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RESEARCH ARTICLE

Disparities in Diabetes Care Quality by English Language Preference in Community Health Centers

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Objective. To conduct a parallel analysis of disparities in diabetes care quality among Latino and Asian community health center (CHC) patients by English language preference.

Study Setting/Data Collection. Clinical outcomes (2011) and patient survey data (2012) for Type 2 diabetes adults from 14 CHCs (n = 1,053).

Study Design. We estimated separate regression models for Latino and Asian patients by English language preference for Clinician & Group—Consumer Assessment of Healthcare Providers and System, Patient Assessment of Chronic Illness Care, hemoglobin A1c, and self-reported hypoglycemic events. We used the Blinder–Oaxaca decomposition method to parse out observed and unobserved differences in outcomes between English versus non-English language groups.

Principal Findings. After adjusting for socioeconomic and health characteristics, disparities in patient experiences by English language preference were found only among Asian patients. Unobserved factors largely accounted for linguistic disparities for most patient experience measures. There were no significant differences in glycemic control by language for either Latino or Asian patients.

Conclusions. Given the importance of patient retention in CHCs, our findings indicate opportunities to improve CHC patients' experiences of care and to reduce disparities in patient experience by English preference for Asian diabetes patients.

Key Words. Diabetes, limited English proficiency, racial-ethnic disparities, community health centers

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Community health centers (CHCs) face many challenges in managing diabetes in Latino and Asian patients, who are two of the fastest growing ethnic groups in the United States (Ennis, Ríos-Vargas, and Albert 2011; Hoeffel et al. 2012) and are disproportionately affected by diabetes (Gany et al. 2011). According to 2007–2009 Centers for Disease Control and Prevention (CDC) data, the age-adjusted prevalence of diabetes is 11.8 percent in Latinos and 8.4 percent in Asians, compared to 7.1 percent in whites (Centers for Disease Control and Prevention 2012). While similar proportions of Asians and whites have diabetes, the BMI-adjusted prevalence of diabetes is actually 60 percent higher in Asians (McNeely and Boyko 2004). Disease mortality is similarly skewed; diabetes age-adjusted mortality rates are 60 (per 100,000) for Latinos compared to 38 for whites (California Medi-Cal Type 2 Diabetes Study Group 2004).

In addition to being disproportionately affected by diabetes, Latinos and Asians have different diabetes care and patient experiences than other groups. Disparities between Latino and Asian versus white diabetic patients exist: glycemic and cardiovascular risk factor control (Brown et al. 2003; Lanting et al. 2005; Peek, Cargill, and Huang 2007; Baty et al. 2010), diabetic complications (i.e., retinopathy, end-stage renal disease) (Emanuele et al. 2005; Lanting et al. 2005), diabetes self-monitoring (i.e., home glucose testing, foot exam) (Brown et al. 2003; Nwasuruba et al. 2009), and diabetes quality of care (i.e., hemoglobin A1c and cholesterol screening, dilated eye exam, pneumococcal vaccinations, hypertensive medications) (Thackeray, Merrill, and Neiger 2004; Hosler and Melnik 2005). Latinos and Asians often perceive their quality of diabetes care to be worse than whites (Saha et al. 1999; Lurie et al. 2003; Ngo-Metzger, Legedza, and Phillips 2004). Asians, in particular, consistently report worse experiences of care and rate their physicians lower than both whites and blacks (Lurie et al. 2003; Saha and Hickam 2003; Ngo-Metzger, Legedza, and Phillips 2004).

Because Latinos and Asians are the two largest foreign-born groups (U.S. Census Bureau 2010), limited English proficiency (LEP) likely contributes to these disparities. LEP often co-occurs with low health literacy (Sentell and Braun 2012). In particular, Chinese LEP respondents to the California Health Interview Survey had the highest prevalence of low health literacy (68.3 percent), followed by Latinos (45.3 percent), and whites (18.8 percent)

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(Sentell and Braun 2012). A recent study, however, found that the association between Spanish language preference and poorer health was not necessarily mediated by this group's lower health literacy (Hahn et al. 2015), indicating that other complicating factors may be at play. For Latinos and Asians, LEP has been associated with poor health status (Wilson et al. 2005; Pippins, Alegria, and Haas 2007; Shi, Lebrun, and Tsai 2009; Gee and Ponce 2010), poor glycemic control (Fernandez et al. 2011), lower provision of health education, worse experiences of interpersonal care, lower patient satisfaction (Ngo-Metzger et al. 2007), and more reported health care discrimination (Lyles et al. 2011). The Endocrine Society's Scientific Statement on Health Disparities in Endocrine Disorders highlights that most studies do not differentiate subgroups among Latino and Asian patients, which is a major gap in our current understanding of race/ethnic disparities in diabetes (Lopez and Golden 2014).

