately for different age groups: a child self report (CSR) for middle childhood, i.e., school age and preteen (ages 8-14), as well as teens (ages 13-18). Similar items were developed for parents: a PRC for the parents' reports of oral health in early childhood (ages 3-7), middle childhood, and teens; and a parent self report. This project used the POQL PRC instrument, comprised of ten items in four domains: physical functioning, role functioning, emotional impact, and social impact (16).

The POQL questionnaires were first developed in English; in parallel, a Spanish translation and adaptation was developed (Reategui-Sharpe L., Cortes D. *et al.*, personal communication and manuscript under development). A comprehensive adaptation methodology (21-23) resulted in POQL_S (Spanish) version questionnaires that are conceptually equivalent to the English-language POQL and culturally appropriate for Spanish-speaking Hispanics of diverse national origins. Briefly, this process included two separate translations of the CSR and PRC instruments into Spanish; each translation was then back translated by two different bilingual speakers. A bilingual expert committee of native Spanish speakers of diverse national origins then reviewed, scored, and reconciled the two Spanish versions. Thirteen focus groups (i.e., nine with parents and four with children) and 55 face-to-face interviews (i.e., 36 with parents, 7 with children, and 12 with parent-child dyads) were conducted. The countries of origin of parents were Dominican Republic

(20 percent), Puerto Rico (28 percent), Honduras (13 percent), El Salvador (13 percent), Colombia (12 percent), Guatemala (5 percent), Mexico (4 percent), United States (3 percent), and Costa Rica (1 percent). About half (51 percent) of children were born in the United States whereas only 3 percent of the parents were born in the same country; 66 percent of the parents reported to have high school or General Educational Development degree, 31 percent reported lower than high school, and 3 percent reported some college or technical studies. The age of the children ranged from 6 to 14 years (median age 8.6 years). The purpose of the focus groups was to assess cultural appropriateness. Once the instrument was refined using data from focus groups and individual interviews, pretesting was performed through individual interviews with a diverse sample of Spanish-speaking Hispanics.

Parents were given the choice of completing the questionnaire either in English or Spanish and were supplied with both Spanish and English POQL questionnaires. For each item, an impact score was calculated by assessing how often the problem occurred and how bothered the child was by the problem in the past 3 months. From these, an overall score and domain scores were calculated (16). Figure 2 lists the items that are included in the scores. Higher impacts (on a scale of 0-12) and higher scores (on a scale of 0-100) indicated more problems.

Each parent also completed the Pediatric Quality of Life Inventory™ (PedsQL) (25), a generic health-related quality of

All questions start: In the past 3 months, because of your child's teeth or mouth ...

DOMAIN	PRC QUESTION
EMOTIONAL	Did your child feel angry or upset?
	Did your child feel worried?
	Did your child cry?
PHYSICAL	Did your child have pain?
	Did your child have trouble eating foods (hot/cold/hard)
ROLE	Did your child have trouble paying attention in school?
	Did your child miss school?
SOCIAL	Did your child not want to laugh or smile around other people?
	Did your child feel that he/she was not as good looking to others?
	Was your child unhappy with the way he/she looked?

Figure 2 List of items in the POQL questionnaire.

life measure for children that contains a core and separate modules particular to specific disease states. Again, the parent was given the choice of completing the questionnaire in English or Spanish. The PedsQL™ assessed health-related quality of life in four domains: physical, emotional, social, and school/role. Item responses were never a problem, almost never a problem, sometimes a problem, often a problem, or almost always a problem.

Dental screening examinations

Participating children had brief dental screening exams based on the Association of State and Territorial Dental Directors Basic Screening Survey [ASTDD BSS (26)]. Six trained dentists and dental hygienists conducted the exams. Calibration included review of written descriptions and pictures of caries and soft tissue lesions; however, inter-examiner reliability scores were not calculated. Per the ASTDD BSS protocol, examiners used a mirror and flashlight to briefly assess untreated caries (yes, no) and treatment urgency (0 = none, 1 = needs early treatment, and 2 = needs immediate treatment). Children with any treatment needs were given a notice to take to their parents describing the findings and indicating the urgency of treatment needs to take to a community-based dentist.

