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Understanding Ethnic and Nativity-Related Differences in Low Cardiovascular Risk Status among Mexican-Americans and Non-Hispanic Whites

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Abstract

Objective—Recent guidelines highlight the importance of improving cardiovascular health in the general population in addition to disease prevention among high risk individuals. We investigated factors associated with ethnic and nativity-related differences in the prevalence of low cardiovascular risk (optimal levels of all major cardiovascular risk factors).

Methods—We used logistic regression to estimate differences in likelihood of being low risk (not currently smoking; no diabetes; untreated total cholesterol < 200 mg/dL; untreated blood pressure <120/<80; and body mass index < 25 kg/m²) among 8,693 foreign- and U.S.-born Mexican-American and non-Hispanic White 2003–2008 U.S. National Health and Nutrition Examination Survey participants before and after adjustment for socioeconomic, lifestyle, and acculturation-related factors.

Results—Foreign-born Mexican-Americans were more likely to be low risk than non-Hispanic Whites after adjustment for all covariates (Odds Ratio [OR]: 1.53; 95% Confidence Interval [CI]: 1.00, 2.34). In contrast, U.S.-born Mexican-Americans were less likely to be low risk compared to Whites (OR: 0.60; 95% CI: 0.43, 0.84). Differences between foreign-born and U.S.-born Mexican-Americans were largely attenuated after adjustment for acculturation indicators.

Conclusions—Our findings support the healthy migrant hypothesis and suggest acculturation-related factors may be important drivers of ethnic and nativity-related differences in low cardiovascular risk.

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest.

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Keywords

health disparities; cardiovascular; acculturation; Hispanics/Latinos

INTRODUCTION

Elevated levels of modifiable risk factors are responsible for a substantial number of cardiovascular disease (CVD) deaths in the U.S. (Danaei et al., 2009, Mokdad et al., 2004). Smoking, hypertension, diabetes mellitus, hypercholesterolemia, and obesity are all strong independent CVD risk factors (Lloyd-Jones et al., 2010, Lowe et al., 1998, Stamler et al., 1993). While research has traditionally focused on disease prevention in high risk populations, recent health guidelines have highlighted the importance on cardiovascular health promotion and primordial prevention of CVD in the general population (Lloyd-Jones et al., 2010, U.S. Department of Health and Human Services). Maintenance of favorable levels of all major cardiovascular risk factors, i.e., low risk status, in young adulthood and middle age is associated with better health-related quality of life (Daviglius et al., 2003, Liu et al., 2012). Furthermore, individuals with favorable levels of all major CVD risk factors incur lower Medicare costs, and have lower risk of CVD and all-cause mortality (Daviglius et al., 1998, Daviglius et al., 2004, Giampaoli et al., 2006, Palmieri et al., 2006).

National estimates indicate that low CV risk prevalence is less common among Mexican-Americans than non-Hispanic Whites (Ford et al., 2009); reasons for these differences have not been reported. Several studies have found that Hispanics/Latinos have similar or better health outcomes compared to non-Hispanic Whites despite having fewer socioeconomic resources (Crimmins et al., 2007, Peek et al., 2010). These differences may be due to the healthy migrant hypothesis, i.e., the selective immigration of healthier individuals into the U.S. (Abraido-Lanza et al., 1999, Jasso et al., 2004). This hypothesis posits that the continuous influx of healthier Hispanic/Latino immigrants into the U.S. makes the average health of Hispanics/Latinos appear better or comparable to that of their non-Hispanic White counterparts. Consistent with this, previous research suggests foreign-born Mexican-Americans may have more favorable health profiles than U.S.-born Mexican-Americans (Crimmins et al., 2007, Eschbach et al., 2007, Palloni and Arias, 2004). However, some research suggests the health advantages seen among foreign-born Mexican-Americans do not persist over time and/or across generations due to factors associated with acculturation (Antecol and Bedard, 2006, Jasso et al., 2004). The process of acculturation may impact health behaviors and social networks, leading to divergent health outcomes for Mexican-Americans over time and across generations (Dixon et al., 2000, Hummer et al., 2007, Benfante, 1992, Markides et al., 1987, Markides et al., 1988, Markides et al., 1993).