As Latinos and Asians are a large proportion of CHC patients, we aim to explore the extent to which LEP impacts their diabetes care outcomes and whether LEP-outcome relationships differ between Latino and Asian patients. In this study, we examine English language preference as a proxy for English proficiency. First, we examine whether disparities in diabetes care quality and patient experiences exist between CHC patients by English language preference and compare whether the English language proficiency–outcome relationship is different for Latinos and Asians, controlling for sociodemographic and health characteristics. Second, we clarify the extent to which disparities are attributable to observed (e.g., patient sociodemographic and health characteristics) versus unobserved factors (e.g., individual beliefs, cultural factors, provider variation). If differences in Latino and Asian CHC groups are not explained by sociodemographic and health characteristics, then cultural norms, personal beliefs, or other unobserved factors may explain disparities, indicating that interventions to improve quality and outcomes of diabetes care may need to be tailored differently for each racial-ethnic linguistic group.

METHODS

Clinic Participants

Fourteen CHC sites were recruited to participate in a research project assessing patient experience and quality of diabetes care in CHCs. Our study CHCs were located in Santa Clara, San Francisco, and San Benito counties in Northern California and were all affiliated with the same community clinic network organization. These CHCs serve mostly low-income, Latino and Chinese patients and are highly segregated by race/ethnicity, as described in greater detail elsewhere (Van der Wees et al. 2014). All CHCs studied have bilingual and bicultural staff that can provide care in patients' language preference.

Patients were eligible for the study if they were 18 years or older and had two clinic visits for type 2 diabetes within the 2011 measurement year (Nichols et al. 2012). We used diabetes-related ICD-9 codes (250, 357.2, 362.0, 366.41, 648.0) to identify these visits. To supplement missing information in encounter data, we used additional methods to identify patients with diabetes, including pharmacy data, billing/claims data, and other encounter record data. Using clinical data from the 14 CHCs in 2011, 2,855 diabetic patients were randomly sampled within each CHC to complete a patient experience survey in 2012.

Patient Survey Measures

We administered the survey in English, Spanish, and Chinese, and included a $10 gift card. Both survey content and informed consent were understandable to potential research participants of low levels of literacy and LEP; we validated survey data in participants' native languages if they were not fluent in English. Patients initially received a mailed survey. Interviewers then called any nonrespondents by phone up to eight times to complete the survey. The human research ethics committee at University of California Los Angeles approved this study protocol (IRB#10-000596).

Over a 7-week fielding period (July 1, 2012–August 13, 2012), we received 1,344 complete surveys (response rate = 47.1 percent). Despite having two or more diabetes-related visits in encounter data, some patients (n = 79) reported not having a clinical encounter in the past 12 months and were screened out of questions related to the patient experience. Non-Latino and non-Asian groups were excluded from analysis because they were a small percentage of the sample and respondents (n = 212) and they universally preferred English. The final Latino and Asian patient sample included 1,053 diabetic patients. The overall 47 percent response rate is substantially higher than prior initiatives measuring patient care experiences in safety net settings (Zuckerman et al. 2012).

Survey questions included the Clinician & Group—Consumer Assessment of Healthcare Providers and System (CG-CAHPS) survey (Rodriguez and Crane 2011) ($\alpha = .91$), Patient Assessment of Chronic Illness Care (PACIC-11) measure (Aragones et al. 2008; Gugiu et al. 2009) ($\alpha = .91$), the Problem Areas in Diabetes (PAID-5) scale (McGuire et al. 2010) ($\alpha = .91$), and a count of self-reported hypoglycemic events over the previous 4 weeks (Sarkar et al. 2010). CG-CAHPS is a gold standard for capturing patients' assessments of ambulatory care, used by Medicare, Medicaid, and the National Committee on Quality Assurance (Rodriguez et al. 2009a,b). Because CHC patients are generally assigned to a team or to the entire practice rather than to individual primary care clinician panels (Singer et al. 1998; Quinn et al. 2013), we adapted the standard CG-CAHPS questions to reference "doctors and nurses at this clinic" rather than "your personal doctor." PACIC is widely used to evaluate the delivery of chronic care management activities for a variety of conditions, including diabetes (Aragones et al. 2008; Gugiu et al. 2009). PAID-5 is a psychometrically robust short-form measure of diabetes-related emotional distress (McGuire et al. 2010). Finally, we included a hypoglycemia measure because it is an important adverse event and contributor to poorer diabetes outcomes (Sarkar et al. 2010). We used the half-scale rule (Nunnelly and Bernstein 1994) to calculate composites scores, whereby respondents had to complete at least half of the items comprising the composite measure for a score to be calculated. For ease of interpretation, we transformed the unweighted average of the survey composite questions to a 0 to 100 scale when calculating composite scores (Item content is detailed in Appendix SA1).

Diabetes Control Measures

We analyzed each patient respondent's most recent hemoglobin A1c (HbA1c), a lab test averaging blood glucose levels over the previous 3 months and a clinically accepted marker for diabetes control (American Diabetes Association 2013). Hypoglycemia or frequent low blood sugar events are also problematic for diabetic patients, especially in vulnerable groups, so we used an adapted version of the DISTANCE study measure of hypoglycemia events to assess patient-reported hypoglycemia (Sarkar et al. 2010).