Analyses

All analyses were performed using SAS® (Statistical Analysis Software, Version 9.2, Cary, NC). Sample and POQL (total and domain scores) descriptive characteristics (mean, median, 75th percentile, minimum, maximum, percent of participants at minimum and maximum, percent missing) and psychometric characteristics were calculated. Cronbach's coefficient alpha tested internal consistency, overall, by domain and by language of parent's form. Percent of items completed assessed feasibility. Bivariate analyses used *t*-tests of POQL scores (total and domain) and impacts of each indi-

vidual item to compare by language of parent's form. Factor analyses used iterated principal axes and oblique rotation to achieve a four-factor solution and compared it by language reading preference and to our previous sample (16). Tests of construct validity examined the relationships of POQL as the dependent variable to relevant covariates, including examiner determined need for care, single-item parent rating of their child's oral health (OH1), use of care in last year, and reason for last visit. We compared general linear models of the same covariates to their associations with PedsQL as the dependent variable. Again, examiner's determined need for dental care, OH1, timing of last dental visit (less than or longer than 1 year), and reason for last visit (preventive/exam versus treatment/emergency) were the independent variables, all adjusted for language of parent's form and age group of child (8-10 versus 11-14).

Finally, to test whether reading language preference was related to POQL, a multivariable least squares regression regressed POQL as the dependent variable on preferred language of completion, sociodemographics, country of birth, need for care, visit in the last year, reason for last visit, dental insurance, and whether parent reports of oral health were worse than a year ago. Variables with $P < 0.2$ were kept in the parsimonious model, which also controlled for parent reading language preference. The final model included child's need for dental care, oral health worse than 1 year ago, and dental visit in the past year.

Results

Parents of 387 children identified themselves as Hispanic; 237 of the parents completed their questionnaire in Spanish (SSP group), while 150 completed it in English (ESP group) (see Figure 1). The demographics of the children and parents and comparison of the two groups by the language of the parent form are shown in Table 1. The mean age was 10.2 (range 8-14); the children of SSP were slightly younger (mean age 10.0) than the children of ESP (mean age 10.6, $P = 0.008$).

Table 1 Demographics and Descriptive Results, Parent Report on Child, Overall and by Language Selection

Variable	Total		Spanish		English		P value
	n	Mean (SD) / Freq	n	Mean (SD) / Freq	n	Mean (SD) / Freq	
Total	387		237		150		
Age	387	10.2 (1.7)	237	10.0 (1.7)	150	10.6 (1.6)	0.0008
Female	227	58.7%	135	57.0%	92	61.3%	0.3949
Male	160	41.3%	102	43.0%	58	38.7%	
Oral health screener	386		236		150		
Need dental care = yes	109	28.2%	67	28.4%	42	28.0%	0.9339
Any insurance = yes*	332	89.5%	203	88.6%	129	90.8%	0.5021
Medicaid	200	74.1%	130	77.8%	70	68.0%	0.1121
Private	63	23.3%	32	19.2%	31	30.1%	
Other	7	2.6%	5	3.0%	2	1.9%	
PRC – OH1							
Excellent/very good/good	309	84.2%	184	81.4%	125	88.6%	0.0645
Fair/poor	58	15.8%	42	18.6%	16	11.4%	
Parent place of birth (n = 385)							
Central America	203	52.7%	154	75.9%	49	24.4%	<0.0001
Dominican Republic	22	5.7%	15	68.2%	7	31.8%	
Puerto Rico	42	10.9%	19	45.4%	23	54.8%	
South America	28	7.3%	21	75%	7	25%	
United States	68	17.7%	13	19.1%	55	80.9%	
Other	22	5.7%	14	63.6%	8	36.4	
Parent time in United States** (years)	289	13.3 (7.2)	213	12.0 (6.6)	76	17.0 (7.3)	<0.0001
Child born in United States = yes	265	68.5%	136	57.4%	129	86.0%	<0.0001
Child time in United States** (years)	112	5.0 (3.0)	92	4.7 (2.8)	20	6.4 (3.5)	0.0163
Oral health compared with 1 year ago							
Better/same	354	96.5%	217	96.0%	137	97.2%	0.7732
Worse	13	3.5%	9	4.0%	4	2.8%	
Last dental visit <1 year ago	283	82.3%	163	78.7%	120	87.6%	0.0355
Reason for last dental visit							
Diagnostic/preventive	280	81.6%	172	83.9%	108	78.3%	0.1858
Treatment/emergency	63	18.4%	33	16.1%	30	21.7%	

