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Primary Language Spoken at Home and Children's Dental Service Utilization in the United States

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Abstract

Objective: Language barriers have been well documented as a contributing factor to disparities in the receipt of medical services, especially for Hispanic children. However, there is a paucity of information on the effect of language barriers on children's dental service utilization. We examined the association of primary language spoken at home with the receipt of preventive and routine dental care for children in the United States. **Methods:** We analyzed data from the Medical Expenditure Panel Survey (2002-2004), which contains data on 21,049 children weighted to represent 75.8 million children nationally. **Results:** Among children aged 1-18 years, 13 percent spoke a language other than English at home. Whites, females, children between the ages of 7 and 12 years, and those whose parents spoke English at home had the highest marginal rates of preventive and routine dental visits. However, the large marginal effect of language, even among Hispanics, was not significant after adjusting for other covariates. Parental education and having a primary provider were the strongest predictors of preventive and routine dental visits. **Conclusion:** Children that did not speak English at home were less likely to receive preventive or routine dental care. However, after adjusting for other socio-economic factors, our study suggests that language barriers may not play as pronounced a role in the receipt of dental care as that documented for medical services.

Introduction

An increasing number of people in the United States speak a language other than English at home, with Spanish being the second most prevalent language spoken. Between the years 1990 and 2000, the number of Spanish speakers in the United States rose by 62 percent, increasing from 17.3 to 28.1 million individuals [1]. Language barriers have been consistently linked to the under-utilization and nonreceipt of health-care services by racial/ethnic minorities. For example, Flores and Tomany-Korman reported that children from non-English primary language (NEPL) households experience a multitude of health-related disparities, including reduced access to dental and medical care [2]. Additionally, children of non-English-speaking parents are more likely to be from disadvantaged families and to experience barriers to health care when compared with children of English-speaking parents [3]. Furthermore, language barriers have been shown to affect safety in health care, result in low quality of care, and cause dissatisfaction with care among recipients [4-7].

Disparities in the receipt of oral health care are greatest among racial and ethnic minority children, a large proportion of which speak a language other than English at home, and lack dental insurance [3, 8].Cohen and Christakis [9] reported disparities based on primary language in the receipt of recommended pediatric preventive care by White, Hispanic, and African–American infants enrolled in Medicaid. Graham *et al.*[10] examined the extent to which perceived social status and primary language are associated with having a dental home among four Hispanic groups in Florida. They concluded that those respondents who spoke Spanish at home were less likely to have a dental home, compared with those who spoke English.

Preventive and routine dental care is essential in achieving and maintaining good oral health [11]. Preventive dental interventions, such as fluoride varnish and dental sealant applications are cost-effective ways to reduce dental caries and their associated complications and expenses [12]. Studies have reported that under-utilization of preventive dental services are associated with the following factors: poverty or lower income, male gender, lack of regular dental care, feelings of anxiety toward dental care, lack of insurance, lack of education, and race/ethnicity [13, 14]. Lack of access to preventive and routine dental services commonly results in emergency treatment as the only option for many poor and minority children, resulting in significant financial burdens for their families as well as society through higher health-care costs and inappropriate use of scarce resources. This creates a self-sustaining cycle of unmet treatment need [15, 16].

Although language barriers have been indirectly implicated in the observed oral health disparities for racial/ethnic minority children in the said reports, there has been limited evaluation of the role language barriers play in the receipt of dental services. Flores and Tomany-Korman[2] reported that children from NEPL households were more likely than children who spoke English at home to lack dental insurance, have teeth in fair/poor condition, have unmet dental care needs, and have not seen a dentist in the last year. However, one limitation of that study (which used The National Survey of Childhood Health) is the unusual high percentage of dental utilization exhibited in the study sample. For example, within children living in NEPL households (comprised of 86.7% Hispanic children), 85.8% had a routine preventive dental visit in the last 12 months. This level of utilization is considerably higher than other published reports on the use of dental services among Hispanic populations [17-19], and even considerably higher than similar reports using the same database [20]. Therefore, it is unclear whether the study of Flores and Tomany-Korman truly generalizes to its intended population in terms of dental services and outcomes. Because of this uncertainty, this study sought to examine whether primary language spoken at home was associated with lower utilization of preventive and routine dental care among racial and ethnic minority children on a national level.