Statistical Analyses

First, we performed a parallel comparison of sociodemographic and health characteristics for Latino and Asian diabetic patients by race-ethnicity and by English language preference. In lieu of self-reported English language proficiency, we used the language in which the survey was answered; this revealed an exercised preference and was strongly related to CHC organization's records on language preference ($r = .95$). We calculated the unadjusted estimates for each of the outcome measures (i.e., CG-CAHPS, PACIC-11, hypoglycemia, hemoglobin A1c) by race-ethnicity and by English language preference. HbA1c less than 8.0 percent was defined as “controlled,” consistent with the Healthcare Effectiveness Data and Information System (HEDIS) comprehensive diabetes care measures. For these unadjusted analyses, we used *t*-tests to examine differences in continuous measures and χ^2 tests to examine differences in categorical variables by race-ethnicity and language.

Next, we estimated nested linear regression models for each of the outcome measures, stratified by Asian and Latino patient groups. The first set of regression models controlled for English language preference, the second set of models additionally controlled for sociodemographic characteristics, and the final set of models additionally controlled for health status, including self-reported health (Jenkinson et al. 2001), an adapted version of the Charlson comorbidity index (Deyo, Cherkin, and Ciol 1992), and diabetes emotional distress (i.e., PAID-5) (McGuire et al. 2010). For each model, we accounted for the clustering of respondents within CHCs using CHC fixed effects. Because sensitivity analyses yielded similar results for the estimation sample versus the complete sample, we retained all observations for each regression model.

Finally, we were interested in clarifying the extent to which any disparities between language preference groups we discovered could be explained by observed versus unobserved factors. The Blinder–Oaxaca decomposition method was used to parse out observed and unobserved differences in outcomes between groups where we found significant differences in multivariate regression analyses. This method has been used in health services research to study racial-ethnic disparities in different measures of health care access and utilization (Waidmann and Rajan 2000; Vargas Bustamante et al. 2010). The decomposition method disentangles disparities further after adjusted regression analysis, by estimating the magnitude of our mean outcome differences in diabetes care quality and patient experiences.

Significance was determined using a two-tailed alpha of 0.05. All analyses were conducted using *Stata 14.0.*

RESULTS

Respondent Characteristics

Our study patients were primarily Asians (37 percent, *n* = 384) and Latinos (39 percent, *n* = 409) who did not prefer English, compared to Asians (10 percent, $n = 110$) and Latinos (14 percent, $n = 150$) who preferred English. In comparing Latino and Asian patients, we found statistically significant differences in sociodemographic and health characteristics between groups at the 95 percent level (Table 1). Latino patients were more likely to be female, young, insured, less educated, and had better self-reported health, compared to their Asian counterparts. Both groups had similar levels of emotional distress from diabetes (PAID-5) and number of chronic comorbidities.

In comparing Latino patients by English language preference, we found no statistically significant differences in gender and age between groups. For Latino patients, there were also no significant differences in health insurance status, self-reported health status, and emotional distress from diabetes by language group. However, Latinos who preferred Spanish were less likely to have higher education ($p < .001$) and had fewer comorbidities ($p < .001$) than Latinos who preferred English.

For Asian patients, there were larger differences by English language preference. Asians who preferred Chinese were more often male ($p < .001$), were older ($p < .001$), were less likely to have health insurance ($p < .001$), were less educated ($p < .001$), reported worse self-reported health ($p < .001$), and had less emotional distress from diabetes ($p = .02$) than Asians who preferred English. There was no significant difference in number of chronic comorbidities between the Asian groups ($p = .07$). When we examined the estimation samples for the "access to care" regression model with the smallest number of observations ($n = 511$) due to patients being screened out of these questions, the racial-ethnic-linguistic composition of patients remained similar.

Unadjusted Analyses

In unadjusted analyses, Asian patients preferring Chinese consistently reported worse patient experiences compared to Latinos and to Asians who preferred English. Asian patients reported lower mean scores for CG-CAHPS clinician–provider communication (difference = -10.57, $p < .001$), CG-CAHPS access to care (difference = -2.19, p = NS), and patient experience of chronic illness care (i.e., PACIC-11) (difference = -14.30, $p < .001$), compared to Latino patients. Asian patients who preferred Chinese reported lower mean scores for CG-CAHPS clinician–provider communication (difference = -3.85, $p < .001$), CG-CAHPS access to care (difference = -5.29, p = NS), and patient experience of chronic illness care (i.e., PACIC-11) (difference = -16.04, $p < .001$), compared to Asians who preferred English. For

Table 1: Socioeconomic and Health Characteristics of Latino and Asian Diabetic Patients by English Language Preference