* Not all respondents specified type of insurance.

** Time in United States was only recorded for those not born in the United States.

PRC – OH1, Parent report on child of the single-item assessment of oral health: "How would you rate the health of your teeth and gums?"
SD, standard deviation.

There were no significant differences by gender, percent of children needing care, having any dental insurance, change in oral health in the past year (better or same versus worse), reason for last dental visit, or type of dental insurance (Medicaid versus private versus other). Almost all parents (81.4 percent of the SSP and 88.6 percent of the ESP) rated their child's single-item report of oral health (OH1) as excellent, very good, or good, as opposed to fair or poor ($P = 0.064$). Few (4.6 percent) of the SSP were born in the continental United States versus 36.7 percent of the ESP who were born in the United States ($P < 0.0001$). Of those born outside the United States, the Spanish completers had been in this country for a mean of 12.0 years, the English completers for a

mean of 17.0 years. Over half (57.4 percent) of the children of SSP were born in the United States, and most (86 percent) of the children of ESP were born here ($P < 0.0001$).

Overall, half of the parents (53 percent) were born in Central America, 18 percent in the United States, 11 percent in Puerto Rico, 7 percent in South America, 6 percent in the Dominican Republic, and <1 percent in Cuba and Brazil (data not shown in table). Parents from Central America, the Dominican Republic, South America, and Mexico (included in "other") were more likely to complete the forms in Spanish, while parents who completed the form in English were more likely to be from the United States and Puerto Rico. Mothers (85 percent) were the most common

Table 2 Characteristics of POQL, Overall and Domain Scores, Parent Report on Child, Overall and by Language Preference

	Domain	<i>n</i>	Mean	Min (%)	Median (50th percentile)	75th percentile	Max (%)	Cronbach's alpha
PRC total	Overall	357	5.2	0 (47.1)	0.8	6.2	77.4 (0.3)	0.82
	Emotional	360	5.0	0 (70.3)	0.0	5.6	92.5 (0.3)	0.86
	Physical	362	9.6	0 (58.0)	0.0	16.7	100 (0.3)	0.92
	Role	360	1.5	0 (87.8)	0.0	0.0	45.8 (0.3)	0.90
	Social	360	4.8	0 (72.5)	0.0	2.8	100 (0.3)	0.89
PRC Spanish	Overall	216	6.0	0 (44.9)	1.7	6.7	77.4 (0.5)	0.86
	Emotional	218	5.9	0 (70.6)	0.0	5.6	92.5 (0.5)	0.89
	Physical	220	11.6	0 (54.1)	0.0	16.7	100 (0.4)	0.93
	Role	218	1.9	0 (87.2)	0.0	0.0	45.8 (0.5)	0.91
	Social	218	5.2	0 (71.6)	0.0	2.8	92.5 (0.5)	0.91
PRC English	Overall	141	3.8	0 (50.4)	0.0	5.0	46.7 (0.7)	0.66
	Emotional	142	3.6	0 (69.7)	0.0	5.6	55.6 (1.4)	0.72
	Physical	142	6.5	0 (64.1)	0.0	8.3	50.0 (2.1)	0.86
	Role	142	0.8	0 (88.7)	0.0	0.0	16.7 (0.7)	0.85
	Social	142	4.2	0 (73.9)	0.0	2.8	100 (0.7)	0.74

POQL, pediatric oral health-related quality of life; PRC, parent report on child.

completers, followed by fathers (11 percent), grandmothers (2 percent), and both parents (2 percent); this did not vary by language of completion.

