

THE ASSOCIATION OF LANGUAGE WITH PREVALENCE OF UNDIAGNOSED HYPERTENSION AMONG OLDER MEXICAN AMERICANS

Objective: Language barriers have been shown to negatively impact health care for immigrants. We evaluated the association between language use and the diagnosis of hypertension among elderly Mexican Americans.

Study population: We studied subjects from the Hispanic Established Populations for Epidemiologic Studies of the Elderly, a cohort of 3050 Mexican American subjects age ≥ 65 .

Predictors: Measures of language included Spanish and/or English language read/spoken, language used in social situations, and language of mass media use.

Outcome measure: Undiagnosed hypertension on physical exam was defined as systolic blood pressure ≥ 140 mm Hg and/or diastolic blood pressure ≥ 90 mm Hg in persons who did not report previous hypertension diagnosis or were not current users of anti-hypertensive medications.

Results: The age- and sex-adjusted prevalence of diagnosed hypertension and undiagnosed hypertension were 50.5% and 19.3%, respectively. Among 1347 older adults without previous diagnosis of hypertension that were included in the primary analysis, the mean age was 72 years and 43% were immigrants. After adjusting for age, gender, and education, Spanish use more often than English use in mass media was significantly associated with undiagnosed hypertension (adjusted OR 2.2 [1.3–3.6]). Other measures of acculturation were not independently associated with undiagnosed hypertension. In analyses restricted to persons with hypertension, similar language factors distinguished those who had been diagnosed from those whose hypertension was undiagnosed.

Conclusions: Mexican American elders who reported using Spanish more often than English use in mass media were more likely to have undiagnosed hypertension compared to those using English language in mass media. Further studies are needed to elucidate the role of mass media language in hypertension awareness and management among Hispanic elders. (*Ethn Dis.* 2007;17:699–706)

Key Words: Language, Spanish, Cardiovascular, Risk Factor, Hypertension, Mexican American, Hispanic

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INTRODUCTION

Despite recent federal initiatives to eliminate health disparities among racial and ethnic groups, leading indicators of health continue to demonstrate disparities for the Hispanic population.¹ In 2001, Hispanics of all races experienced more years of potential life lost before age 75 than non-Hispanic Whites for many causes of death, including cerebrovascular disease.² Recent data from 1999–2004 National Health and Nutrition Examination Survey (NHANES) demonstrate that awareness and control of hypertension remain low for non-Hispanic Whites, non-Hispanic Blacks, and Mexican Americans.³ In research specific to older Mexican Americans, only 50% of patients with hypertension are receiving antihypertensive medications and only 25% have adequate blood pressure control.⁴ In addition, Mexican Americans have lower rates of hypertension control compared to non-Hispanic Whites in the United States.^{5,6} One possible cause is inadequate intensification of medications for poorly controlled hypertension among Hispanics.⁷ This may explain only a small portion of the disparity experienced by Hispanics with hypertension. Previous

studies have focused on control of hypertension, but little is known about why many persons with high blood pressure, particularly Hispanics, fail to get diagnosed with hypertension.

Language may be one factor to explain the underdiagnosis of hypertension among Hispanics. Previous studies have shown that language barriers negatively affect healthcare experiences of Spanish-speaking patients.⁸ Physician language concordance is independently associated with better satisfaction among Spanish-speaking patients.⁹ Although patients with limited English proficiency believe interpreters should be used more often, Spanish-speaking patients are less satisfied with their care when interpreters are used compared to English-speaking counterparts.¹⁰ Spanish-speaking patients followed by non-Spanish speaking physicians may be more likely to miss medications and skip office visits.¹¹ Specifically, immigrants who speak Spanish are less likely to report for blood pressure screening.¹² Studying disparities according to language may lead to interventions to reduce health disparities in hypertension management. In our study, we focused on elder Mexican Americans because disease prevalence is high and there is a broad range of language ability and preference.