The goals of this study were to characterize ethnic and nativity-related differences in low CV risk prevalence and to explore socioeconomic position (SEP), lifestyle factors, and acculturation as correlates of these differences. Understanding factors associated with variation in low CV risk may help enhance efforts to improve CV health promotion in Hispanics/Latinos.

METHODS

Study population

We used data on self-identified foreign-born Mexican-American, U.S.-born Mexican-American, and non-Hispanic White participants of the 2003–2008 National Health and Nutrition Examination Survey (NHANES) aged 20 years and older. NHANES is a nationally-representative survey designed to assess health and nutrition in U.S. children and

adults (Centers for Disease Control and Prevention). Participants were selected to represent the non-institutionalized, civilian U.S. population using a multistage stratified probability sample design.

Among the 10,456 non-Hispanic White and Mexican-American participants aged 20 years and older who participated in the NHANES examinations, 9.5% were excluded for missing data on one or more measures needed to determine low risk status, 4.2% were excluded for being pregnant at the time of the examination, and 4.1% were excluded for missing data on one or more additional study covariates. Thus, these analyses are based on the 8,693 men and non-pregnant women with complete data on all study covariates. National Center for Health Statistics Research Ethics Review Board approval was obtained for NHANES and informed consent was obtained from all participants.

Cardiovascular risk factor stratification

As previously described (Daviglius et al., 2004), participants were considered low risk if they met all of the following criteria: not currently smoking; no diabetes; total cholesterol < 200 mg/dL and not using cholesterol-lowering medication; systolic blood pressure < 120 mm Hg, diastolic blood pressure < 80 mm Hg, and not using antihypertensive medication; and body mass index (BMI) < 25.0 kg/m².

Participants were classified as not currently smoking if they reported not having smoked 100 cigarettes in their lifetime or as having smoked 100 or more cigarettes but not smoking at the time of the interview. Participants were considered diabetic if they reported receiving a diagnosis of diabetes by a physician, or if they had measured HbA1c levels ≥ 6.5% (American Diabetes Association, 2010). Measured HbA1c was used instead of fasting plasma glucose to maintain a larger sample size. Sensitivity analyses were conducted to determine whether using measured fasting glucose instead of HbA1c influenced low CV risk classification among study participants.

BMI (kg/m²) was calculated using measured height (in m) and weight (in kg). Total cholesterol was measured enzymatically in serum samples. Resting seated blood pressure was measured up to four times in a single visit by certified staff using a mercury sphygmomanometer. The average of the last two measurements was used for participants who had three to four measurements taken; the second measurement was taken for those who had only two measurements; and the only measurement was used for participants who had just one measurement (Mensah et al., 2005). Further details on all measurements can be found elsewhere (Carroll et al., 2005, Cutler et al., 2008, Centers for Disease Control and Prevention). Cholesterol-lowering and antihypertensive medication use were based on self-report.

Covariates

Age in years was modeled continuously. Education was categorized as less than high school graduate, high school graduate, and more than a high school education. Self-reported health insurance status was dichotomized as currently having health insurance versus not currently having insurance. Dietary quality was assessed based on one 24-hour dietary recall and one food frequency questionnaire. The 2005 U.S. Department of Agriculture Healthy Eating Index (HEI) was used to evaluate dietary quality (Guenther et al., 2007). The HEI score is based on consumption levels of total fruit; whole fruit; total vegetables; dark green vegetables, orange vegetables, and legumes; total grains; whole grains; milk; meat and beans; oils; saturated fat; sodium; and calories from solid fats, alcoholic beverages, and added sugars. HEI scores range from 0 to 100. An HEI over 80 signifies a “good” diet, a score between 51 and 80 represents a diet that “needs improvement”, and a score below 51

indicates a “poor” diet. Since only a small percentage of participants (<1%) had a good diet based on these cutpoints, diet was dichotomized as good or needs improvement versus poor for these analyses.