	Latino						*Asian*		
	Non-English No (%)	*English No (%)*	*p-value*	*All Latino No (%)*	*All Asian No (%)*	*p-value*	*Non-English No (%)*	*English No (%)*	*p-value*
Gender (*n*)	409	150		559	494		384	110	
Female	273 (67)	99 (66)	NS	372 (67)	232 (47)	<.001	167 (43)	165 (59)	<.01
Male	136 (33)	51 (34)		187 (33)	262 (53)		217 (57)	45 (41)	
Age (*n*)	409	150		559	494		384	110	
<35	25 (6)	16 (11)	NS	41 (7)	5 (1)	<.001	1 (0)	4 (4)	<.01
36–45	87 (21)	22 (15)		109 (19)	20 (4)		14 (4)	6 (5)	
46–55	108 (26)	44 (29)		152 (27)	95 (19)		72 (19)	23 (21)	
56–65	112 (27)	46 (31)		158 (28)	201 (41)		163 (42)	38 (35)	
66–75	49 (12)	18 (12)		67 (12)	120 (24)		88 (23)	32 (29)	
>75	28 (7)	4 (3)		32 (6)	53 (11)		46 (12)	7 (6)	
Insured (*n*)	337	126		463	475		375	100	
Yes	288 (85)	111 (88)	NS	399 (86)	250 (53)	<.001	181 (48)	69 (69)	<.001
No	49 (15)	15 (12)		64 (14)	225 (47)		194 (52)	31 (31)	
Education (*n*)	352	149		501	473		364	109	
<High school	253 (72)	17 (11)	<.001	270 (54)	201 (42)	<.001	187 (51)	14 (13)	<.001
Some high school	48 (14)	49 (33)		97 (19)	64 (14)		53 (15)	11 (10)	
>High school	51 (14)	83 (56)		134 (27)	208 (44)		124 (34)	84 (77)	
Health (*n*)	390	149		539	484		376	108	
Poor/fair	212 (54)	81 (54)	NS	293 (54)	291 (60)	<.001	245 (65)	46 (43)	<.001
Good	98 (25)	41 (28)		139 (26)	145 (30)		102 (27)	43 (40)	
Very good	80 (21)	27 (18)		107 (20)	48 (10)		29 (8)	19 (18)	

Continued

Table 1. *Continued*

	Latino						*Asian*		
	Non-English No (%)	*English No (%)*	*p-value*	*All Latino No (%)*	*All Asian No (%)*	*p-value*	*Non-English No (%)*	*English No (%)*	*p-value*
	Mean (SD)	*Mean (SD)*		*Mean (SD)*	Mean (SD)		*Mean (SD)*	*Mean (SD)*	
Problem Areas in Diabetes (PAID-5)	348	135	NS	483	425	NS	329	96	.02
	54.7 (29.6)	58.5 (30.6)		55.7 (29.9)	54.4 (26.8)		52.8 (26.7)	60.1 (26.6)	
Charlson Comorbidity Index	409	150	<.001	559	494	NS	384	110	NS
	1.9 (1.6)	2.5 (2)		2.1 (1.8)	2 (1.5)		1.9 (1.5)	2.1 (1.6)	

NS, not significant at the 95% level.

Latino patients, the differences between language groups were smaller in magnitude and none were statistically significant. Latinos who preferred Spanish reported lower mean scores for CG-CAHPS communication (difference = −3.85, p = NS), CG-CAHPS access to care (difference = −3.29, p = NS), and PACIC-11 (difference = −4.09, p = NS), compared to Latinos who preferred English. Notably, Asians who preferred Chinese had the lowest mean HgA1c (mean = 6.98, difference = −0.50, p = .02), but no other differences in glycemic control measures were statistically significant between any racial-ethic linguistic group (Appendix SA2).

Multivariate Results

Differences by English language preference persisted in multivariate regression analyses for only Asian patients. Language preference differences for Asians persisted when controlling for socioeconomic status (Model 2). The pattern is robust in the fully adjusted Model 3, which additionally controls for patient health status: CG-CAHPS communication (β = −17.71, SE = 4.90, $p < .01$), CG-CAHPS access to care (β = −14.96, SE = 5.00, $p < .01$), and PACIC-11 (β = −9.96, SE = 4.55, p = .03). Conversely, Latinos who preferred Spanish versus English demonstrated no statistically significant difference in their patient experience of care ratings across the regression models (Table 2).

Lower health status was significantly associated with worse patient care experiences for Latinos and Asians. Asian and Latino patients with "very good" or "excellent" self-reported health reported better patient experiences in CG-CAHPS communication (β = 16.92, SE = 3.38, $p < .001$; β = 18.30, SE = 4.74, $p < .001$), CG-CAHPS access to care (β = 23.34, SE = 4.47, $p < .001$; β = 16.88, SE = 4.75, $p < .001$), and PACIC-11 (β = 25.91, SE = 3.55, $p < .001$; β = 14.86, SE = 4.35, $p < .001$), compared to patients with "poor" or "fair" self-reported health. Furthermore, Asian patients with more emotional distress from diabetes (i.e., PAID-5) (β = -4.61, SE = 1.34, $p < .001$) reported lower PACIC scores, compared to those with less emotional distress. By contrast, we found that Asian patients with more comorbidities had higher PACIC scores compared to Asian patients with fewer comorbidities (β = 2.30, SE = 0.82, $p < .01$).

