

The influence of English proficiency on access to care

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Objective. The number of individuals with limited English proficiency in the USA is large and rapidly growing. Consequently, addressing language barriers in access to medical care is becoming increasingly important. Previous studies have reported that individuals with limited English proficiency have more difficulty gaining access to care, compared to English-proficient individuals. We assessed the impact of English language proficiency on access to medical care, accounting for health and socioeconomic status, using nationally representative data.

Design. Cross-sectional data from the 2006 National Health Interview Survey ($n = 29,868$). The main outcome measures of interest were self-reported delayed medical care, forgone needed care, and visits to a health care professional.

Results. In unadjusted analyses, individuals with limited English proficiency were more likely to forgo needed medical care and less likely to have a health care visit, compared to individuals who were proficient in English. There was no significant association between language proficiency and reports of delayed care. After accounting for individuals' health and socioeconomic status, only the relationship between limited English proficiency and health care visits remained statistically significant. Most associations between language proficiency and access to care did not differ across various racial/ethnic groups.

Conclusion. Results indicate that the choice of access measure may influence conclusions about language barriers in health care. Given the growing proportion of US residents with limited English proficiency, health care settings need to better address potential language barriers.

Keywords: access to care; language; national surveys; disparities

Introduction

According to the 2000 Census, 47 million (18%) of United States (US) residents aged five years and over speak a language other than English at home. Of those with a primary language other than English, 21.4 million (8.2% of US residents) have limited English proficiency, indicated by self-reports of speaking English less than 'very well' (Shin and Bruno 2003). These figures have been increasing over time, with the number of people speaking a language other than English at home growing by 47% from 1990 to 2000 (Shin and Bruno 2003). As the patient population in the USA grows increasingly diverse, addressing language barriers in access to care is becoming more important (Fein 1997). Indeed, the national health promotion and

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disease prevention initiative Healthy People 2010 recognizes that 'linguistically competent provider-patient communication is essential for the prevention, diagnosis, treatment, and management of health concerns' (US Department of Health and Human Services 2000).

Minority populations more often have limited English proficiency compared to their White counterparts (US Census Bureau 2000). Individuals of Hispanic or Asian origin are especially likely to face language difficulties, with about 40% of each of these ethnic groups speaking English less than very well, compared to less than 2% among non-Hispanic Whites. About 15% of Native Hawaiians and other Pacific Islanders and 10% of American Indians and Alaska Natives have limited English proficiency. Only 2.5% of non-Hispanic Blacks have limited English proficiency, due to the small proportion of the Black population that is foreign-born (McKinnon and Bennett 2005). Consequently, differences in English fluency across these groups help to explain ethnic disparities in certain dimensions of access to care, such as physician visits, mental health visits, preventive services, and having a usual source of care (Weinick and Krauss 2000, Fiscella *et al.* 2002, Kirby *et al.* 2006, Sentell *et al.* 2007).

Numerous studies have investigated the influence of limited English language proficiency on access to health care, identifying multiple consequences of language barriers. Compared to individuals with high English proficiency, those with low English proficiency experience worse access to care, including obtaining health insurance coverage, necessary medical care, physician visits, and preventive services such as mammography, Pap tests, and immunizations (Woloshin *et al.* 1997, Jang *et al.* 1998, Derose and Baker 2000, Sun *et al.* 2001, Ngo-Metzger *et al.* 2003, Weech-Maldonado *et al.* 2003, Flores *et al.* 2005, Jacobs *et al.* 2005, Caesar 2006, Chin *et al.* 2006).

People with low English proficiency also experience difficulty communicating with providers (Tocher and Larson 1999, Elderkin-Thompson *et al.* 2001, Collins *et al.* 2002, O'Leary *et al.* 2003, Weech-Maldonado *et al.* 2003, Gany *et al.* 2006, Phokeo and Hyman 2007, Potocky *et al.* 2007), inappropriate diagnosis and treatment (Waxman and Levitt 2000, Flores *et al.* 2003), low-quality care (Ferguson and Candib 2002, Timmins 2002, Seid *et al.* 2003, De Alba and Sweningson 2006), low patient satisfaction (Baker *et al.* 1998, Carrasquillo *et al.* 1999, Morales *et al.* 1999, Ngo-Metzger *et al.* 2003, Weech-Maldonado *et al.* 2003), low comprehension of medication instructions and low adherence to regimens (Crane 1997, Karter *et al.* 2000, Collins *et al.* 2002, O'Leary *et al.* 2003, Phokeo and Hyman 2007), fewer follow-up visits (Hunt *et al.* 1998, Sarver and Baker 2000), and poorer health outcomes (Perez-Stable *et al.* 1997, Ponce *et al.* 2006).