The characteristics of the POQL, overall and domain scores, and overall and by parent's preferred language of completion are shown in Table 2. Lower scores indicate better oral health-related quality of life. Note that the mean values of all items are higher in parents selecting Spanish forms than for parents selecting English. Cronbach's alpha scores are higher (0.86-0.93 versus 0.66-0.86) and indicate that internal

consistency is higher among Hispanic parents who completed the questionnaire in Spanish than in English.

Comparisons of impact scores overall and by domain and by item for parents who completed the questionnaires in Spanish and English are shown in Table 3. POQL total score, physical and role domains, and items for crying, pain, and eating hot/cold/hard foods items are all significantly higher ($P < 0.05$) when the parents completed the questionnaires in Spanish than in English (Table 3). Also shown are percent missing by item and overall as measures

Table 3 POQL Impact Scores, Overall and by Domain and Language Preference, Parent Report on Child

Variable	Parent language: Total English versus Spanish				% missing	
	Total mean	English mean	Spanish mean	<i>P</i> value	English	Spanish
Overall 10-item score, PRC	5.16	3.82	6.03	0.0222		
Emotional domain	4.99	3.57	5.91	0.0615		
Physical domain	9.62	6.54	11.61	0.0016		
Role domain	1.46	0.82	1.87	0.0286		
Social domain	4.81	4.20	5.20	0.4526		
Impacts						
Angry/upset (E)	0.38	0.38	0.39	0.9770	7.3	11.4
Worry (E)	0.90	0.74	1.01	0.2396	9.3	9.7
Cry (E)	0.46	0.19	0.64	0.0028	4.7	8.4
Pain (P)	0.98	0.68	1.18	0.0155	4.7	9.7
Eat hot/cold/hard foods (P)	1.37	0.90	1.67	0.0027	5.3	6.8
Pay attention (R)	0.09	0.04	0.11	0.1331	9.3	11.4
Miss school (R)	0.17	0.12	0.19	0.2867	6.0	8.9
Not smile (S)	0.51	0.57	0.47	0.6273	8.7	9.3
Less attractive (S)	0.53	0.51	0.54	0.8544	9.3	9.7
Unhappy with looks (S)	0.62	0.44	0.74	0.1174	8.0	10.6
Overall					6.0	8.9

E, emotional domain; P, physical domain; POQL, pediatric oral health-related quality of life; PRC, parent report on child; R, role domain; S, social domain.

of feasibility. Percent missing was higher among Spanish completers.

Exploratory factor analyses for the parents who completed the questionnaire in Spanish versus English are shown in Table 4. For comparison, also shown are the results from the 8-14-year-olds described in Huntington *et al.*'s (16) description of the POQL. The physical and social domains show the greatest consistency overall for parents regardless of language chosen to complete the form.

To test construct validity, general linear models of POQL and PedsQL scores by caries status, visit in the last year, single-item self-report of oral health (OH1) scores, and reason for last visit are shown in Table 5. POQL scores are associated with caries status ($P = 0.03$), visit in the last year ($P = 0.05$), and OH1 group ($P = 0.0001$) in the expected directions supporting construct validity; however, PedsQL scores are only associated with caries status ($P = 0.001$). All POQL and PedsQL scores are also significantly associated with the language preferred by the parents.