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Our hypothesis was that older adults who use Spanish were more likely to have undiagnosed hypertension.

In prior studies, measures of acculturation have included place of birth, age of migration, duration of residence in the United States, language use, language preference, and social interaction with other ethnic groups.¹³⁻¹⁵ Acculturation is defined as the process of adaptation to a new culture, measured by the degree with which individuals have integrated the values, beliefs, and attitudes of a new culture into their daily lives.¹⁶ In this study, we investigated the association of language measures, duration of residence in the United States, and age of migration with the prevalence of undiagnosed hypertension in the Hispanic Established Populations for Epidemiologic Studies of the Elderly (EPESE). Our hypothesis was that older adults who use Spanish were more likely to have undiagnosed hypertension. Language variables included traditional measures such as language read/spoken and language in social situations, as well as a newly defined measure of language of mass media use.

METHODS

Study Population

The study subjects were participants of the 1993-1994 Hispanic EPESE, a longitudinal study of 3050 Mexican Americans ≥ 65 years of age residing in communities throughout five US southwestern states: Arizona, California, Colorado, New Mexico, and Texas. Participants were selected by use of a multistage area probability cluster sampling that involved selection of counties, census tracts, and households within selected census tracts. Only counties where the Mexican American population comprised at least 6.6% of the county populace were included. The response rate in the door-to-door recruitment was 83 percent.¹⁷ Due to reliability concerns, 316 subjects were excluded from the analysis because interview data were collected through

proxies. Additionally, 120 subjects did not have blood pressure measurements and 17 did not have self-report or medication data, leaving a total of 2597 subjects for analysis. We divided our total study sample into three main groups: 1) those without hypertension, 2) those with undiagnosed hypertension, and 3) those with diagnosed hypertension. Our primary study aim was to determine the likelihood of having undiagnosed hypertension among those never diagnosed with hypertension [Group 2/(Group 1 + Group 2)] according to acculturation. As a primary aim, we took a public health perspective to identify patients at risk for hypertension among those who are seemingly healthy. As a secondary aim, we took a clinical perspective to determine the acculturation factors that contribute to failure to diagnose hypertension, in response to the question, how do persons with undiagnosed hypertension differ from their peers whose hypertension has been diagnosed?

Data Collection

Baseline in-home interviews and examinations were conducted in 1993 to 1994 by bilingual interviewers. The data collected included demographic characteristics, self-reported chronic medical conditions such as hypertension, diabetes, stroke, myocardial infarction, and functional status. Interviewers underwent three days of special training in the use of a standardized protocol for measurement of blood pressure. Satisfactory performance on both standardized videotape test and live performance on volunteer subjects was a requirement for completion of the training. Interviewers were required to review the training videotape monthly and undergo annual retraining.

Blood pressure was measured with appropriate cuff size by standard mercury sphygmomanometer after the subject was comfortably seated. Two sitting blood pressure measurements were taken for each subject with a 60-second

interval between the two according to the standard protocol used in the third NHANES (www.cdc.gov/nchs/nhanes.htm). Average systolic and diastolic blood pressures were calculated for each person.

Study Outcomes

Diagnosed hypertension was defined as an affirmative response when asked, "Has a doctor ever told you that you have high blood pressure?", current use of an antihypertensive medication, or both. Medication data were collected by reviewing all medications taken in the previous two weeks. The name, strength, dose, and frequency of medication use were recorded from the medication container. Antihypertensive medications included diuretics, ACE inhibitors, calcium channel blockers, and beta blockers. Any subject taking any of these drugs was considered to be on antihypertensive treatment. In addition, specific drugs used predominantly for hypertension that did not fall into the above categories were also included (hydralazine, methyldopa, and clonidine). Among persons who did not report being told by their doctor that they had high blood pressure and were not taking antihypertensive medications, undiagnosed hypertension was determined by a participant having an average systolic blood pressure ≥ 140 mm Hg and/or average diastolic blood pressure ≥ 90 mm Hg. For our primary study aim, it is important to note that the outcome is undiagnosed hypertension vs no hypertension. For our secondary aim, the outcome is diagnosed vs undiagnosed hypertension.