Asian and Latino patients with more comorbidities (β = −3.69, SE = 0.95, $p < .001$; β = −3.30, SE = 0.93, $p < .001$) reported less hypoglycemic events, compared to those with fewer clinical comorbidities. However, those with more emotional distress from diabetes (i.e., PAID-5) reported

Table 2: Adjusted Analyses of Patient Experience of Care (CG-CAHPS and PACIC-11)

	Latino									Asian								
	Clinician–Patient Communication§			Access to Care§			Patient Assessment of Chronic Illness			Clinician–Patient Communication§			Access to Care§			Patient Assessment of Chronic Illness Care		
	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)
Language																		
English	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Non-English	1.82	2.61	1.07	−1.18	−0.60	0.11	1.33	−0.35	−1.64	−19.71‡	−19.33‡	−17.71‡	−14.91‡	−17.31‡	−14.96†	−14.05‡	−12.85†	−9.96*
	(2.65)	(3.57)	(3.69)	(3.56)	(5.12)	(5.12)	(2.91)	(4.04)	(3.85)	(4.34)	(4.63)	(4.90)	(4.36)	(4.59)	(5.00)	(4.19)	(4.50)	(4.55)
Gender																		
Female		—	—		—	—		—	—		—	—		—	—		—	—
Male		2.38	2.56		1.88	3.78		−0.50	0.53		0.09	−0.42		−0.57	1.13		1.48	1.87
		(3.05)	(3.15)		(4.25)	(4.18)		(3.42)	(3.27)		(2.53)	(2.64)		(2.67)	(2.77)		(2.45)	(2.43)
Age																		
≤35		—	—		—	—		—	—		—	—		—	—		—	—
36–45		−1.20	−2.75		2.21	−1.74		−1.20	−3.81		0.60	−4.46		26.69	21.34		1.26	−3.57
		(5.57)	(5.59)		(7.61)	(7.35)		(6.13)	(5.76)		(13.06)	(13.05)		(14.21)	(14.28)		(12.13)	(11.95)
46–55		−7.97	−9.07		0.50	−2.29		−9.84	−10.42		−7.75	−12.39		20.41	15.46		−11.23	−13.06
		(5.27)	(5.30)		(7.24)	(7.03)		(5.76)	(5.44)		(11.82)	(11.84)		(13.07)	(13.09)		(10.97)	(10.86)
56–65		−2.29	−2.73		6.31	3.92		−6.59	−7.08		−5.01	−10.20		22.50	17.56		−11.31	−14.58
		(5.36)	(5.51)		(7.44)	(7.34)		(5.92)	(5.67)		(11.66)	(11.72)		(12.98)	(13.09)		(10.83)	(10.75)
66–75		−1.74	−2.79		1.22	−1.53		−8.19	−9.59		−3.62	−7.46		16.26	11.28		−9.44	−12.89
		(5.87)	(6.01)		(8.63)	(8.40)		(6.56)	(6.24)		(11.87)	(12.06)		(13.24)	(13.49)		(11.09)	(11.05)
75+		−2.81	−8.65		11.16	3.35		−4.56	−11.90		−4.32	−6.31		29.95*	28.62*		−11.88	−16.65
		(7.09)	(7.30)		(10.22)	(10.14)		(8.04)	(7.64)		(12.42)	(12.74)		(13.86)	(14.19)		(11.57)	(11.66)
Insured																		
Yes		—	—		—	—		—	—		—	—		—	—		—	—
No		−1.25	−3.87		−4.56	−7.23		−1.57	−5.08		−1.23	−1.16		−2.99	−1.46		0.65	0.69
		(4.16)	(4.35)		(5.91)	(5.93)		(4.72)	(4.53)		(3.05)	(3.14)		(3.26)	(3.38)		(2.93)	(2.88)
Education																		
<High school		—	—		—	—		—	—		—	—		—	—		—	—
Some high school		−5.79	−6.54		−3.36	−4.43		−3.03	−2.59		0.59	0.85		−0.31	1.36		4.28	3.93
		(3.71)	(3.83)		(5.21)	(5.12)		(4.24)	(3.99)		(3.78)	(4.09)		(4.04)	(4.22)		(3.78)	(3.77)
>High school		0.45	−2.22		0.31	−1.92		−0.65	−3.02		1.45	−0.66		−0.04	−0.35		4.76	3.62
		(3.67)	(3.81)		(5.42)	(5.34)		(4.19)	(3.99)		(2.82)	(3.03)		(2.99)	(3.19)		(2.79)	(2.79)
Health status																		
Poor/fair			—			—			—			—			—			—
Good			9.44†			13.91†			12.46‡			7.96†			5.62			4.89
			(3.38)			(4.81)			(3.50)			(2.96)			(3.27)			(2.73)