Methods

We analyzed data from the Medical Expenditure Panel Survey (MEPS) Household Component for 2002-2004. Conducted by the Agency for Healthcare Research and Quality, MEPS is a national survey of health-care use and expenditures that can be generalized to the civilian non-institutionalized population of the United States [21, 22]. Response rates were 64.7 percent, 64.5 percent, and 63.1 percent for 2002, 2003, and 2004 MEPS surveys, respectively. Each year a "panel," a subset of the National Health Interview Survey (NHIS) households, is chosen and is followed up over 2 years by MEPS interviewers. The 2002-2004 period contains information from four panels: the second year of panel 6 which was recruited in 2001, both years of panels 7 and 8 recruited in 2002 and 2003, respectively, and the first year of panel 9 recruited in 2004. To avoid dependencies introduced by having multiple data points per respondent, we used only 1 year's worth of data for each panel. Specifically, 2002 data were used for panel 6, 2003 data for panels 7 and 8, and 2004 data for panel 9. Extensive details on MEPS 2002-2004 methodologies, exclusion and inclusion criteria, as well as the panel structure are provided elsewhere [23]. The two primary outcome variables were preventive dental visits (defined as having had a dental visit during the index year for any of the following procedures: general exam/checkup or consultation, cleaning or prophylaxis/polishing, radiographs/x-rays or bitewings, fluoride treatment, sealant application), and routine dental visits (defined as having at least one event during the index year which may be preventive, restorative, surgical, or orthodontic care classified as dental care by the respondent).

Explanatory variables included were sex, age (categorized as 1-3, 4-6, 7-12, 13-15, and 16-18 years of age), race/ethnicity with Hispanic ethnicity defined as a separate category from non-Hispanics, which was categorized as African-American, Asian, and White/other. Primary language spoken at home was available as English, Spanish, and Other. A combination of the three different languages spoken at home with the four racial/ethnic groups leads to 12 race/ethnic-language categories. Because certain race/ethnicity-language combinations were very rare (for example, Spanish was spoken almost exclusively by Hispanics), these two variables were combined into one and we were left with seven categories. Two percent of the respondents did not belong to any of these seven categories, and were omitted from further analysis. Dental insurance and having a primary medical provider were collected as yes/no variables. Parental education was classified as less than high school, high school degree, or more than high school. When information from both parents was available, the higher level was taken. Poverty status was based on the relationship of household income to the federal poverty level, with levels defined as poor, near poor, low income, middle income, and high income.

Statistical Analysis.

All analyses took into account the complex survey design of MEPS using Proc SurveyFreq and Proc SurveyLogistic in SAS 9.1.3 (SAS Institute, Cary, NC, USA). We followed the recommendations laid out by the NHIS for pooling data from multiple years [24], and report weighted frequencies for each of the separate demographic characteristics. In univariate analyses, rates of preventive and routine dental visits were compared across levels of the demographic variables using the Rao–Scott design-adjusted chi-square test for difference in proportions. Odds ratios (OR) and 95% confidence intervals (CI) were calculated to assess the association of preventive and routine dental visits with each covariate, both marginally and in a multivariable logistic regression model. We fit separate models for preventive and routine dental visits.

In addition, we examined potential interactions between the combined language-race/ethnicity variable and the other predictors. Only one statistically significant interaction was noted: the effect of having a primary provider was higher among racial/ethnic minorities. The inclusion of the interactions did not alter the main significant findings of the multivariable models. We therefore chose to omit the findings of multivariable models that included interaction terms. An alpha level of 0.05 was used throughout to denote statistical significance. This study was approved by the Institutional Review Board of Marquette University.

Results

Table 1 displays weighted population demographics for children in the United States between the ages of 1 and 18 years. Children that had a primary provider and those that had dental insurance had almost twice the odds of reporting the use of preventive or routine dental services than children without a primary provider and without dental insurance, respectively (**Table 2**). Compared with English-speaking White children, racial/ethnic minority groups, regardless of language spoken at home, were less likely to report preventive or routine dental care. Within Hispanics, a higher proportion of those who spoke English at home reported preventive or routine dental visit compared with those who spoke Spanish at home ($P < 0.01$). Asians who spoke English at home also were more likely to report a preventive dental care compared with those who spoke other languages at home.