Predictor Variables

Eighteen questions were asked during the interview specifically regarding acculturation. Of these variables, we categorized the questions into five main categories: 1) language read and spoken; 2) language used in social situations; 3) language of mass media use; 4) duration of US residence; and 5) age of migra-

tion. Language read and spoken was based on two items: how well do you read Spanish compared to English and how well you speak Spanish compared to English. Language used in social situations included language spoken with: spouse/partner, children, friends, neighbors, people at work, and at family gatherings. Language of mass media use included language of television programs watched, radio stations listened to, and books/magazines read.

We created a summary score from subject responses based on average language use and subsequently categorized each subject into one of three groups for each language variable: English more than Spanish, English as much as Spanish, and Spanish more than English. For example, a subject who reported reading books and magazines only in Spanish but reported watching television or listening to radio mostly in Spanish were categorized as Spanish more than English for the mass media variable. Duration of US residence was determined by subtracting the subject's birthyear from the year in which the subject arrived to the United States. For duration of US residence, the responses were categorized as US-born, ≥ 20 years of US residence, and < 20 years of US residence. Age of migration was the age at which the respondent reported arriving to the United States. For age of migration, the responses were categorized as US-born, moving to the United States at age < 20 , and moving to the United States at age ≥ 20 .

Other Measures

Education was dichotomized into less than elementary school education ($< 6^{\text{th}}$ grade) vs elementary school education or higher. Household income was divided into $< \$10,000$ and $\geq \$10,000$. Healthcare utilization was determined by self-reported number of physician visits in the past year (< 4 visits or ≥ 4 visits). These variables were dichotomized to derive approximately

equal numbers of participants in each category while maintaining interpretability. Health insurance status categories included no insurance, Medicare only, Medicaid only, and other insurance. The other insurance category comprised subjects with other single insurance as well as combinations of insurance. Difficulties with instrumental activities of daily living (IADLs) were dichotomized according to whether the subject reported any difficulties vs none. Other factors known to be associated with hypertension, including current smoking, alcohol use, and history of diabetes, stroke, and myocardial infarction were measured by self-report. Height and weight were measured during the physical examination. Body mass index (BMI) was calculated as weight (kilograms) divided by height (meters²) and grouped according to standard NIH guidelines (< 25 , $25-29$, ≥ 30).¹⁸

Data Analysis

Age- and sex-adjusted prevalence of diagnosed and undiagnosed hypertension was calculated using the direct method applying the Hispanic population (aged ≥ 65 years) distribution from the 2000 US Census. Denominators of results presented in Table 1 varied slightly according to number of missing subjects. No variable was missing more than 5% of responses. Statistical comparisons for categorical variables were assessed by chi square test. The analysis utilized appropriate weighting and adjusted for design effects using SUDAAN.¹⁹ We used multivariable logistic regression to assess the impact of each acculturation measure on risk for undiagnosed hypertension while controlling for possible confounders using PROC LOGISTIC. We performed two series of models using the respective subpopulations described in our study aims: Aim 1, all persons without a previous diagnosis of hypertension; Aim 2, all persons with hypertension, diagnosed or undiagnosed. We assessed the

following potential confounders: education, health insurance, household income, health care utilization, IADLs, smoking, alcohol use, diabetes, stroke, and myocardial infarction. Adjusted odds ratios (OR) were subsequently computed along with 95% confidence intervals. For each of the five predictor variables, our final multivariable model included age, sex, and all confounders significantly associated with undiagnosed hypertension ($P \leq .10$).