Language barriers to care exist in both primary and acute care settings. In primary care settings, patients with limited English proficiency are less likely to report having a regular source of care, continuity of care, or receipt of screening services, and more likely to report long waits in the waiting room and difficulty obtaining information or advice over the telephone, compared to English-proficient patients (De Alba *et al.* 2004, Greek *et al.* 2006, Pippins *et al.* 2007). When professional medical interpreter services are provided, language barriers are reduced and limited-English patients have better access to preventive care (Flores 2005, Karliner *et al.* 2007, Graham *et al.* 2008). However, many community-based clinics and small, private practices do not make use of professional interpreters due to the high cost and inconvenience, suggesting that language barriers remain in these

settings (Vandervort and Melkus 2003, Gadon *et al.* 2007, Kuo *et al.* 2007). Similar barriers exist in acute care settings, such as hospital emergency departments. Compared to their English-proficient counterparts, patients with limited English proficiency experience more difficulty obtaining care and diagnostic testing, utilize more resources and spend more time during visits, and report lower satisfaction with care (Carrasquillo *et al.* 1999, Hampers *et al.* 1999). At both the national and state levels, various guidelines and legislative mandates have recently been implemented regarding the provision of culturally and linguistically appropriate care (e.g., Office of Minority Health 2007). These laws and recommendations typically apply to health care settings which receive public funding, and in theory should reduce or eliminate language barriers to care in settings such as hospital emergency departments. Yet professional interpreter services are underused in these settings, even when mandated by law, implying that limited-English patients continue to experience less than optimal access to and quality of care (Baker *et al.* 1996, Ginde *et al.* 2008).

Isolating the effects of language on access to care is challenging because language may operate through several different mechanisms. For instance, individuals with limited English proficiency may face communication barriers with their health care providers. Alternatively, low English proficiency may represent a marker for other factors that negatively affect access to care in the USA, such as socioeconomic factors (e.g., income, education level, employment; Feinstein 1993).

The impact of socioeconomic status on access to care is well documented. The National Healthcare Quality Report and the National Healthcare Disparities Report, annual reports from the US Department of Health and Human Services, describe worse quality care among poor individuals. Poor adults are also less likely to receive colorectal and breast cancer screening and influenza immunizations (Kelley *et al.* 2005). Women from low socioeconomic backgrounds have lower cervical cancer screening rates (Akers *et al.* 2007), and lower socioeconomic status is also associated with worse access and quality care among individuals with diabetes mellitus (Brown *et al.* 2004). Physicians tend to perceive patients of lower socioeconomic groups more negatively than those of higher socioeconomic groups, which may impact treatment decisions (van Ryn and Burke 2000).

Several nationally representative studies have examined the relationships among English language proficiency, socioeconomic status, and access to health care. Results suggest that non-English-speaking patients experience reduced access to care, even after accounting for socioeconomic status and race/ethnicity. These findings are consistent regardless of whether language proficiency is assessed by proxy using language of survey administration or language spoken at home and comfort level with the English language. Most of the research conducted on this topic in the USA focuses on Spanish-speaking populations. For instance, Cheng and colleagues (2007) used 2003 Medical Expenditure Panel Survey data to show that Hispanics who did not speak English at home were 12–16% less likely than English-speaking, non-Hispanic Whites to receive recommended health care services, such as cancer screenings, blood pressure checks, cholesterol testing, and influenza vaccines; however, there were no significant differences between English-speaking Hispanics and Whites. Fiscella and colleagues (2002) used data from the 1996–1997 Community Tracking Survey and assessed language proficiency based on the language in which surveys were conducted. They also found that access to physician visits and mental health visits was equivalent among English-speaking Hispanics and

Whites, and worse among Spanish-speaking Hispanics. Using data from the 1999 National Health Interview Survey (NHIS), Brotanek and colleagues (2005) found that asthmatic children from Spanish-speaking families (assessed through language of interview) had 69% reduced odds of having a usual health care provider compared to their counterparts from English-speaking families. More limited research has been conducted among limited-English populations other than Spanish speakers, but findings appear to be nonetheless similar. For instance, Weech-Maldonado and colleagues (2003) examined the effects of language proficiency (measured through both language of interview and language spoken at home) on access to care among various racial/ethnic groups. They found that even among Asians and Whites, non-English speakers had more difficulty obtaining timely and needed care compared to their English-speaking counterparts.