Table 1. Unweighted and Weighted Characteristics of US Children Based on MEPS: 2002-2004

Description	Characteristics	Unweighted frequency	Weighted frequency (in millions)	Weighted % (SE)
Sex	Male	10,777	38.9	51.3 (0.5)
	Female	10,272	36.9	48.7 (0.5)
Age (years)	1-3	3,331	12.0	15.9 (0.3)
	4-6	3,474	12.2	16.2 (0.3)
	7-12	7,246	25.3	33.4 (0.4)
	13-15	3,666	13.4	17.6 (0.3)
	16-18	3,332	12.8	16.9 (0.3)
Primary provider	Yes	18,191	67.4	89.5 (0.4)
	No	2,756	7.8	10.5 (0.4)
Primary language at home	English	16,106	65.8	86.9 (0.6)
	Spanish	4,221	7.3	9.6 (0.5)
	Other	689	2.6	3.5 (0.4)
Dental insurance	Yes	7,539	34.9	46.1 (0.7)
	No	13,497	40.8	53.9 (0.7)

Race/Ethnicity	White/Other	9,444	47.6	62.8 (1.0)
	Hispanic	7,157	14.1	18.7 (0.9)
	Black	3,740	11.3	14.9 (0.7)
	Asian	708	2.7	3.6 (0.3)
Poverty category	Poor	5,633	12.9	17.0 (0.6)
	Near poor	1,745	4.3	5.7 (0.3)
	Low income	4,141	12.3	16.3 (0.4)
	Middle income	5,747	24.9	32.9 (0.7)
	High income	3,783	21.3	28.1 (0.7)
Perceived health status	Excellent	9,652	38.4	50.8 (0.7)
	Very good	6,609	23.2	30.7 (0.5)
	Good	4,147	12.2	16.2 (0.5)
	Fair	559	1.5	2.0 (0.1)
	Poor	65	0.2	0.3 (0.0)
Education	Less than HS degree	5,526	12.0	15.8 (0.5)
	HS degree	8,446	30.3	40.1 (0.7)
	More than HS degree	6,127	30.5	40.2 (0.8)
	No information	950	3.0	3.9 (0.2)
Year	2002	5,984	20.3	26.7 (0.5)
	2003	10,029	36.7	48.5 (0.6)
	2004	5,036	18.8	24.8 (0.6)
Dental visit in last year	Yes	8,798	36.3	47.9 (0.7)
	No	12,251	39.6	52.1 (0.7)
Preventive visit in last year	Yes	8,116	33.6	44.4 (0.7)
	No	12,933	42.1	55.6 (0.7)

MEPS, Medical Expenditure Panel Survey; HS, high school; SE, standard error.

Table 2. Univariate Relationship with Rates of Preventive and Routine Dental Visits

	Percent with preventive visit (SE)	**OR (95% CI)**	**Percent with any dental visit (SE)**	**OR (95% CI)**
Sex				
Male	43.1 (0.8)	0.90 (0.84, 0.96)	46.6 (0.8)	0.90 (0.84, 0.96)
Female	45.8 (0.8)	1.0	49.3 (0.8)	1.0
Age (years)				
1-3	13.0 (0.8)	0.19 (0.16, 0.23)	13.5 (0.8)	0.16 (0.14, 0.19)
4-6	49.1 (1.2)	1.24 (1.09, 1.40)	50.7 (1.2)	1.06 (0.94, 1.20)
7-12	54.3 (1.0)	1.52 (1.38, 1.69)	57.3 (0.9)	1.39 (1.25, 1.54)
13-15	50.2 (1.2)	1.29 (1.17, 1.43)	57.2 (1.1)	1.38 (1.24, 1.53)
16-18	43.8 (1.2)	1.0	49.2 (1.2)	1.0
Has primary provider				
Yes	46.7 (0.7)	2.38 (2.04, 2.77)	50.0 (0.7)	2.19 (1.90, 2.53)
No	26.9 (1.5)	1.0	31.4 (1.5)	1.0
Race/Ethnicity-language				
Hispanic-Spanish	26.5 (1.2)	0.33 (0.29, 0.38)	29.6 (1.3)	0.33 (0.29, 0.38)
Hispanic-English	34.5 (1.5)	0.48 (0.42, 0.55)	37.8 (1.5)	0.48 (0.42, 0.55)
Black-English	33.2 (1.3)	0.45 (0.40, 0.52)	35.6 (1.2)	0.44 (0.38, 0.49)