RESULTS

The prevalence of undiagnosed hypertension and diagnosed hypertension was 19.3% and 50.3%, respectively (age- and sex-adjusted). The average age of the cohort was 72 years. The cohort was 52% female, 60% had $< 6^{\text{th}}$ grade education, and 59% had household income less $< \$10,000$ annually. In the entire cohort, the median number of visits with a medical doctor was four and 18% had never seen a medical doctor in the previous year. Table 1 shows weighted percentages of baseline characteristics according to hypertension status. Among persons without a previous diagnosis of hypertension, persons with undiagnosed hypertension had less education than those without hypertension ($P = .06$). No significant differences were observed for the other characteristics studied. Compared to those with previously diagnosed hypertension, persons with undiagnosed hypertension were more likely younger, male, smokers, with fewer visits to a physician, fewer difficulties with IADLs, and less likely to have diabetes, stroke, or myocardial infarction.

Among those without previous diagnosis of hypertension, approximately two-thirds reported using Spanish more than English with few differences between those with and without hypertension. More than 40% of those who used Spanish more than English had undiagnosed hypertension compared to

Table 1. Population characteristics based on diagnosis of hypertension among older Mexican Americans, Hispanic EPESE 1993–1994

Population characteristics	No hypertension (n=828)	Undiagnosed hypertension (n =519)	Diagnosed hypertension (n=1250)
Age*			
65–74	72.8%	73.2%	66.3%
75–84	23.6%	21.1%	27.7%
≥85	3.6%	5.7%	5.9%
Sex–Female*	52.1%	48.0%	65.1%
Education–<6 gradet	52.6%	61.8%	56.9%
Household income –<\$10,000	49.6%	53.0%	53.2%
Insurance			
None	12.2%	10.1%	9.0%
Medicaid only	2.8%	2.4%	2.9%
Medicare only	43.7%	37.9%	37.4%
Medicare + other insurance	41.3%	49.6%	50.7%
Utilization–≥4 physician visits*	42.3%	48.1%	68.4%
Difficulties with IADLs*	41.3%	46.3%	61.3%
Current tobacco use*	18.4%	15.0%	8.3%
Alcohol use in the last month	27.2%	16.9%	20.6%
BMI (kg/m ²)			
≥30	24.5%	27.3%	33.7%
≥25 and <30	40.2%	44.5%	42.1%
<25	35.4%	28.3%	24.2%
Diabetes mellitus*	19.8%	23.2%	32.4%
Stroke*	2.3%	1.4%	8.9%
Myocardial infarction*	5.2%	3.7%	16.0%

Note: Percents were weighted to reflect the population distribution. All statistical comparisons were done using unweighted data.

* Chi-square test for between group differences of persons with undiagnosed hypertension compared to persons with diagnosed hypertension ($P<.10$).

† Chi-square test for between group differences of persons with undiagnosed hypertension compared to persons without hypertension ($P=.06$).

23%–33% of those who used English more than Spanish in each of the language groups (Table 2). Similar proportions had undiagnosed hypertension vs no hypertension across categories of duration of US residence and age of migration. Similar trends to those described above were present among subjects with undiagnosed hypertension compared to patients with diagnosed hypertension (Table 3).

Among patients without previous diagnosis of hypertension, persons who used Spanish more than English for mass media had more than a two-fold likelihood (adjusted OR 2.3 [95% CI, 1.4–4.0]) of having undiagnosed hypertension compared to persons who used English more than Spanish after adjustment for age and gender (Table 2). Other language factors were not independently associated with undiagnosed hypertension. After further adjustment for education, the association

with Spanish language mass media and undiagnosed hypertension remained (adjusted OR 2.2 [95% CI, 1.3–3.6]). Duration of US residence and age of migration were not associated with undiagnosed hypertension.

In the secondary analysis, comparing persons with undiagnosed vs diagnosed hypertension, results were similar to those above (Table 3). Persons who used Spanish more than English for mass media had more than a two-fold likelihood (adjusted OR 2.2 [95% CI, 1.3–3.6]) of having undiagnosed hypertension compared to those who used English more than Spanish after adjustment for age and sex. Other language factors were not independently associated with undiagnosed hypertension. After further adjustment for covariates (physician visits, IADLs, smoking, diabetes, stroke, and myocardial infarction), the association with Spanish language mass media and undiagnosed

hypertension remained (adjusted OR 2.0 [95% CI, 1.1–3.4]). Duration of US residence and age of migration were not associated with undiagnosed hypertension.