Leisure-time physical activity was assessed using self-reported duration and intensity. The 2008 Physical Activity Guidelines for Americans recommend adults perform 150 minutes/week of moderate intensity aerobic activity or 75 minutes/week of vigorous intensity aerobic activity (U.S. Department of Health and Human Services). For these analyses, participants were categorized as physically active and meeting these guidelines; as engaged in leisure-time physical activity but not meeting the recommended guidelines; and as not engaged in any leisure-time physical activity.

Language of exam, language spoken at home, and length of residence in the U.S. were included as indicators of acculturation. The 2003–2008 NHANES examinations were offered to study participants in both Spanish and English. Study participants were also asked what language was usually used at home. Language spoken at home was dichotomized as Spanish (if they reported speaking only Spanish or speaking more Spanish than English) or English (if they reported an equal mix of Spanish and English, more English than Spanish, or only English). Among foreign-born Mexican-American participants, length of time lived in the U.S. was dichotomized as less than 10 years or 10 years or more (Antecol and Bedard, 2006, Peek et al., 2010).

Statistical analyses

Age-adjusted estimates of low risk prevalence were computed based on the 2000 U.S. Census, and stratified by ethnicity, nativity (for Mexican-Americans), and sex. Descriptive statistics were generated on the distribution of study covariates by ethnicity and nativity. Serial logistic regression models were used to examine factors accounting for ethnic differences in low risk. A separate series of logistic regression models were generated among participants of Mexican origin in order to examine the influence of acculturation indicators on the relationship between nativity and low risk. SAS 6.2 survey procedures (SAS Institute, Cary, NC) were used for all analyses to account for the survey weights and the complex sampling design of NHANES.

RESULTS

Ethnic and nativity-related differences in low cardiovascular risk

Among men, low CV risk prevalence was less common for U.S.-born Mexican-Americans (2.9%) compared to foreign-born Mexican-Americans and non-Hispanic Whites (4.9% and 4.8%, respectively) (Figure 1). Low CV risk among women was less prevalent among foreign-born and U.S.-born Mexican-Americans (9.4% and 7.7%) compared to non-Hispanic Whites (12.1%). Sensitivity analyses showed all of the study participants who were classified as low risk and had available fasting plasma glucose data had levels below 126 mg/dL, the diagnostic cutpoint for diabetes (not shown). There were no significant differences in multivariable associations of ethnicity and nativity with low risk status by sex, therefore data on men and women were pooled for the remainder of the analyses.

A larger percentage of non-Hispanic Whites had BMI <25 kg/m² compared with foreign-born and U.S.-born Mexican-Americans (Table 1). Non-Hispanic Whites were least likely to have favorable cholesterol levels, while foreign-born Mexican-Americans were most likely to be non-smokers and to have favorable blood pressure. A higher proportion of foreign- and U.S.-born Mexican-Americans had low educational attainment and lacked health insurance compared to non-Hispanic Whites. Compared to non-Hispanic Whites and U.S.-born Mexican-Americans, a larger percentage of foreign-born Mexican-Americans reported no

leisure-time physical activity but a smaller percentage had a poor Healthy Eating Index score. Among Mexican-Americans, the acculturation indicators varied markedly by nativity status. Foreign-born Mexican-Americans were more likely to have taken the NHANES examination in Spanish and to report speaking primarily Spanish at home compared to U.S.-born Mexican-Americans. Less than half of all foreign-born Mexican-Americans reported living in the U.S. for < 10 years.

There was no difference in low risk among foreign-born Mexican-Americans versus non-Hispanic Whites in age- and sex-adjusted models (OR: 0.90; 95% Confidence Interval (CI): 0.62, 1.33) (Table 2). Odds of being low risk was 1.40 (95% CI: 0.92, 2.12) times higher for foreign-born Mexican Americans compared to non-Hispanic Whites after adjustment for education. This relationship became stronger and reached statistical significance after further adjustment for insurance status (OR: 1.57; 95% CI: 1.04, 2.38), and it remained essentially unchanged after subsequent adjustment for diet and physical activity.