Asian-Other	22.8 (3.2)	0.27 (0.19, 0.39)	28.6 (3.4)	0.32 (0.23, 0.44)
Asian-English	46.1 (4.2)	0.78 (0.56, 1.09)	48.3 (4.2)	0.74 (0.53, 1.03)
White/Other-Other	39.2 (5.6)	0.59 (0.37, 0.94)	45.2 (5.7)	0.65 (0.41, 1.02)
White/Other-English	52.2 (0.9)	1.0	56.0 (0.9)	1.0
Dental insurance				
Yes	53.7 (1.1)	2.01 (1.82, 2.23)	57.4 (1.0)	2.04 (1.85, 2.25)
No	36.5 (0.8)	1.0	39.8 (0.8)	1.0
Poverty category				
Poor	30.3 (1.1)	0.28 (0.24, 0.32)	33.0 (1.1)	0.26 (0.23, 0.30)
Near poor	34.1 (1.7)	0.33 (0.28, 0.40)	36.7 (1.8)	0.31 (0.26, 0.37)
Low income	32.5 (1.2)	0.31 (0.27, 0.35)	35.2 (1.2)	0.29 (0.25, 0.33)
Middle income	45.3 (1.2)	0.53 (0.47, 0.60)	48.9 (1.2)	0.50 (0.44, 0.57)
High income	60.8 (1.1)	1.0	65.5 (1.1)	1.0
Perceived health status				
Poor	31.2 (6.1)	0.51 (0.29, 0.88)	33.6 (6.2)	0.49 (0.28, 0.84)
Fair	39.0 (2.8)	0.71 (0.56, 0.90)	43.4 (2.8)	0.74 (0.59, 0.93)
Good	37.2 (1.2)	0.66 (0.59, 0.74)	40.8 (1.2)	0.67 (0.60, 0.74)
Very good	44.2 (1.0)	0.88 (0.81, 0.97)	47.3 (1.0)	0.87 (0.80, 0.95)
Excellent	47.2 (0.9)	1.0	50.8 (0.9)	1.0
Parental education				
More than HS degree	57.3 (1.0)	4.15 (3.53, 4.88)	61.1 (1.0)	4.21 (3.58, 4.96)
HS degree	40.1 (0.9)	1.99 (1.74, 2.27)	43.6 (0.9)	2.07 (1.82, 2.35)
Less than HS degree	26.9 (1.1)	1.0	29.4 (1.1)	1.0
No information	27.1 (2.0)	1.11(0.88, 1.40)	30.5 (2.1)	1.17 (0.93, 1.47)
Hispanic – English versus Spanish		1.34 (1.13, 1.60)		1.29 (1.08, 1.54)
Asian – English versus Other		2.04 (1.14, 3.66)		1.66 (0.96, 2.88)

CI, confidence interval; HS, high school; OR, odds ratio; SE, standard error.

Compared with those who perceived their health status as excellent, the proportion of children that reported the use of preventive or routine dental care was lowest in children with perceived health status identified as poor. Children in the 7-12 age groups had the highest proportion of preventive and routine dental care, with slightly lower proportions for 4- to 6-year-olds and 13- to 15-year-old children, and lowest among 1- to 3-year-olds. Children of parents with more than a high school degree had almost four times the odds of reporting use of preventive or routine dental care compared with those with less than a high school degree. A direct relationship between family income and the probability of reporting use of preventive or routine dental care was identified, with poor children being the least likely to report receiving either type of care.

Multivariable Analysis of Factors Associated with Dental Service Utilization.

Several factors were significantly associated with preventive and routine dental care in the multivariable regression models (**Table 3**). Male children were somewhat less likely to report a preventive or routine dental care (OR = 0.88, 95 percent CI: 0.78-1.0) and (OR = 0.86, 95 percent CI: 0.76-0.98) than female children, respectively. Parental education [i.e., having more than high school degree (OR = 2.29, 95 percent CI: 1.77-2.96)] and having a primary provider (OR = 1.64, 95 percent CI: 1.30-2.07) were the strongest predictors of preventive or routine dental care. Children with dental insurance had increased probability of preventive and routine dental care.