The influence of health status on access to care has been studied to a lesser degree, especially in the USA, but evidence indicates that poorer health status is associated with greater use of health care (Freeborn *et al.* 1977, Connelly *et al.* 1989, Ren *et al.* 1994, Gijsen *et al.* 2001, Jordan *et al.* 2003, León-Muñoz *et al.* 2007). These findings hold true whether health status is measured by perceived physical limitation, activity limitation, general health status, or presence of specific diseases or comorbid conditions. The relationship between health status and health care utilization makes common sense, but it is less clear whether individuals in poorer health are able to access sufficient services to meet their needs.

To build on this body of literature, we used recent (2006) data from the NHIS to assess the impact of individuals' English proficiency, race/ethnicity, socioeconomic status, and health status on access to care. Our investigation was guided by Andersen and Aday's foundational framework, which outlines the predisposing, enabling, and need factors that influence individuals' ability to obtain health care services (Andersen 1995). The framework defines predisposing factors as those demographic (e.g., age, sex), social structure (e.g., race/ethnicity, education), and health belief variables that influence individuals' likelihood of using health services. Enabling factors refer to the means available to help individuals access services (e.g., income, insurance) as well as community attributes (e.g., availability of health care resources). Need factors are specific diseases or health needs that drive the use of health care. We used these categorizations to inform the conceptual model for this study in order to identify relevant factors which influence access to care among populations with limited English skills. For instance, English proficiency, as well as family income and employment, were regarded as enabling characteristics which help individuals to access services. Education was included as a predisposing factor which influences individuals' propensity to use services, and general health status was considered a health need that drives the use of health care.

The purpose of the study was to test the hypothesis that individuals with limited English proficiency are more likely than English-proficient individuals to report having trouble accessing medical care, even after controlling for socioeconomic and health status factors. Thus, the results of our analyses provide a nationally representative assessment of the impact of limited English proficiency on access to care in the USA after accounting for socioeconomic factors. Our study also explores potential interaction effects between language proficiency and race/ethnicity.

Methods

Data

We analyzed data from the Family Core component of the 2006 NHIS (National Center for Health Statistics n.d.). The NHIS is an in-person, cross-sectional household interview survey of the civilian non-institutionalized US population, administered by the Centers for Diseases Control and Prevention's National Center for Health Statistics. It is conducted in English, Spanish, and other languages based on respondents' preference and proficiency. The stratified sampling design uses geographic primary sampling units to ensure a nationally representative sample. The Family Core includes information that describes characteristics of families and individuals within families. In 2006, information was collected on 29,868 families, and one individual was randomly selected from each family for inclusion in the sample of adults.

Measures

The three outcome measures of interest were self-reported (1) delayed medical care, (2) inability to obtain needed care (i.e., forgone medical care), and (3) any visits to a health professional. The first two measures reflect a perceived lack of access to medical care and the third measure is a more objective indicator of health care utilization. All three indicators of access to care were measured using dichotomous (yes vs. no) variables. We examined delayed care through the survey question, 'During the past 12 months, have you delayed seeking medical care because of worry about the cost?' Forgone medical care was assessed using the question, 'During the past 12 months, was there any time when you needed medical care, but did not get it because you couldn't afford it?' Health care visits within a two-week period (excluding hospitalizations) were assessed using the question, 'Did you see a doctor or other health care professional at a doctor's office, a clinic, an emergency room, or some other place?'

The main independent variable was English language proficiency (proficient vs. limited proficient), which was assessed based on the language in which interviews were conducted. Respondents were categorized as limited English proficient if their interview was conducted in Spanish, English and Spanish, or some other language besides English. Relying on language of interview as a proxy for English proficiency is a commonly used method in the literature on language and access to care (Weinick and Krauss 2000, Fiscella *et al.* 2002, Seid *et al.* 2003, Weech-Maldonado *et al.* 2003, Brotanek *et al.* 2005).