Odds ratios for being low risk were significantly lower in age- and sex-adjusted models for U.S.-born Mexican Americans (Model 1 OR: 0.49; 95% CI: 0.34, 0.71) compared to non-Hispanic Whites. While adjustment for education slightly attenuated this difference, findings remained significant (Model 2 OR: 0.59; 95% CI: 0.41, 0.84). This difference persisted with further adjustment for other covariates.

Low cardiovascular risk among Mexican-Americans

Foreign-born Mexican-Americans were 2.72 (95% CI: 1.74, 4.24) times more likely to be low risk than U.S.-born Mexican-Americans after adjustment for age, sex, SEP, and lifestyle factors (Table 3). Language of questionnaire was not significantly associated with low risk. However, Mexican-Americans who mostly spoke Spanish at home were 2.25 (Model 3; 95% CI: 1.20, 4.23) times more likely to be low risk than those who spoke mostly English or an equal mix of English and Spanish. Adjustment for language spoken at home attenuated the association between nativity and low risk (OR: 1.61; 95% CI: 0.87, 2.97).

Nativity-related differences in likelihood of being low risk were smaller between U.S.-born Mexican-Americans and foreign-born Mexican-Americans who reported having lived in the U.S. for a longer period of time. Foreign-born Mexican Americans living in the U.S. for less than 10 years were 4.30 (95% CI: 2.61, 7.10) times more likely to be low risk than U.S.-born Mexican Americans, while foreign-born Mexican Americans living in the U.S. for 10 years or more were only 1.61 (95% CI: 0.99, 2.61) times more likely to be low risk.

DISCUSSION

We examined factors associated with ethnicity- and nativity-related variation in low CV risk prevalence among Mexican-American and non-Hispanic White NHANES participants. Our findings provide support for the healthy migrant hypothesis. In age- and sex-adjusted models there was no difference in likelihood of being low risk between foreign-born Mexican-Americans and non-Hispanic Whites. However, after controlling for education and insurance status, foreign-born Mexican-Americans were significantly more likely to be low risk than Whites. This suggests that foreign-born Mexican-Americans who migrate to the U.S. may be healthier than Whites due to selection factors, and that education and insurance status were suppressing, or dampening, these differences (resulting in no significant difference in minimally adjusted models). In contrast, low risk disparities between U.S.-born Mexican-Americans and Whites persisted after adjustment for SEP, suggesting differences between U.S.-born Mexican-Americans and Whites may be driven by other unmeasured psychosocial factors associated with ethnicity (e.g. experiences of discrimination or acculturative stress).

Among Mexican-Americans, we found a significant difference in likelihood of being low CV risk by nativity after adjusting for socioeconomic and lifestyle factors, but associations were largely attenuated with adjustment for acculturation indicators. Those who spoke mostly Spanish in the home were more likely to be low risk, and this “explained” a substantial portion of the relationship between nativity and low risk. This may be due to unmeasured factors that are conferring a health advantage to those who continue to speak Spanish at home. For example, Mexican-Americans living in immigrant or ethnic enclaves may be less exposed to U.S. language and culture, and that environment may be health-protective by shielding residents from the stress of direct exposure to discrimination and improving access to social support and community resources (Borrell et al., 2010, Bull et al., 2006, Gorman and Sivaganesan, 2007, Lewis et al., 2011, Inagami et al., 2006). This is supported by our descriptive finding (Table 1) that U.S.-born Mexican-Americans have less favorable blood pressure, a health condition associated with stress and low social support (Pickering, 1999, Pickering, 2007, Schnall et al., 1994, Gorman and Sivaganesan, 2007, Wirtz et al., 2006, Strogatz and James, 1986), compared to foreign-born Mexican-Americans.

Moreover, nativity-related differences in low CV risk were larger for Mexican-Americans who have spent less than 10 years in the U.S. than for those who have lived there for 10 years or more. This is consistent with previous studies that have indicated that immigrants enter the U.S. in relatively good health and over time lose this advantage and converge with health status levels of U.S.-born residents (Antecol and Bedard, 2006, Peek et al., 2010). This may be due to increased exposure to different cultural and environmental factors that lead to poorer dietary practices, physical inactivity, and weight gain over time. In addition, the longitudinal process of acculturation may increase exposure to certain stressors such as inter-personal or institutional discrimination that could have deleterious effects on health.