DISCUSSION

These findings demonstrate that Spanish language use is associated with greater likelihood of undiagnosed hypertension among older Mexican Americans, compared to those without hypertension and also to those with previous diagnosis of hypertension. Socioeconomic factors and medical comorbidities did not completely explain the impact of language on undiagnosed hypertension. Among the five predictor variables we studied, language of mass media was the single factor that was independently associated with undiagnosed hypertension after multivariable analysis.

Table 2. Prevalence and odds ratios for undiagnosed hypertension among those never diagnosed with hypertension by language use (N=1347), Hispanic EPESE 1993–1994

	No hypertension n=828	Prevalence of undiagnosed hypertension (%)* n=519	Model 1† OR (95% CI)	Model 2‡ OR (95% CI)
Language read/spoken				
English>Spanish	205	80 (33)	1.0	1.0
Spanish=English	145	87 (37)	1.2 (0.7–2.2)	1.1 (0.6–2.1)
Spanish>English	468	346 (41)	1.4 (0.9–2.3)	1.2 (0.7–2.0)
Language social situations				
English>Spanish	118	49 (31)	1.0	1.0
Spanish=English	174	99 (39)	1.5 (0.8–2.8)	1.4 (0.7–2.7)
Spanish>English	536	371 (41)	1.6 (0.9–2.7)	1.3 (0.7–2.3)
Language mass media				
English>Spanish	179	60 (23)	1.0	1.0
Spanish=English	199	119 (42)	2.3 (1.4–4.2)	2.3 (1.3–4.1)
Spanish>English	447	335 (42)	2.3 (1.4–4.0)	2.2 (1.3–3.6)
Duration of US residence				
US-born	463	301 (38)	1.0	1.0
≥20 years	279	172 (40)	1.1 (0.8–1.6)	1.0 (0.7–1.4)
<20 years	62	38 (42)	1.2 (0.6–2.2)	1.0 (0.5–1.8)
Age of migration to US				
US-born	463	301 (38)	1.0	1.0
<20 years of age	83	63 (42)	1.2 (0.7–2.0)	1.1 (0.6–1.8)
≥20 years of age	258	147 (40)	1.1 (0.7–1.7)	1.0 (0.6–1.4)

Note: adjusted odds ratios derived from multivariable logistic regression models accounting for sample weights and complex sampling design, using SUDAAN.

* Weighted percentages for undiagnosed hypertension among those never diagnosed with hypertension (no hypertension and undiagnosed hypertension).

† Adjusted for age and sex.

‡ Adjusted for age, sex, and education.

Our primary and secondary aims in this study address two related though separate questions. Our first set of analyses demonstrates that among seemingly healthy subjects without a diagnosis of hypertension, those who report using Spanish mass media are more likely to have hypertension. Our second set of analyses demonstrates that among all subjects with hypertension, those who report using Spanish mass media are more likely to be undiagnosed. The consistency of the results of the two analyses provides evidence of the relevance of the language in mass media item in the diagnosis of hypertension.

A recent review of the literature on acculturation and Latino health in the United States concluded that high levels of acculturation are associated with worse healthcare outcomes in substance abuse, dietary practices, and birth outcomes.²⁰ This review did not identify a clear relationship between acculturation and chronic diseases including

hypertension due to a lack of studies in this area. However, the relationship between acculturation and diagnosis of hypertension is complicated by opposing factors, including unhealthy dietary behavior,^{21,22} improved access to care, and use of preventive health services among acculturated Hispanics.^{23,24} Furthermore, measures of acculturation vary greatly across studies. We chose to assess prevalent hypertension among those who might be at risk, the previously undiagnosed population.