Continued

Table 2. *Continued*

	Latino									*Asian*								
	Clinician–Patient Communication§			*Access to Care*§			*Patient Assessment of Chronic Illness*			*Clinician–Patient Communication*§			*Access to Care*§			*Patient Assessment of Chronic Illness Care*		
	Model 1 *β (SE)*	*Model 2* *β (SE)*	*Model 3* *β (SE)*	*Model 1* *β (SE)*	*Model 2* *β (SE)*	*Model 3* *β (SE)*	*Model 1* *β (SE)*	*Model 2* *β (SE)*	*Model 3* *β (SE)*	*Model 1* *β (SE)*	*Model 2* *β (SE)*	*Model 3* *β (SE)*	*Model 1* *β (SE)*	*Model 2* *β (SE)*	*Model 3* *β (SE)*	*Model 1* *β (SE)*	*Model 2* *β (SE)*	*Model 3* *β (SE)*
Very good/ excellent			16.92‡ (3.40)			23.34‡ (4.47)			25.91‡ (3.55)			18.30‡ (4.74)			16.88‡ (4.75)			14.86‡ (4.35)
Problem areas in diabetes (PAID-5)			0.30 (1.30)			0.48 (1.79)			−1.68 (1.36)			0.46 (1.44)			−0.31 (1.59)			− 4.61‡ (1.34)
Total comorbidities			−0.71 (0.83)			0.54 (1.11)			0.50 (0.86)			−0.76 (0.94)			0.28 (0.95)			2.30† (0.82)
Constant	74.74‡ (2.23)	78.73‡ (5.80)	76.76‡ (6.16)	55.58‡ (2.92)	51.99‡ (8.26)	44.35‡ (8.41)	54.64‡ (2.43)	62.84‡ (6.38)	55.97‡ (6.39)	80.84‡ (3.56)	85.50‡ (11.78)	86.79‡ (11.89)	64.05‡ (3.57)	47.09‡ (13.11)	44.12‡ (13.08)	52.08‡ (3.41)	57.45‡ (10.97)	50.71‡ (10.86)
n	522	406	372	345	259	243	490	380	371	469	437	392	318	296	268	427	399	387
R^2	0	0.03	0.1	0	0.02	0.14	0	0.02	0.15	0.04	0.05	0.11	0.04	0.08	0.14	0.03	0.06	0.13

Notes. Standard errors (SE) are reported in parentheses. *, †, ‡ indicates significance at the 95%, 99%, and 99.9% level, respectively.
Empty cells reflect covariates that were not controlled for in each model. "—" represents reference category.
Model 1 is unadjusted. Model 2 is adjusted for sociodemographic characteristics. Model 3 is additionally adjusted for health characteristics.
§Derived from Clinician & Group—Consumer Assessment of Healthcare Providers and System (CG-CAHPS) survey.

the opposite ($\beta = 8.89$, SE = 1.49, $p < .001$; $\beta = 6.06$, SE = 1.45, $p < .001$). Latino patients with "very good/excellent" self-reported health reported more hypoglycemic events ($\beta = 11.62$, SE = 3.90, $p < .01$), compared to those with "poor/fair" self-reported health. Unlike with measures of patient experiences, there were no statistically significant differences in hemoglobin A1c control and hypoglycemic events between CHC patients who preferred and not preferred English (Table 3).

Decomposition Analyses

Decomposition analyses parsed out observed and unobserved factors that explain differences in patient experiences between Asian patients who preferred Chinese versus English and estimated the share of these disparities attributable to observed patient characteristics or health system factors (Table 4). In our study, observed factors accounted for a low proportion of the disparity in patient experiences between Asian patients who preferred Chinese versus English (CG-CAHPS communication 21.28 percent; PACIC-11 15.78 percent). The CG-CAHPS access to care composite was an exception where observed factors accounted for 55.40 percent of the observed disparity, but results did not reach statistical significance. The largest and only significant observed factor contributing to disparities in patient experience among Asians by language preference was self-reported health. Thus, even if Asians who preferred Chinese had the same measured sociodemographic and health characteristics as those who preferred English, disparities in patients' experiences, with the exception to access to care, would persist between the two groups. Instead, unobserved factors, such as expectations of care or health literacy or provider variation, could contribute to the disparities between the two groups.

DISCUSSION

To our knowledge, no other study has simultaneously examined diabetes care quality and patient experiences in a large safety net sample consisting of mostly low-income LEP Asian and Latino patients. Consistent with previous research, our study shows that Asians report worse experiences of care (CG-CAHPS and PACIC-11) compared to other racial-ethnic groups (Lurie et al. 2003; Ngo-Metzger, Legedza, and Phillips 2004). Our findings, however, highlight that the disparities in patient experience of care by English language preference found in Asian diabetes patients only. The relationship of language

Table 3: Adjusted Analyses of Hemoglobin A1c Control and Hypoglycemic Events

	Latino						Asian					
	Hemoglobin A1c			Hypoglycemia			Hemoglobin A1c			Hypoglycemia		
	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)
Language												
English	—	—	—	—	—	—	—	—	—	—	—	—
Non-English	0.08 (0.21)	−0.17 (0.29)	−0.14 (0.31)	−1.64 (3.37)	−0.62 (4.60)	−2.52 (4.25)	−0.42 (0.23)	−0.31 (0.25)	−0.26 (0.27)	4.68 (4.85)	0.64 (5.22)	0.72 (5.02)
Gender												
Female		—	—		—	—		—	—		—	—
Male		0.05 (0.24)	0.04 (0.26)		6.46 (3.92)	4.19 (3.62)		−0.03 (0.13)	−0.05 (0.14)		5.56* (2.78)	5.59* (2.66)
Age												
≤35	—	—			—	—		—	—		—	—
36–45	−0.67 (0.47)	−0.42 (0.49)			4.38 (6.99)	1.11 (6.42)		−1.11 (0.67)	−1.12 (0.69)		11.47 (13.67)	8.09 (13.06)
46–55	−0.73 (0.44)	−0.67 (0.45)			4.63 (6.58)	6.13 (6.07)		−1.19 (0.61)	−1.18 (0.62)		11.24 (12.37)	7.05 (11.86)
56–65	−0.74 (0.45)	−0.54 (0.47)			5.43 (6.75)	8.03 (6.30)		−1.27* (0.60)	−1.21* (0.62)		12.86 (12.21)	8.87 (11.75)
66–75	−0.81 (0.49)	−0.66 (0.51)			2.93 (7.41)	3.01 (6.90)		−1.37* (0.61)	−1.34* (0.63)		16.68 (12.50)	12.17 (12.07)
75+	0.09 (0.57)	0.29 (0.61)			25.45† (8.95)	21.74† (8.34)		−1.35* (0.65)	−1.49* (0.68)		17.96 (13.12)	17.18 (12.78)
Insured												
Yes		—	—		—	—		—	—		—	—
No		0.57 (0.31)	0.42 (0.33)		−1.63 (5.36)	−3.19 (4.99)		0.16 (0.16)	0.14 (0.17)		0.25 (3.31)	−0.20 (3.15)