Table 3.
Weighted Logistic Regression Analysis of Factors Associated with Preventive and Routine Dental Visits

Characteristic	**Adjusted odds ratio (95% CI) for preventive visits**	***P* value**	**Adjusted odds ratio (95% CI) for routine dental visits**	***P* value**
Sex				
Male	0.88 (0.78, 1.0)	0.05	0.86 (0.76, 0.98)	0.02
Female	Referent		Referent	
Age (years)				
1-3	0.17 (0.13, 0.23)	<0.01	0.15 (0.11, 0.19)	<0.01
4-6	1.18 (0.95, 1.46)	0.14	0.99 (1.1, 1.57)	0.87
7-12	1.47 (1.23, 1.75)	<0.01	1.31 (0.80, 1.22)	<0.01
13-15	1.30 (1.09, 1.55)	<0.01	1.29 (1.07, 1.54)	<0.01
16-18	Referent		Referent	
Has primary provider				
Yes	1.77 (1.40, 2.23)	<0.01	1.64 (1.30, 2.07)	<0.01
No	Referent		Referent	
Race/Ethnicity-language				
Hispanic-Spanish	0.71 (0.56, 0.89)	<0.01	0.72 (0.57, 0.89)	<0.01
Hispanic-English	0.72 (0.58, 0.90)	<0.01	0.72 (0.58, 0.88)	<0.01
African American-English	0.59 (0.50, 0.71)	<0.01	0.57 (0.48, 0.68)	<0.01
Asian-Other	0.44 (0.25, 0.79)	<0.01	0.54 (0.40, 1.37)	0.02
Asian-English	0.75 (0.39, 1.45)	0.39	0.74 (0.32, 0.92)	0.34
White/Other-Other	1.58 (0.87, 2.88)	0.13	1.59 (0.86, 2.94)	0.14
White/Other-English	Referent		Referent	
Dental insurance				
Yes	1.29 (1.09, 1.54)	<0.01	1.29 (1.08, 1.54)	<0.01
No	Referent		Referent	
Poverty category				
Poor-low income	0.95 (0.79, 1.14)	0.59	0.97 (0.81, 1.17)	0.77
Middle-high income	Referent		Referent	
Perceived general health				
Poor	1.00 (0.37, 2.75)	0.99	1.22 (0.49, 3.04)	0.67
Fair	1.16 (0.84, 1.60)	0.37	1.17 (0.85, 1.61)	0.34
Good	0.91 (0.75, 1.11)	0.35	0.88 (0.73, 1.07)	0.20
Very good	1.06 (0.90, 1.25)	0.48	1.04 (0.88, 1.22)	0.65
Excellent	Referent		Referent	
Parental education				
More than HS degree	2.16 (1.66, 2.80)	<0.01	2.29 (1.77, 2.96)	<0.01
HS degree	0.95 (0.71, 1.27)	0.72	1.3 (1.07, 1.58)	<0.01
No information	1.24 (1.01, 1.51)	0.04	0.99 (0.74, 1.33)	0.96
Less than HS degree	Referent		Referent	
Hispanic–English versus Spanish	1.0 (0.81, 1.28)	0.88	1.0 (0.8, 1.24)	0.98
Asian–English versus Other	1.7 (0.71, 4.05)	0.24	1.36 (0.6, 3.07)	0.46

CI, confidence interval; HS, high school.

Children from racial and ethnic minority groups had significantly lower odds of preventive and routine dental visits compared with Whites (OR ranged from 0.44 to 0.75). Among the minority groups, African Americans (who spoke English at home) and Asians (who spoke other languages at home) had the lowest odds of preventive and routine dental care compared with Whites. Hispanic children who spoke Spanish at home and those who spoke English had the same lower odds of preventive and routine dental care. Although the comparison between English-speaking Asians and Asians who spoke another language at home is not statistically significant (OR = 1.7, 95 percent CI: 0.71-4.05 for preventive care), we cannot rule out a potential difference because of the small sample size and wide confidence interval.

Effect of Language Spoken at Home, Parental Education, and Dental Insurance on Preventive Visits among Hispanic Children.

The disappearance of the large marginal effect of home language among Hispanics in the multivariable analysis was very surprising, so we conducted further analysis to investigate this change. Hispanic children who spoke Spanish at home differed from their English-speaking counterparts in a variety of ways: for example, they had lower rates of dental insurance (17 percent versus 38 percent for English speakers) and their parents had lower levels of education (59 percent had less than high school education versus 24 percent for English speakers).