Covariates included race/ethnicity, socioeconomic factors, and measures of health status. Race/ethnicity was categorized into White (non-Hispanic), Black (non-Hispanic), Hispanic, and Asian (non-Hispanic). Education was grouped into four categories: less than high school diploma; high school diploma; some college; and college degree or higher. Poverty level was grouped into three categories: less than 100% of the federal poverty level (FPL); between 100 and 200% FPL; and 200% FPL or higher. Home ownership (yes vs. no) was assessed using the question, 'Is this house/apartment owned or being bought, rented, or occupied by some other arrangement by you?' Individuals' general health status was assessed using the question, 'Would you say your health in general is excellent, very good, good, fair, or poor?' Responses from this question were used to create a dichotomous variable

indicating whether a person reported being in fair or poor health (versus being in excellent, very good, or good health). Finally, a dichotomous variable for the presence of any limitation (yes vs. no) was included.

The 2006 NHIS dataset includes information on current insurance status, indicating that 14.8% of respondents were uninsured at the time of interview (Centers for Disease Control and Prevention 2007). However, insurance was not included as a covariate due to potential multicollinearity between poverty and insurance.

Analysis

We first produced descriptive statistics for the study variables in order to compare English-proficient vs. limited-English-proficient groups. We conducted bivariate analyses using χ^2 tests to compare the distributions of the categorical variables. We then created a three-step logistic regression model for each of three health care access indicators.

To assess the total impact of English proficiency on access to care, we conducted simple logistic regressions of English proficiency on each of the three outcomes. In the second step, we assessed the additional impact of health status by adjusting for measures such as having limitations and general health status. In the third step, we also adjusted for factors indicating race/ethnicity and socioeconomic position (i.e., education, poverty level, and home ownership). Adjusted odds ratios and 95% confidence intervals were calculated for each variable in the model. Finally, we added interaction terms to the fully adjusted models in order to test for a moderating effect of race/ethnicity on the association between language proficiency and access to care (i.e., to determine whether the association between language and access varies for the different racial/ethnic groups).

All analyses were performed using SAS version 9.1, using statistical methods to account for the complex sampling design (i.e., stratification and weighting). Two-tailed *p*-values less than or equal to 0.05 were considered statistically significant.

Results

Descriptive and comparative statistics

Table 1 shows the health and socioeconomic characteristics and indicators of access to health care of the sample. The sample is predominantly proficient in English (91.3%). For the sample as a whole, 11.4% of individuals have experienced cost-related delays in obtaining medical care, 8.4% of individuals have not received needed/necessary medical care due to lack of affordability, and 18.6% of individuals have visited a doctor or other health professional at a doctor's office, clinic, emergency room, or some other place within a given two-week period.

There are statistically significant differences regarding access to health care between the proficient group and the limited proficiency group. Compared to English-proficient individuals, more individuals with limited English proficiency experience forgone care and fewer report health care visits. In addition, fewer limited-English-proficiency individuals have a limitation and more of these individuals are in fair/poor health, compared to English-proficient individuals. There are also socioeconomic differences between the two groups. Specifically, compared to English-speaking

Table 1. Health and socioeconomic characteristics and access to health care: National Health Interview Survey (NHIS), 2006.

	English proficient (<i>n</i> = 27,236) % (SE)	Limited English proficient (<i>n</i> = 2606) % (SE)	Total (<i>n</i> = 29,842) % (SE)
Any limitation (<i>n</i> = 29,846)	16.6 (0.25)	11.1 (0.68)**	16.4 (0.24)
Fair/poor health (<i>n</i> = 29,765)	12.9 (0.22)	17.1 (0.81)**	13.1 (0.22)
Race/ethnicity (<i>n</i> = 29,649)		**	
Hispanic	7.2 (0.15)	91.6 (0.72)	11.5 (0.17)
Black, non-Hispanic	13.3 (0.20)	0.2 (0.10)	12.6 (0.19)
Asian, non-Hispanic	4.0 (0.11)	3.8 (0.41)	4.0 (0.11)
White, non-Hispanic	75.6 (0.26)	4.3 (0.61)	71.9 (0.27)
Education (<i>n</i> = 28,942)		**	
Less than a high school diploma	13.2 (0.23)	60.2 (1.11)	15.6 (0.23)
High school diploma	27.8 (0.31)	19.9 (0.88)	27.4 (0.30)
Some college	31.0 (0.33)	11.8 (0.75)	30.0 (0.32)
College degree or higher	28.0 (0.32)	8.1 (0.68)	27.0 (0.31)
Poverty level (<i>n</i> = 20,907)		**	
≥ 200% FPL	67.6 (0.38)	27.8 (1.34)	65.8 (0.37)
100–199% FPL	19.0 (0.31)	37.1 (1.34)	19.9 (0.31)
< 100% FPL	13.4 (0.28)	35.1 (1.31)	14.4 (0.28)
Home ownership (<i>n</i> = 29,165)	66.6 (0.33)	37.7 (1.09)**	65.1 (0.32)
Delayed medical care (<i>n</i> = 29,767)	11.4 (0.22)	11.5 (0.70)	11.4 (0.22)
Forgone medical care (<i>n</i> = 29,760)	8.4 (0.19)	9.8 (0.65)*	8.4 (0.19)
Doctor visit (<i>n</i> = 29,616)	19.1 (0.27)	9.1 (0.62)**	18.6 (0.26)