The results of this investigation demonstrate that Spanish language use is associated with undiagnosed hypertension in Hispanic elders. Similar results were found for those who use Spanish equally to English compared to Spanish more than English. Spanish language use may indicate a particular vulnerability that lends itself to missed diagnosis of hypertension, regardless of English language ability. For example, those who report Spanish use equal to

English use may be equally illiterate in both, which may subsequently lead to disparities in health. Also, participants who spend much of their time obtaining health information in Spanish may not receive the same degree of health education compared to those who utilize solely English.

Although the three language measures in our study were correlated, only language in mass media was independently associated with undiagnosed

The results of this investigation demonstrate that Spanish language use is associated with undiagnosed hypertension in Hispanic elders.

Table 3. Prevalence and odds ratios for undiagnosed hypertension among those with hypertension by language use (N=1769), Hispanic EPESE 1993–1994

	Diagnosed hypertension <i>n</i> =1250	Undiagnosed Hypertension (%) [*] <i>n</i> =519	Model 1† OR (95% CI)	Model 2‡ OR (95% CI)
Language read/spoken				
English>Spanish	307	80 (24)	1.0	1.0
Spanish=English	191	87 (32)	1.5 (0.8–2.5)	1.4 (0.8–2.4)
Spanish>English	742	346 (29)	1.4 (0.9–2.1)	1.3 (0.8–2.1)
Language social situations				
English>Spanish	168	49 (24)	1.0	1.0
Spanish=English	265	99 (28)	1.2 (0.7–2.0)	1.0 (0.6–1.8)
Spanish>English	817	371 (29)	1.4 (0.9–2.2)	1.3 (0.8–2.1)
Language mass media				
English>Spanish	249	60 (18)	1.0	1.0
Spanish=English	300	119 (31)	2.1 (1.2–3.5)	1.9 (1.1–3.3)
Spanish>English	694	335 (30)	2.1 (1.3–3.4)	2.0 (1.1–3.4)
Duration of US residence				
U.S.-born	701	301 (29)	1.0	1.0
≥20 years	447	172 (26)	0.9 (0.6–1.3)	0.8 (0.6–1.2)
<20 years	73	38 (38)	1.5 (0.8–2.7)	1.1 (0.6–2.1)
Age of migration to US				
US-born	701	301 (29)	1.0	1.0
<20 years of age	153	63 (27)	1.1 (0.7–1.7)	1.1 (0.7–2.0)
≥20 years of age	367	147 (28)	1.0 (0.6–1.4)	0.8 (0.5–1.2)

Note: adjusted odds ratios derived from multivariable logistic regression models accounting for sample weights and complex sampling design, using SUDAAN.

^{*} Weighted percentages for undiagnosed hypertension among those never diagnosed with hypertension (no hypertension and undiagnosed hypertension).

† Adjusted for age and sex.

‡ Adjusted for age, sex, physician visits, IADLs, tobacco use, diabetes, stroke, and myocardial infarction.

hypertension after adjusting for possible confounders/mediators. This may indicate that language of mass media is a useful measure of acculturation. Further studies should compare language of mass media with other summary measures traditionally used in epidemiologic studies such as preferred language use or language spoken at home. Future studies focusing on the effect language measures have on health-seeking behaviors and patient relationships within the healthcare system may also elucidate the mechanism by which language of mass media affects health outcomes.

It is unclear whether language of mass media is a proxy for other unhealthy behaviors. For example, Mexican Americans who spend their time reading, listening to the radio, or watching the television in Spanish may be more prone to a sedentary lifestyle compared to those who use English.