Table 4 shows the observed rates of preventive dental visits among Hispanics broken down by language spoken at home, dental insurance, and parental education. There is no consistent trend of children with one primary language having more preventive care than those that speak a different language at home, especially among parents with a high school education or lower. There is some evidence that children of parents with more than a high school education are disadvantaged if Spanish is spoken at home, but the relatively low number of such families (<5 percent of the Hispanic children) results in large standard errors and low power to detect an effect in this subgroup.

Table 4. Weighted Percent of Hispanic Children with Preventive Visits by Primary Language, Parental Education, and Dental Insurance

Parental education	**Dental insurance**	**Parental language spoken at home**		
		% of Spanish speakers (standard error)	**% of English speakers (standard error)**	***P* value**
Less than high school	No	22.7 (1.7)	26.4 (2.8)	0.26
	Yes	34.3 (4.5)	26.8 (6.2)	0.33
High school	No	31.0 (2.3)	27.1 (2.3)	0.23
	Yes	36.8 (5.1)	41.6 (3.1)	0.42
Above high school	No	30.6 (6.8)	50.4 (7.9)	0.06
	Yes	35.2 (11.0)	51.1 (6.1)	0.21

Discussion

Findings from this study support similar reports that have documented disparities in the receipt of dental care for racial and ethnic minority children [2, 7, 12, 16]. Regardless of the language spoken at home, African-American, Hispanic, and Asian children were generally less likely to receive either preventive or routine dental services compared to their White counterparts. We found that almost 1 in 7 children between the ages of 1 and 18 years spoke a language other than English at home. There was little indication of a language effect within racial and ethnic minority children's dental service utilization after considering other factors such as parental education

and having a primary provider. This was observed even among Hispanic children, the ethnic group most likely to speak a language other than English at home.

At first glance, our results appear in stark contrast to other studies from the medical community that have examined the effect of language barriers on health service utilization. Cheng *et al.*[25], reported that speaking a language other than English at home identifies Hispanics as being at risk for not receiving recommended health-care services. Cohen and Christakis [9] reported disparities in the receipt of recommended pediatric preventive care among infants enrolled in Medicaid based on primary language spoken at home. Flores *et al.*[6] also documented language and cultural barriers to health care for Hispanic children. Upon careful examination of the above studies, our results are not as discrepant as they first appear. For example, Cheng *et al.* based their conclusion on a comparison of Spanish-speaking Hispanics to English-speaking Whites. Their presented multivariable analysis, however, indicates little to no effect of language spoken at home on the receipt of health-care services within Hispanics (after considering socio-economic differences). While language issues were shown to affect safety and quality of care in the study by Flores *et al.*, the most frequently cited access barriers were primarily income driven, such as transportation difficulties and not being able to afford care.

In our study, parental education was the strongest predictor of utilization of either preventive or routine dental visits. Children of parents with more than a high school degree had twice the odds of utilizing dental services when compared with those with less than a high school degree. This result supports the hypothesis that people with higher levels of education have higher health literacy, which has been shown to have a positive correlation with the utilization of dental services [26, 27]. People with higher levels of education also tend to have higher levels of income which has been shown to be a predictor of dental service utilization. Additionally, there was some evidence in our study that children of parents with more than a high school education are disadvantaged if Spanish is spoken at home. However, we likely had low power to detect such an effect given the relatively low number (<5 percent of the Hispanic children) of such families in our study. Further research will therefore be required to investigate whether or not language differentially affects oral health-care usage in educated Hispanic families. Furthermore, children who reported having a primary provider were almost twice as likely to report a dental visit as those who did not. Children who have primary providers are more likely to visit the dentist because of the potential for subsequent referrals following a routine health check [28].

It is important to acknowledge, given the observational nature of the present study, that it is impossible to completely separate the effect of language from related factors such as parental education, family income, or insurance status. For example, among Hispanic children, those that spoke Spanish at home had lower rates of dental insurance coverage and their parents tended to be less educated than those that did not. While the present study suggests that families that do not speak English at home experience barriers to oral health care because they are likely to be economically and educationally disadvantaged, one can argue that language barriers at least indirectly contribute to this lack of educational and economic attainment. To address the language barrier issue, studies conducted within the medical community have advocated for the use of interpreters and training of bilingual providers as a means of facilitating the receipt of health-care services. While we agree that this will help ensure safe and quality care, it is unclear how this would impact access to dental care because of the effect of socio-economic barriers.