Continued

Table 3. *Continued*

	Latino						Asian					
	Hemoglobin A1c			Hypoglycemia			Hemoglobin A1c			Hypoglycemia		
	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)
Education												
<High school		—	—		—	—		—	—		—	—
Some high school		−0.00 (0.32)	0.06 (0.34)		−2.77 (4.80)	−3.62 (4.39)		−0.08 (0.20)	−0.11 (0.22)		0.43 (4.26)	−0.07 (4.11)
>High school		−0.18 (0.29)	−0.22 (0.31)		4.61 (4.78)	3.03 (4.42)		−0.10 (0.15)	−0.11 (0.17)		−0.48 (3.16)	−0.95 (3.05)
Health status												
Poor/fair			—			—			—			—
Good			0.04 (0.27)			−3.51 (3.89)			0.07 (0.16)			5.42 (2.99)
Very good/ excellent			−0.48 (0.29)			11.62† (3.90)			−0.01 (0.26)			9.13 (4.75)
Problem areas in diabetes (PAID-5)			−0.27* (0.11)			8.89‡ (1.49)			−0.08 (0.08)			6.06‡ (1.45)
Total comorbidities			0.02 (0.07)			−3.69‡ (0.95)			0.01 (0.05)			−3.30‡ (0.93)
Constant	7.63‡ (0.18)	8.33‡ (0.49)	8.31‡ (0.54)	72.44‡ (2.83)	64.16‡ (7.28)	73.43‡ (7.08)	7.38‡ (0.20)	8.54‡ (0.61)	8.50‡ (0.63)	76.38‡ (3.98)	62.54‡ (12.36)	71.33‡ (11.87)
n	360	283	252	475	370	368	430	402	355	420	393	388
R^2	0	0.04	0.07	0	0.04	0.21	0.01	0.03	0.04	0	0.02	0.13

Notes. Standard errors (SE) are reported in parentheses. *,†,‡ indicates significance at the 95%, 99%, and 99.9% level, respectively.
Empty cells reflect covariates that were not controlled for in each model. "—" represents reference category.
Model 1 is unadjusted. Model 2 is adjusted for sociodemographic characteristics. Model 3 is additionally adjusted for health characteristics.

Table 4: Decomposition Analyses of Experience of Care for Asian Patients

Study Outcome	*β*	*SE*	*% of Total Difference*
Clinician–patient communication§			
Predicted value for Chinese-speaking patient	61.16	1.37‡	
Predicted value for English-speaking patient	79.15	2.47‡	
Total difference	−17.99	2.82‡	
Difference explained by observed characteristics	−3.83	1.28†	21.28
Significant determinant: *Self-reported health*	−2.89	0.97†	16.07
Access to care§			
Predicted value for Chinese-speaking patient	51.41	1.35‡	
Predicted value for English-speaking patient	55.34	3.49‡	
Total difference	−3.94	3.74	
Difference explained by observed characteristics	−2.18	1.53	55.40
Significant determinant: *Self-reported health*	−2.63	1.13*	66.90
Patient Assessment of Chronic Illness Care (PACIC-11)			
Predicted value for Chinese-speaking patient	36.57	1.27‡	
Predicted value for English-speaking patient	56.25	2.60‡	
Total difference	−19.68	2.89‡	
Difference explained by observed characteristics	−3.10	1.34*	15.78
Significant determinant: *Self-reported health*	−2.43	0.89†	12.36

*, †, ‡ indicates significance at the 95%, 99%, and 99.9% level, respectively.
§Derived from Clinician & Group—Consumer Assessment of Healthcare Providers and System (CG-CAHPS) survey.

preference and patients' experiences does not extend to Latino diabetes patients.

Our research finds that poor patient experiences in Asians who preferred Chinese are not simply explained by language preference. Previous studies suggest that Asians may report more negative experiences than non-Latino whites for equivalent quality of primary care experiences (Rodriguez and Crane 2011) but have not identified whether English language preference plays a role. Our study demonstrates that LEP Asians rate their care differently and the pathways by which this occurs are in need of further exploration. Possible explanations may be related to less patient-centeredness for LEP Asians in CHCs. For example, it may be more difficult to access English-to-Chinese interpretation than English-to-Spanish interpretation. Qualitative, exploratory research examining cultural competency issues for LEP Asians and how care delivery can be improved for these patients is warranted. Services will likely need to move beyond language assistance programming for Chinese-speaking Asians, given that our sample CHCs were already providing such services. Future research could also clarify whether similar linguistic disparities extend among other Asian subgroups (i.e., Korean and Vietnamese patients). In light of the overall poor patient experiences across all groups, research is necessary to clarify how to improve patient experiences in safety net practices, especially for Chinese-speaking Asian diabetic patients.