This study did not assess the amount of time spent daily on mass media. There was no difference in prevalence of undiagnosed hypertension between those who had not seen a physician in the previous year and those who had (data not shown). However, this measure did not assess the acuity of care during physician visits. This implies that there may be problems with communication that might then lead to failed diagnosis. For example, a Spanish-speaking patient being told in English they have hypertension might not understand the meaning or clinical significance of high blood pressure. Unfortunately, we do not have data on patient-physician language concordance or interpreter use, but we can assume that Spanish-speaking patients might be more likely to experience communication problems than English-speaking patients. In addition to language barriers, limited English proficiency may

also be a proxy for a cultural barrier that also could lead to misunderstandings in hypertension management.

With regard to mass media information in particular, Mexican Americans receiving their news in Spanish may have limited access to medical news. News presented in Spanish may be less likely to educate its patrons regarding their health in general and specifically with the case of hypertension. In a study by Ruiz et al,²⁵ language acculturation among 598 elderly Hispanic women predicted improved knowledge of symptoms and cancer screening. These findings suggested that cancer prevention programs should use Spanish language media to reach a wider Hispanic audience, especially those who are more proficient in Spanish than English. Although mass media programs to reduce cardiovascular risk have been implemented in English within the United States,²⁶ such programs may

not be as widely used currently in Spanish mass media. This would suggest one possible mechanism by which mass media information might more directly influence awareness of hypertension among older Mexican Americans. No studies have evaluated the use of mass media education for hypertension specifically in the Hispanic population. Although some evidence suggests health education through pamphlets may improve consumer knowledge of hypertension,²⁷ this approach may not be ideal for an older Mexican American population with a predominantly lower level of education.

Although the majority of our patient population was born in the United States (57%), elderly Mexican Americans may not be well-aculturated given that approximately two-thirds of the population use Spanish more than English in the three language variables of this study. Based on these data, immigrant status, duration of US residence, and age of migration may not contribute to the underdiagnosis of hypertension in this elderly population compared to language measures.

There are several limitations to this study. Hispanic EPESE was designed to assess overall health and functional status in an elderly Mexican American population and cannot be generalized to the entire Hispanic population. Notably, the sampling frame for the Hispanic EPESE population included 85% of the Mexican American elders in the United States.¹⁷ Although we do assess for BMI and IADLs, this study did not assess the effect of diet and exercise on the relationship between language use and hypertension diagnosis. This could account for the low sensitivity in detecting an association between hypertension diagnosis and other language measures we studied. The diagnosis of hypertension was based on self-report, and there was likely some misclassification of diagnosed hypertension. We partially corrected for this, however, by including antihypertensive medication

use in our definition of diagnosed hypertension. Some antihypertensive medications may not have been prescribed for hypertension; this could also have contributed to misclassification bias. We were not able to look at language of primary care provider or use of interpreters to assess patient-physician language concordance as these data were unavailable in Hispanic EPESE. We were also unable to assess for other patient-physician interactions such as urgency of visit or duration of visit. A strength of this study was the relative homogeneity of insurance status since nearly all participants had some health insurance coverage through Medicare. This likely means that undocumented immigrants were not included in this study. The database was compiled in 1993–1994 and may not reflect current trends in hypertension prevalence. Data from this time period, however, are still valuable given that recent data from 1999–2002 National Health and Nutritional Examination Surveys shows that only 35% of Mexican Americans are under treatment and 17% are under control.²⁸

Our study has shown that language, specifically language used in mass media, is associated with undiagnosed hypertension compared to those without hypertension and also to those with previously diagnosed hypertension. Language barriers may be an important cause of lack of awareness and underdiagnosis of hypertension among Mexican Americans. This would imply that educating Mexican Americans through Spanish television, radio, and/or publications may possibly improve awareness and understanding of hypertension and could subsequently lead to improved diagnosis and management of hypertension. As mass media can reach nearly all immigrant populations in their respective languages regardless of education level, a preventive focus through mass media education may be applied to other ethnicities in the United States. In conclusion, this study

implicates language as one potential barrier for elder Mexican Americans to be diagnosed with hypertension. Future studies are needed to confirm our finding. This research supports interventions focused on language preferences to improve hypertension awareness and control in vulnerable immigrant populations.

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