Results of the multivariable least squares regression model with POQL as the dependent variable are shown in Table 6. Variables with $P < 0.2$ were kept in the parsimonious model, which also controlled for parent language reading preference. The final model included child's need for dental care ($P = 0.05$), oral health worse than 1 year ago ($P = 0.002$), and dental visit in the past year ($P = 0.05$); there were no significant differences in POQL score based on parents' preferred reading language.

Discussion

This study shows that the Spanish version of the POQL is an internally consistent and valid translation and adaptation of the English version (16). Of note is that when Hispanic parents completed the Spanish version of the POQL, the results demonstrated higher internal consistency scores and comparable validity to use of the English version by Hispanic parents. The higher internal consistency among Spanish completers may either reflect the effort used to achieve conceptual and cultural appropriateness and clarity of each item during the translation/back translation processes or an overestimation of English proficiency among parents selecting English forms who opted for responding to the instrument's English version. Importantly, there is evidence that language proficiency and reading preference are neither conceptually nor empirically equivalent (27). Thus, choosing to answer a survey in one language has limited predictive validity of reading language preference and proficiency, in part because English proficiency may be an indicator of social status that could have influenced participants to overestimate their English proficiency (28). Because reading is linked to educational status, and some immigrants may have limited reading proficiency in their native language, it is reasonable

Table 4 Exploratory Factor Analysis, Parent Report on Child – Middle Childhood, by Language Preference

Domain	Variable	All Hispanic parents* n = 302/387				Hispanic English preference n = 117/150				Hispanic Spanish preference n = 185/237				All other students, same schools n = 444/617				All participants, Huntington et al. (16) n = 1041			
		F1	F2	F3	F4	F1	F2	F3	F4	F1	F2	F3	F4	F1	F2	F3	F4	F1	F2	F3	F4
P	Pain	2	-1	82	9	1	34	29	21	7	8	75	10	-5	-1	9	78	-3	26	45	-3
P	Trouble eating hot/cold/hard foods	-2	13	50	-1	1	-5	77	-10	10	13	54	-3	13	12	-2	41	0	-6	89	0
R	Cannot pay attention	-17	-5	22	39	5	18	-5	45	-10	-9	13	68	8	7	62	8	-2	35	6	19
R	Miss school	20	46	13	-16	-16	62	0	22	3	62	16	-17	56	-17	23	15	9	58	2	-3
E	Angry/upset	86	8	0	-11	11	80	-3	5	95	5	-6	-4	-11	77	35	-8	2	5	-2	97
E	Worry	57	17	16	15	48	39	17	-10	54	27	15	8	24	78	-14	14	40	22	19	20
E	Cry	-9	99	1	9	61	9	-12	-28	-15	89	11	7	32	28	41	-2	3	80	0	5
S	Not smile/laugh	76	-9	-5	4	31	70	-3	-5	48	-18	20	-2	78	19	-9	1	76	-6	-5	15
S	Worry less attractive	31	-9	-3	52	73	-5	9	7	30	5	-5	48	96	-4	6	-9	86	-1	-2	-8
S	Unhappy with looks	18	10	-7	57	103	-9	-4	22	7	37	-15	32	65	17	10	4	65	16	2	-6

Factor loadings multiplied by 100.

* The numbers included in each factor analyses are lower as a result of missing items in those questionnaires. Cells highlighted in gray indicate the factor into which each item fell. P, physical; R, role; E, emotional; S, social.

Table 5 General Linear Models of POQL and PedsQL Scores as Dependent Variables

Dependent variable	Independent variable	P value, independent variable	P value, age group	P value, parent language	Group	LS mean
POQL	Oral health	0.028	0.771	0.041	Caries-free	4.22
					Caries	6.72
POQL	Dental visit within last year	0.048	0.478	0.153	Yes	4.45
					No	7.28
POQL	OH1 group	<0.001	0.964	0.170	Excellent / very good / good	3.49
					Fair / poor	12.44
POQL	Reason for last visit	0.114	0.791	0.031	Preventive / diagnostic	4.49
					Emergency / treatment	6.76
PedsQL	Oral health	0.001	0.862	<0.001	Caries-free	81.84
					Caries	74.35
PedsQL	Dental visit within last year	0.808	0.706	0.009	Yes	79.98
					No	79.30
PedsQL	OH1 group	0.386	0.561	0.003	Excellent / very good / good	80.60
					Fair / poor	78.02
PedsQL	Reason for last visit	0.860	0.902	0.009	Preventive / diagnostic	79.60
					Emergency / treatment	80.11