There are limitations to this study. Factors that might help explain ethnic and nativity-related differences in low CV risk such as discrimination and neighborhood characteristics were not available. In addition, the cross-sectional design does not allow for changes in dietary practices and physical activity levels occurring over time due to the process of acculturation. Furthermore, the available diet and physical activity measures may not have adequately captured the aspects of these health behaviors that could be driving ethnic and nativity-related differences in low CV risk (e.g. how foods were prepared or occupational physical activity levels). This study was also limited in the acculturation measures available. English-language usage and length of residence in the U.S. are commonly used proxies for overall acculturation (Markides et al., 1987, Markides et al., 1988, Markides et al., 1993, Pabon-Nau et al., 2010, Peek et al., 2010), but they may not reflect the aspects of cultural assimilation that influence health (Lopez-Class et al., 2011). Finally, while the NHANES are designed to be representative of Mexican-Americans residing in the U.S., it is uncertain whether this is true for foreign-born versus U.S.-born participants.

CONCLUSIONS

Our findings highlight ethnic and nativity-related variation in low risk and point to some reasons for these differences. Specifically, they support the healthy migrant hypothesis and aspects of the acculturation process as important drivers of divergent cardiovascular health profiles by nativity and ethnicity. Enhanced understanding of the factors associated with low CV risk may help inform efforts to reduce ethnic disparities and support national goals of optimal cardiovascular health (Lloyd-Jones et al., 2010, U.S. Department of Health and Human Services).

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Highlights

- We assess variation in low cardiovascular risk prevalence by nativity and ethnicity
- Foreign-born Mexican-Americans were more likely to be low risk than Whites
- U.S.-born Mexican-Americans were less likely to be low risk than Whites
- Acculturation indicators attenuated nativity-related differences in low risk

Figure 1.

Age-adjusted prevalence of low risk by ethnicity and nativity (for Mexican-Americans) among men and women: U.S. National Health and Nutrition Examination Surveys, 2003–2008

Note. Low risk defined as no history of cardiovascular disease and all of the following: not currently smoking; no diabetes; total cholesterol < 200 mg/dL and not using cholesterol-lowering medication; systolic blood pressure <120 mm Hg, diastolic blood pressure <80 mm Hg, and not using antihypertensive medication; and body mass index <25.0 kg/m². The 2000 U.S. population was used for age adjustment.

Table 1

Components of low cardiovascular risk, sociodemographic characteristics, health behaviors, and acculturation measures by ethnicity: U.S. National Health and Nutrition Examination Surveys, 2003–2008

Variables	Foreign-born Mexican-Americans (n=1,349)		U.S.-born Mexican-Americans (n=949)		Non-Hispanic Whites (n=6,395)	
	Mean or %	(SE)	Mean or %	(SE)	Mean or %	(SE)
Components of low risk						
Body mass index < 25.0 kg/m ² , %	25.3	(1.8)	21.8	(1.9)	33.3	(0.9)
No diabetes, %	89.9	(1.5)	88.1	(1.1)	91.8	(0.5)
Favorable cholesterol ^a , %	48.9	(2.6)	51.3	(2.3)	42.0	(1.0)
Favorable blood pressure ^b , %	55.8	(2.4)	45.7	(2.8)	38.8	(1.0)
Not currently smoking, %	78.7	(1.4)	77.1	(2.1)	75.1	(1.0)
Sociodemographic characteristics and health behaviors						
Age, years	39.4	(0.9)	40.8	(0.8)	48.9	(0.4)
Male, %	57.6	(1.8)	51.1	(1.8)	48.9	(0.7)
Less than high school education, %	67.0	(2.6)	30.2	(2.8)	12.3	(1.2)
Uninsured, %	64.4	(2.7)	30.5	(3.1)	13.2	(0.8)
Healthy Eating Index score < 51, %	49.4	(1.9)	59.4	(2.4)	53.6	(1.4)
No leisure-time physical activity, %	57.7	(2.5)	38.6	(3.1)	35.1	(1.9)
Acculturation indicators						
Questionnaire administered in Spanish, %	73.7	(2.4)	4.2	(1.0)	-	-
Spanish usually spoken at home, %	84.5 ^c	(1.4)	10.2 ^d	(1.7)	-	-
Lived in the U.S. < 10 years, %	39.5 ^e	(2.6)	-		-	-

Note. A “-” means the covariate was not assessed for that ethnic group.