p* < 0.05, *p* < 0.001, based on χ^2 (for categorical variables).

Note: Total sample size of the dataset was 29,868, however, language of interview was not recorded for 26 observations so these were excluded from the analysis.

individuals, fewer non-English-speaking individuals own their home, and more non-English-speaking individuals have less education and live in poverty or near poverty. Hispanics make up the vast majority of the population with limited English proficiency, with non-Hispanic Whites and Asians making up most of the remainder; a very small fraction of non-Hispanic Blacks have limited English proficiency.

Simple logistic regression analyses

Table 2 presents the disparities in access to health care by language proficiency. For each health care access indicator, bivariate relationships between the variables of interest and language spoken are presented. Model 1 shows that compared to individuals who are proficient in English, individuals who are not proficient in English have 18.4% greater odds of not receiving needed medical care due to costs (OR = 1.184, 95% CI: 1.017–1.379). In addition, the odds of having a health care visit are 57.7% lower for non-English-speaking individuals compared to English-speaking individuals (OR = 0.423, 95% CI: 0.364–0.492). The relationship between language proficiency and delayed medical care is not statistically significant.

Table 2. Odds ratios (OR) and 95% confidence intervals (CI) for bivariate and multivariate analyses: National Health Interview Survey (NHIS), 2006.

	Delayed medical care			Forgone needed medical care			Doctor visit		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Language									
Limited English proficient	1.013 (0.879, 1.167)	1.012 (0.875, 1.172)	0.804 (0.644, 1.004)	1.184* (1.017, 1.379)	1.180* (1.006, 1.384)	0.787 (0.620, 1.000)	0.423*** (0.364, 0.492)	0.425*** (0.365, 0.493)	0.661*** (0.532, 0.821)
English proficient	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Any limitation									
Yes		1.697*** (1.515, 1.901)	1.532*** (1.344, 1.747)		1.785*** (1.572, 2.026)	1.624*** (1.401, 1.881)		2.666*** (2.433, 2.922)	2.786 *** (2.495, 3.112)
No		1.00	1.00		1.00	1.00		1.00	1.00
General health status									
Excellent/very good/good		0.468*** (0.422, 0.503)	0.498*** (0.434, 0.570)		0.385*** (0.339, 0.437)	0.460*** (0.396, 0.533)		0.556*** (0.504, 0.614)	0.535*** (0.473, 0.605)
Fair/poor		1.00	1.00		1.00	1.00		1.00	1.00
Race/ethnicity									
Hispanic			0.940 (0.795, 1.111)			1.084 (0.902, 1.302)			0.749 *** (0.643, 0.872)
Black, non-Hispanic			0.741*** (0.645, 0.851)			0.928 (0.802, 1.074)			0.906 (0.805, 1.019)
Asian, non-Hispanic			0.466*** (0.323, 0.673)			0.431*** (0.301, 0.618)			0.763** (0.629, 0.926)
White, non-Hispanic			1.00			1.00			1.00
Education									
College degree or higher			1.260* (1.053, 1.508)			0.933 (0.759, 1.147)			1.427*** (1.228, 1.657)
Some college			1.598*** (1.371, 1.861)			1.360*** (1.152, 1.607)			1.341*** (1.169, 1.538)
High school diploma			1.272** (1.090, 1.485)			1.112 (0.941, 1.315)			1.054 (0.918, 1.210)
Less than a high school diploma			1.00			1.00			1.00

Table 2 (Continued)