GLM-modelled POQL (PedsQL) = independent variable + age group + language reading preference only. No other covariates were included in the model. POQL = pediatric oral quality of life ten-item survey, parent report on child. OH1 group = parent reports of child's oral health, dichotomized as excellent/very good/good versus fair/poor. PedsQL = pediatric quality of life inventory, parent version.

Age groups were 8-10 years and 11-14 years.

GLM, generalized linear model; LS, least squares mean; OH1, single-item parent-report of child's oral health.

that the generalized linear model analyses (Table 5) show no difference between English and Spanish forms.

The validity of the Spanish version of the POQL is also supported by scores that were related to need for care, visit in the last year, and parent perceived oral health (OH1) in the expected directions (Table 5), despite the fact that the unadjusted scores significantly varied by parents' reading language preference (Table 3). The results in Table 5 and the clear preference of the Spanish version by Hispanics born outside the United States, as shown in Table 1, support the importance of having a Spanish version of the POQL for Hispanics.

Data presented in Tables 3 and 5 suggest that Hispanic parents who completed the questionnaires in Spanish reported higher impacts of oral conditions. However,

language-related differences in the general linear models (Table 5) were not present in the multivariable regression model controlling for need for care, visit in the last year, and parent's perception that their child's oral health was worse than a year ago (Table 6). This finding supports the Spanish version's validity and is consistent with Spencer and Do who showed that dental treatment need and caries have negative impacts on oral health quality of life reported by children and caregivers (29). Cunnion *et al.* showed similar results for the effects of early childhood caries on oral health-related quality of life reported by parents (30). Caries and need for treatment were the most salient determinants of oral health-related quality of life in this study.

This work has several important strengths. First, because the POQL is a brief, internally consistent, valid, and reliable instrument (16), this successful validation of the translation and cultural adaptation of the instrument into a Spanish version will allow this brief and user-friendly instrument to reach an increasing population of Hispanic immigrants in the United States. Second, because of the POQL's brevity and simplicity, this instrument could be used in surveillance of Spanish-speaking populations and as an outcome measure in intervention studies among Hispanic children and their parents.

This work also has several limitations, including the size of the populations and the geographic homogeneity (greater Boston). Nevertheless, there was a mix of countries of origin, including countries from Central and South America, Puerto

Table 6 Final Multivariate Analysis of POQL as Dependent Variable

Variable	Parameter estimate	Standard error	t value	pr > T
Intercept	5.66	1.54	3.68	<0.001
Needs dental care	2.31	1.18	1.96	0.051
Parent completed Spanish form	1.09	1.08	1.01	0.314
Oral health worse than a year ago	8.50	2.74	3.10	0.002
Last dental visit <1 year	-2.72	1.40	-1.94	0.053

Dependent variable = POQL; predictors as listed.

POQL, pediatric oral health-related quality of life.

Rico, Mexico, and the United States. There are also some differences in the factor structure among Hispanic parents who completed the questionnaires in Spanish and English. This should be tested in larger populations, including Hispanic populations from different ethnic backgrounds. In addition, this cross-sectional design did not allow for test-retest reliability testing or an assessment of the sensitivity to changes in oral conditions. These are important omissions that must be addressed by future research.

In conclusion, this work supports view that the Spanish version of the POQL PRC is a valid and internally consistent measure of oral health-related quality of life as reported by parents. Future work should examine the factor structure in larger populations, the longitudinal stability, and test-retest reliability, as well as its responsiveness to change and how it performs in children (31).

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