^aFavorable cholesterol is defined as having total cholesterol < 200 mg/dL and not using cholesterol-lowering medication

^bFavorable blood pressure is defined as having systolic blood pressure <120 mm Hg, diastolic blood pressure <80 mm Hg, and not using antihypertensive medication

^cThe sample size is 1,347 for this covariate

^dThe sample size is 948 for this covariate

^eThe sample size is 1,317 for this covariate

Table 2

Odds ratios (95% confidence intervals) of low cardiovascular risk^a associated with nativity and ethnicity: U.S. National Health and Nutrition Examination Surveys, 2003–2008.

	Model 1		Model 2		Model 3		Model 4	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Nativity and ethnicity								
Foreign-born Mexican-American	0.90	0.62–1.33	1.40	0.92–2.12	1.57	1.04–2.38	1.53	1.00–2.34
U.S.-born Mexican-American	0.49	0.34–0.71	0.59	0.41–0.84	0.60	0.43–0.86	0.60	0.43–0.84
Non-Hispanic White	1.00		1.00		1.00		1.00	
Education completed								
Less than high school			0.42	0.30–0.59	0.45	0.32–0.64	0.56	0.40–0.79
High school			0.52	0.38–0.71	0.53	0.39–0.72	0.62	0.44–0.85
More than high school			1.00		1.00		1.00	
Health insurance status								
No health insurance					0.74	0.54–1.03	0.77	0.56–1.07
Any kind of health insurance					1.00		1.00	
Diet								
Healthy Eating Index score < 51							0.58	0.46–0.73
Healthy Eating Index score ≥ 51							1.00	
Leisure-time physical activity								
No leisure-time physical activity							0.56	0.41–0.78
Activity levels below guidelines							0.86	0.65–1.15
Meets recommended guidelines							1.00	

Note. All models are adjusted for age and sex

^aLow cardiovascular risk defined as not having a history of cardiovascular disease and all of the following: not currently smoking; no diabetes; total cholesterol < 200 mg/dL and not using cholesterol-lowering medication; systolic blood pressure < 120 mm Hg, diastolic blood pressure < 80 mm Hg, and not using antihypertensive medication; and body mass index < 25.0 kg/m²

Table 3

Odds ratios (95% confidence intervals) of low cardiovascular risk^a associated with measures of acculturation among Mexican-Americans: U.S. National Health and Nutrition Examination Surveys, 2003–2008.

	Model 1 (n=2,298)		Model 2 (n=2,298)		Model 3 (n=2,295)		Model 4 (n=2,266)	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Nativity								
Foreign-born	2.72	1.74–4.24	2.13	1.14–3.99	1.61	0.87–2.97		
U.S.-born	1.00		1.00		1.00		1.00	
Language of questionnaire								
Spanish			1.61	0.72–3.61				
English			1.00					
Language usually spoken at home								
Spanish					2.25	1.20–4.23		
English					1.00			
Length of time living in U.S. ^b								
< 10 years							4.30	2.61–7.10
10 years							1.61	0.99–2.61

Note. All models are adjusted for age, sex, education, insurance status, Healthy Eating Index, and leisure-time physical activity.

^aLow cardiovascular risk defined as not having a history of cardiovascular disease and all of the following: not currently smoking; no diabetes; total cholesterol < 200 mg/dL and not using cholesterol-lowering medication; systolic blood pressure < 120 mm Hg, diastolic blood pressure < 80 mm Hg, and not using antihypertensive medication; and body mass index < 25.0 kg/m²

^bComparison category is U.S.-born Mexican-Americans