	Delayed medical care			Forgone needed medical care			Doctor visit		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Poverty level									
≥200% FPL			0.539 *** (0.462, 0.628)			0.438*** (0.372, 0.517)			1.046 (0.903, 1.211)
100–199% FPL			1.026 (0.890, 1.183)			1.047 (0.901, 1.216)			0.969 (0.835, 1.125)
<100% FPL			1.00			1.00			1.00
Home ownership									
No			1.580 *** (1.411, 1.770)			1.610*** (1.419, 1.827)			0.914 (0.827, 1.009)
Yes			1.00			1.00			1.00

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Multiple logistic regression analyses

Multivariable analyses were also conducted to examine the effects of language on access to care after adjustment for health status and socioeconomic characteristics (Table 2). After controlling for health status (i.e., any limitation and fair/poor health) in Model 2, the relationship between language and forgone care remains statistically significant and the effect size is about the same: individuals who are not proficient in English have 18.0% increased odds of forgoing needed medical care, compared to those who are proficient in English (OR = 1.180, 95% CI: 1.006–1.384). Similarly, the relationship between language and health care visits remains statistically significant. That is, the odds of having a health care visit are 57.5% lower for non-English-speaking individuals compared to English-speaking individuals (OR = 0.425, 95% CI: 0.365–0.493). The relationship between language and delayed medical care remains statistically non-significant. Individuals' health status is also independently and statistically significantly associated with the various accesses to health care measures: compared to those in fair/poor health, healthier individuals have lower odds of experiencing delays in medical care or forgone care, and also lower odds of having a health care visit. In addition, individuals with a limitation have higher odds of experiencing delays or forgone care, and higher odds of having a health care visit compared to those with no limitations.

Race/ethnicity, education, poverty level, and home ownership covariates were added to Model 3 in order to control for socioeconomic effects on access to care. As a result, language disparities in access to care are once again attenuated. There is still no significant relationship between language and delayed medical care. However, after adjusting for covariates, the relationship between language and forgone medical care becomes statistically non-significant as well (OR = 0.787, 95% CI: 0.620–1.000). The relationship between language and health care visits remains statistically significant, such that individuals who are limited-English-proficient have 33.9% decreased odds of having a visit, compared to those who are English proficient (OR = 0.661, 95% CI: 0.532–0.821).

After adjusting for the effects of socioeconomic factors, the associations between the health status variables (i.e., limitations and fair/poor health) and the three measures of access to care are still statistically significant. Socioeconomic factors are also independently and statistically significantly associated with the access to care outcomes. Compared to non-Hispanic Whites, Hispanic individuals have lower odds of having a health care visit while non-Hispanic Blacks have lower odds of delaying medical care. Asians have lower odds of delaying or forgoing medical care, and also lower odds of having a health care visit. As education level increases, the odds of experiencing delayed or forgone needed care generally increases. On the other hand, higher education levels are associated with greater odds of having a health care visit. Compared to individuals living in poverty, those at or above 200% of the FPL have lower odds of experiencing delayed or forgone needed care. Finally, compared to individuals who own their homes, those who do not own their homes have increased odds of experiencing delayed medical care or forgoing needed medical care.

Interactions between language proficiency and race/ethnicity

For each of the three fully adjusted models, we tested whether the associations between language and access to care varied by racial/ethnic group by testing the significance of interactions between language proficiency and race/ethnicity. The race-by-language interaction terms in the forgone care and health care visit models do not reach statistical significance (Wald χ^2 test of joint significance, $p=0.070$ and $p=0.216$, respectively; data not shown). However, the interaction terms in the delayed care model are statistically significant ($p=0.022$), indicating that the associations between language and delayed care vary by race/ethnicity. Therefore, we estimated multivariable logistic regressions stratified by racial/ethnic group, while controlling for all covariates. We found that there are no statistically significant associations between language proficiency and delayed care for Whites, Blacks, and Hispanics ($p > 0.05$ for all three groups); however, there is an association for Asians, with limited-English-proficient Asians having lower odds of reporting delays than English-proficient Asians (OR = 0.035, 95% CI: 0.004–0.315).

Discussion

In unadjusted analyses, we found that individuals who have limited English proficiency had 18% higher odds of forgoing needed medical care due to cost, and 58% lower odds of having a health care visit, compared to those who were proficient in English. However, most of these differences were explained by factors that accounted for individuals' health status (i.e., any limitations and fair/poor health) and socioeconomic status (i.e., race/ethnicity, education, poverty level, and home ownership). After controlling for these factors, the only statistically significant impact of limited English proficiency was on health care visits; in adjusted analyses, individuals with limited English proficiency had 34% lower odds of having a health care visit compared to those who were proficient in English.