In addition, our findings reveal incongruence between diabetes outcomes and patient experiences between Asians who preferred and not preferred English. Although we found language preference disparities in patient experience measures (i.e., CG-CAHPS, PACIC-11), there were no detectable disparities in intermediate diabetes outcome measures (i.e., HgA1c, hypoglycemic events) by English language preference. Latino diabetic patients, regardless of English language preference, had no differences in diabetes outcomes, as well. Because technical quality of diabetes care may not necessarily reflect patient experience (Sequist et al. 2012), this finding implies that monitoring of experience of care is also necessary in safety net clinics.

Our study also examined the relative impact of health status on patient experience of care and diabetes outcomes for Asian and Latino CHC patients. Consistent with prior research, both Asian and Latino patients with better health status tended to report better experiences with access, communication and chronic illness care compared to those who have worse health (Elliott et al. 2001; Johnson, Rodriguez, and Solorio 2010). On the contrary, we found that patients with less comorbidity and less diabetes-related emotional distress had lower PACIC-11 scores, potentially reflecting less diabetes self-management support provided to these "healthier" patients. Also congruent with previous research, patients with less diabetes-related emotional distress (i.e., lower PAID-5) had lower HbA1c and fewer hypoglycemic events than those with more reported problems (Sinnott et al. 2005). Finding implications include targeting quality improvement and research efforts on diabetic CHC patients reporting poor self-reported health or high emotional distress from diabetes.

Having found linguistic disparities in patient experience of care among Asian CHC patients, we wanted to understand what accounted for them. Decomposition results highlighted that observed factors (i.e., sociodemographic and health characteristics) do not explain most disparities in patient experiences between Asians who preferred and not preferred English in our study. Unobserved factors accounted for the majority of disparities in scores, possibly except access to care, for Asians who prefer English versus Chinese. Unobserved factors may account for a lower proportion of disparities in access to care, perhaps because access is shaped by the structural capabilities of practices (Friedberg et al. 2010) more than by interpersonal aspects of care. Unexplained factors that drive other patient experience measures could be as follows: (1) variation in provider practices or geographic location (Bynum et al. 2010); (2) differences in choice of (or access to) providers by different racial/ethnic minorities (Harris 2001); and (3) differences in individuals' beliefs, behavioral patterns, motivational factors, and cultural factors (Hahn et al. 2015). More research is warranted to explore racial-ethnic and linguistic differences in individual beliefs, cultural factors, provider variation, etc. alongside the factors we analyzed in the current study.

Our study's strengths are the following: (1) large diverse safety net population, (2) inclusion of multimodal survey and clinic level data, and (3) comparison between two minority groups of different language preferences; however, there are several study limitations. First, data collection in safety net settings is challenging and we achieved a response rate of 47 percent. The study, nevertheless, presents the largest sample of diabetic patients in CHCs with a relatively high response rate compared to other studies of patient care experiences among safety net populations. Second, Asian subgroups who preferred neither Chinese nor English may have self-selected into the English preference group or not responded to the survey at all. Unlike Asian patients, Latino patients speak either Spanish or English, which may lead to sample heterogeneity. This was unlikely to have affected the results, because we observed no difference in glycemic control measures. Third, decomposition methods do not identify unobserved factors that account for a substantial portion of the gap in patients' experiences between Asians who preferred English versus Asians who preferred Chinese. For example, we do not have information on other measures of acculturation and are not able to adjust for factors such as cultural identity and family interactions. Our results, however, lay the foundation for research examining potential mechanisms contributing to linguistic disparities among Asians. Finally, our study findings are from 14 CHCs in Northern California in 2012, so extrapolation of results beyond these clinical settings may be limited.

In conclusion, linguistic disparities in diabetic patients' experience of care exist in CHCs, where many low-income, minority, and LEP patients are served. Our study finds that disparities by English language preference are present in patient experiences, but not diabetes outcomes, for Asian patients. Because we do not observe similar patterns in Latino patients, these disparities in Asians are unlikely simply attributable to LEP. Our decomposition analyses also reveal that observed factors like sociodemographic and health characteristics do not explain linguistic disparities in patients' experience of care between Asians who preferred English versus Chinese. Our findings suggest that efforts to eliminate disparities in diabetes care in CHCs are unlikely to be achieved solely by improving insurance coverage or managing clinical comorbidities.

As the Affordable Care Act (ACA) enables greater patient choice of where to seek care, patient retention is critical to the survival of CHCs, where there have historically been high levels of patient turnover. The quality of the patient experience we observed in our study is much lower compared to studies of diabetic patient experience in private physician practices (Sequist et al. 2009, 2012). Understanding how to improve patient experiences among patients with diverse language preferences may aid in the survival, growth, and competitive advantage of CHCs in the post-ACA era.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.

Appendix SA2: Patient Survey Item Content.

Appendix SA3: Unadjusted Mean Outcomes for Latino and Asian Diabetic Patients by English Language Preference.