Children between the ages of 7 and 15 years were more likely to have preventive and routine dental visits compared with children 1-3 years old. Even though the American Academy of Pediatric Dentistry and the American Dental Association have recommended that children have two dental visits per year beginning at age 1 [29-31], children aged 1-3 years were significantly less likely to visit the dentist for preventive and routine care compared with all other age groups in our study. Despite all efforts within the dental community to educate dentists and parents on the importance of seeking dental care for their children starting from age 1, our results indicate that there is still a lot of work to be done in this area.

Limitations.

The primary limitation of the present study is that it is observational in nature, and so it is not possible to evaluate the causal effect of language on dental service utilization. However, a number of similar studies using national databases and comparable analytic methods have been used to document language-related disparities in the use of health-care services [2, 26, 32]. Therefore, we feel that our conclusion regarding the lack of an association between language barriers and preventive and routine dental visits is warranted. However, our hope is that this result may spur future monitoring and data collection concerning language barriers and the receipt of dental care. In addition, MEPS does not contain information related to limited English proficiency (LEP), which has been conjectured as a better metric for assessing the link between language barriers and children's health outcomes and service usage [32]. While the inclusion of both LEP individuals and English-proficient individuals that do not speak English at home has the potential to bias our results, we believe that this bias is likely rather small. Based on calculations described in Flores and Tomany-Korman [2], the proportion of individuals that are LEP and speak a language other than English at home is on the order of 7 percent of all NEPL households. Therefore, the vast majority of NEPL households have at least one member that is English proficient. However, future research should investigate the relationship between LEP and utilization of dental services. Finally, although MEPS contains a nationally representative sample, the survey contains only a small number of non-English-speaking Asians. We therefore had limited power to detect a language effect within this population group and to contrast this effect with that observed among Hispanics.

Conclusions.

Children whose primary language spoken at home was not English exhibited lower rates of preventive and routine dental visits. After accounting for socio-economic factors such as family income and parental education, we did not observe an association between lower dental service utilization and families that did not speak English at home. However, we did observe an indication that language barriers may play a role in the use of dental services for educated Hispanic families (at least one parent with greater than a high school education). While racial/ethnic children experience barriers to dental care, our results indicate that language may not play as pronounced a role in the receipt of dental care as research has documented for medical care. Nonetheless, further research is required to elucidate any potential relationship between primary language spoken at home and other factors associated with disparities in access to oral health care, such as parental education, family income, and dental insurance coverage.

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References

1 Longley R. Nearly 1-in-5 Americans speak foreign languages at home. [cited 2008 Mar 1]. Available from: http://usgovinfo.about.com/cs/censusstatistic/a/foreignlang.htm

2 Flores G, Tomany-Korman SC. The language spoken at home and disparities in medical and dental health, access to care, and use of services in US children. Pediatrics. 2008; 121(6): e1703- 14.

3 Yu SM, Nyman RM, Kogan MD, Huang ZJ, Schwalberg RH. Parent's language of interview and access to care for children with special health care needs. Ambul Pediatr. 2004; 4(2): 181- 7.

4 Woloshin S, Schwartz L, Katz S, Welch H. Is language a barrier to the use of preventive services?. J Gen Intern Med. 1997; 12(8): 472- 7.

5 Timmins C. The impact of language barriers on the health care of Latinos in the United States: a review of the literature and guidelines for practice. J Midwifery Womens Health. 2002; 47: 80- 96.