A few potential explanations come to mind in response to the finding that English language proficiency was associated with health care visits but not with delayed or forgone medical care. Measuring visits to a health professional may more directly capture the communication challenges that patients face in health care settings. For example, obtaining a health care visit requires interaction between patients and administrative staff or health care providers, either to schedule an appointment or to communicate the health concern at hand; this reliance on communication presents a potential barrier to care if the patient has limited English proficiency. English-language competency may also be associated with health literacy, such that individuals with limited English proficiency have more difficulty understanding medical situations compared with English-proficient individuals. In addition, individuals who perceive themselves as English-proficient may actually have inadequate levels of English health literacy, thus limiting the potential for dialog with health care providers. Individuals with limited English proficiency may also exhibit other characteristics not accounted for in this study, which lead them to perceive fewer needs for medical care or to assess delays in care or forgone care less severely, compared to those who speak English. For instance, limited English-proficient patients may have more difficulty acquiring health information about important health care services and relevant disease symptoms, thus attenuating the

potential relationship between language proficiency and these measures of health care access. Finally, respondents may be more likely to recall a more objective event like a health care visit in the past two weeks than to recall and infer any perceived delays or failed attempts at accessing care in the past 12 months, the latter outcomes being more subjective measures of expectations from the health care system. Consequently, health care visits may be a better measure of access to care for this population.

We also found few interaction effects between race/ethnicity and language proficiency, indicating that the effect of limited English proficiency on access to care is the same regardless of an individual's racial/ethnic group. The one exception was among Asians reporting delayed care, where we found that limited-English-proficient individuals had lower odds of reporting delays than their English-proficient counterparts. One possible explanation for this finding is that Asians with limited English proficiency may be less acculturated to the Western health care model, and rely more heavily on complementary and alternative medicine; they may be reporting fewer delays because they are less inclined to seek medical care in the first place.

Another interesting and somewhat paradoxical finding was that as education level increased, the odds of experiencing delayed or forgone needed care also increased. It is possible that education affects the perception of needed care. In other words, patients with higher levels of education have a lower threshold for perceived barriers to care and are consequently more likely to report difficulty obtaining care.

There are several limitations with this study. First, our measure of language proficiency was based on language of survey administration. Consequently, this measure may reflect individuals' preferred spoken language and perceived English proficiency, rather than accurately describe their actual comprehension, ability to navigate the health care system, or communication skills with health care providers. Few health services researchers have examined the usefulness of different approaches to measuring language proficiency (Flores *et al.* 2005), but concerns nevertheless exist regarding the subjective nature of self-assessed language proficiency (Hakuta 1994). For instance, self-declared English-proficient patients may overestimate their abilities and have been found to possess inadequate communication skills when written language tests are administered (Zun *et al.* 2006). Measurement of language skills using reliable and valid scales would be ideal but is rarely done due to lack of feasible, standardized assessment tools (Marian *et al.* 2007). However, evidence suggests that self-perceived language measures are reliable indicators of actual language ability (Marian *et al.* 2007). In addition, using language of interview is one of the more conventional approaches for operationalizing language proficiency, and it allows comparisons with previous studies that have investigated the impact of language on access to health care.

Another limitation of the study was the omission of several mitigating factors that were not available in the dataset, such as information on patient-provider language concordance, availability of professional language translation and interpretation services, and availability of English-proficient family and friends who serve as informal interpreters. Evidence indicates that language-concordant health care providers reduce barriers to care and improve quality of care for limited-English patients (Flores 2005, Green *et al.* 2005, Wilson *et al.* 2005, Ngo-Metzger *et al.* 2007, Eamranond *et al.* 2009). In the absence of language-concordant providers, professional medical interpreters

also reduce language barriers although perhaps not to the same extent (Baker *et al.* 1996, Flores 2005, Green *et al.* 2005, Karliner *et al.* 2007, Ngo-Metzger *et al.* 2007, Graham *et al.* 2008). The use of *ad hoc* interpreters, such as family members, friends, or untrained health care staff, is common because it is convenient and economical (Kuo *et al.* 2007, Ramirez *et al.* 2008, Diamond *et al.* 2009). However, this approach is least preferred, since informal interpreters are more likely than professional interpreters to commit interpretation errors with serious clinical consequences (Elderkin-Thompson *et al.* 2001, Flores *et al.* 2003, Laws *et al.* 2004). Patients are also less likely to be fully informed about and satisfied with their care when *ad hoc* interpreters are used, compared to those who use professional interpreters (Lee *et al.* 2002, Garcia *et al.* 2004, Hunt and de Voogd 2007). Although it was not possible in this particular study to examine the impact of these variables, the above literature suggests that their inclusion in our analytic models would have further reduced the observed language-based disparities in access to care. In other words, language-concordant providers or interpreters would have had a moderating effect on the relationship between language proficiency and access to care, reducing or eliminating language barriers among limited English-proficient patients in the presence of these supports.

Despite these limitations, our study adds to the previous literature by examining the relationship between language proficiency and three different dimensions of access to care in a recently surveyed, nationally representative sample. Our findings corroborate previous research in this area, indicating that language barriers in access to care do exist, even after controlling for the potential confounding effects of socioeconomic factors and health status (Fiscella *et al.* 2002, Weinick *et al.* 2004, Brotanek *et al.* 2005, Cheng *et al.* 2007). However, the results of our analyses also suggest that the choice of access measure may influence conclusions about language barriers in health care.

There are several important implications for health care providers, policy makers, and researchers. The results indicate that language barriers in access to care can be partly explained by socioeconomic and health status factors. One measure of access where language proficiency continues to be a barrier is in visits to health professionals. Given that over 8% of US residents have limited English proficiency and that this proportion is growing (Shin and Bruno 2003), doctors' offices, clinics, emergency rooms, and other health care settings ought to have the necessary resources in order to address potential language barriers. The National Standards on Culturally and Linguistically Appropriate Services (CLAS), introduced in 2001 by the US Department of Health and Human Services, represent one attempt at promoting linguistically accessible health care practices but they provide sometimes vague guidance and are not implemented universally (Office of Minority Health 2007, Oliva 2008). Adoption of more widespread, explicit and stringent CLAS standards may be required in order to eliminate these language barriers. Increased public funding for professional medical interpreters may also help to increase the utilization of these effective services. In addition, increasing the supply of fluently bilingual health care providers would improve patient-provider language concordance.

The findings also suggest that researchers and policy makers ought to consider carefully the formulation of survey questions regarding access to care. Subjective measures of access, such as perceived delays or unmet needs in care, may not be as suitable in diverse societies like the USA. Instead, more objective indicators which

inquire about actual use of care may be more appropriate, especially in cases where study populations are likely to have divergent expectations from the health care system.

Finally, further research is needed to investigate the mechanisms through which language barriers limit access to visits in health care settings. Possible avenues of inquiry include communication difficulties due to discordant languages between patients and health care providers, insufficient provision of translation and interpretation services, lack of awareness about available services, lowered expectations from the health care system, fewer perceived health needs, and negative prior health care experiences that dissuade future attempts to obtain medical attention.

This study focused on language barriers to health care specifically in the USA; however, the topic is also relevant to other multilingual, multicultural countries. Providers, researchers, and policy makers in international settings must also meet the health care needs of increasingly diverse populations. For instance, countries with high immigration rates, such as Canada, Australia, and the UK are also experiencing rapid growth in the proportion of the population which does not speak the dominant language (Aspinall 2005, Australian Bureau of Statistics 2006, Statistics Canada 2007, Gill *et al.* 2009). As in the USA, research in these countries has documented worse access to and quality of care for individuals with limited English proficiency (Gerrish 2001, Bonacruz Kazzi and Cooper 2003, Gerrish *et al.* 2004, John-Baptiste *et al.* 2004, Sheikh-Mohammed *et al.* 2006, Phokeo and Hyman 2007, Teng *et al.* 2007, Bartlett *et al.* 2008, Garrett *et al.* 2008). Successfully addressing language barriers in health care is thus of global interest.

Key messages

Almost 10% of the US population (21.4 million) has limited English proficiency. As these numbers grow, addressing language barriers in access to health care is becoming increasingly important.

This study found that individuals with limited English proficiency are more likely to experience difficulty accessing medical care, compared to their English-proficient counterparts.

Language barriers in access to care can be partly explained by socioeconomic status and health status, but language barriers still remain even after controlling for the potential confounding effects of these factors.

The choice of access measure may influence conclusions about language barriers in health care.

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