6 Flores G, Abreu M, Olivar MA, Kastner B. Access barriers to health care for Latino children. Arch Pediatr Adolesc Med. 1998; 152: 1119- 25.
7 Jacobs EA, Karavolos K, Rathouz PJ, Ferris TG, Powell LH. Limited English proficiency and breast and cervical cancer screening in a multiethnic population. Am J Public Health. 2005; 95: 1410- 16.
8 Edelstein BL. Disparities in oral health and access to care: findings of national survey. Ambul Pediatr. 2002; 2: 141- 7.
9 Cohen AL, Christakis DA. Primary language of parent is associated with disparities in pediatric preventive care. J Pediatr. 2006; 148: 254- 8.
10 Graham MA, Tomar SL, Logan HL. Perceived social status, language and identified dental home among Hispanics in Florida. J Am Dent Assoc. 2005; 136: 1572- 82.
11 Goodman HS, Manski MC, Williams JN, Manski RJ. An analysis of preventive dental visits by provider type, 1996. J Am Dent Assoc. 2005; 136: 221- 8.
12 Savage M, Lee J, Kotch J, William V Jr. Early preventive dental visits: effects on subsequent utilization and cost. Pediatrics 2004; 114: 418- 23.
13 Woolfolk MW, Lang WP, Borgnakke WS, Taylor GW, Ronis DL, Nyquist LV. Determining dental checkup frequency. J Am Dent Assoc. 1999; 130: 715- 23.
14 Yu SM, Bellamy HA, Schwalberg RH, Drum MA. Factors associated with use of preventive dental and health services among U.S. adolescents. J Adolesc Health. 2001; 29: 395- 405.
15 Vargas CM, Monajemy N, Khurana P, Tinanoff N. Oral health status of preschool children attending Head Start in Maryland, 2000. Pediatr Dent. 2002; 24: 257- 63.
16 Vargas CM, Ronzio CR. Disparities in early childhood caries. BMC Oral Health. 2006; 6(Suppl 1): S3.
17 Kenney GM, McFeeters JR, Yee JY. Preventive dental care and unmet dental needs among low-income children. Am J Public Health. 2006; 95(8): 1360- 66.
18 Mouradian WE, Wehr E, Crall JJ. Disparities in children's oral health and access to dental care. JAMA. 2000; 284(2): 2625- 31.
19 Yu SM, Bellamy HA, Kogan MD, Dunbar JL, Schwalberg RH, Schuster MA. Factors that influence the receipt of recommended preventive pediatric health and dental care. Pediatrics. 2002; 110(6): e73.
20 Lewis CW, Johnston BD, Linsenmeyar KA, Williams A, Mouradian W. Preventive dental care for children in the United States: a national perspective. Pediatrics. 2007; 119(3): e544- 53
21 MEPS-HC Sample Design and Collection. Rockville (MD): AHRQ. [cited 2008 Feb 22]. Available from: http://www.meps.ahrq.gov/survey_comp/hc_data_collection.jsp
22 Agency for Healthcare Research and Quality. Medical Expenditure Panel Survey. [cited 2008 Mar 17]. Available from: http://www.meps.ahrq.gov/mepsweb/survey_comp/hc_data_collection.jsp
23 Ezzati-Rice TM, Rohde F, Greenblatt J. Sample design of the Medical Expenditure Panel Survey Household Component, 1998-2007. Methodology Report No. 22. Rockville (MD): Agency for Healthcare Research and Quality, 2008. [cited 2008 Mar 17]. Available from: http://www.meps.ahrq.gov/mepsweb/data_135_files/publications/mr22/mr22.pdf
24 Variance estimation and other analytic issues in the 1997-2005 NHIS. [cited 2008 Feb 22]. Available from: http://cdc.gov/nchs/data/nhis/9705var.pdf
25 Cheng EM, Chen A, Cunningham W. Primary language and receipt of recommended health care among Hispanics in the United States. J Gen Intern Med. 2007; 22: 283- 8. DOI:10.1007/s11606-007-0346-6.
26 Jackson R. Parental health literacy and children's dental health: implications for the future. Pediatr Dent. 2006; 28: 72- 5.
27 Williams NJ, Whittle JG, Gatrell AC. The relationship between socio-demographic characteristics and dental health knowledge and attitudes of parents with young children. Br Dent J. 2002; 193: 651- 4.
28 Chu M. The dental care of U.S. children access, use and referrals by non-dentist providers, 2003. J Am Dent Assoc. 2007; 138: 1324- 31.
29 American Academy of Pediatric Dentistry. Infant oral health care. Pediatr Dent. 2000; 22(Suppl. issue): 82.
30 Donaldson ME, Fenton SJ. When should children have their first dental visit? J Tenn Dent Assoc. 2006; 86: 32- 5.

31 Soxman JA. The first dental visit. Gen Dent. 2002; 50(2): 148- 55.
32 Flores G, Abreu M, Tomany-Korman SC. Limited English proficiency, primary language at home, and disparities in children's health care: how language barriers are measured matters. Public Health Rep. 2005; 120(4): 418- 30.