



Published in final edited form as:

Soc Sci Med. 2005 September ; 61(6): 1243–1255. doi:10.1016/j.socscimed.2005.01.016.

Do healthy behaviors decline with greater acculturation?: Implications for the Latino mortality paradox

Ana F. Abraído-Lanza*, Maria T. Chao, and Karen R. Flórez

Department of Sociomedical Sciences, Mailman School of Public Health, Columbia University,
722 West 168 Street, 5th floor, New York, NY 10032, USA

Abstract

Relative to non-Latino whites, Latinos in the United States have a lower socioeconomic status (SES) profile, but a lower all-cause mortality rate. Because lower SES is associated with poorer overall health, a great deal of controversy surrounds the Latino mortality paradox. We employed a secondary data analysis of the 1991 National Health Interview Survey to test the health behavior and acculturation hypotheses, which have been proposed to explain this paradox. These hypotheses posit that: (1) Latinos have more favorable health behaviors and risk factor profiles than non-Latino whites, and (2) Health behaviors and risk factors become more unfavorable with greater acculturation. Specific health behaviors and risk factors studied were: smoking, alcohol use, leisure-time exercise activity, and body mass index (BMI). Consistent with the health behaviors hypothesis, Latinos relative to non-Latino whites were less likely to smoke and drink alcohol, controlling for sociodemographic factors. Latinos, however, were less likely to engage in any exercise activity, and were more likely to have a high BMI compared with non-Latino whites, after controlling for age and SES. Results provided partial support for the acculturation hypothesis. After adjusting for age and SES, higher acculturation was associated with three unhealthy behaviors (a greater likelihood of high alcohol intake, current smoking, a high BMI), but improvement in a fourth (greater likelihood of recent exercise). Gender-specific analyses indicated that the observed differences between Latinos and non-Latino whites, as well as the effects of acculturation on health behaviors, varied across men and women. Results suggest that the health behaviors and acculturation hypotheses may help to at least partially explain the Latino mortality paradox. The mechanisms accounting for the relationship between acculturation and risky behaviors have yet to be identified.

Keywords

Latino mortality paradox; Smoking; Alcohol use; Exercise; Body mass index; USA

Introduction

An inverse relationship between socioeconomic status (SES) and poor health is well-documented, both in terms of morbidity and mortality (Adler et al., 1994). High rates of morbidity and mortality among Latinos in the United States, who are disproportionately represented among the poor (Falcón, Aguirre-Molina, & Molina, 2001), would be expected on these grounds alone. It is surprising, therefore, Latinos have a lower all-cause mortality rate and higher life expectancy than do non-Latino whites (Hummer, Rogers, Amir, Forbes, & Frisbie, 2000; Lin, Rogot, Johnson, Sorlie, & Arias, 2003; Singh & Siahpush, 2002;

Sorlie, Backlund, Johnson, & Rogot, 1993). Because Latinos have higher rates of poverty, less education, and are less likely to have health insurance than non-Latino whites (Falcón et al., 2001), the lower Latino mortality rate presents an epidemiologic paradox (Markides & Coreil, 1986).

A great deal of controversy surrounds the Latino mortality paradox (Franzini, Ribble, & Keddi, 2001; Patel, Eschbach, Ray, & Markides, 2004; Hunt et al., 2003), and a number of explanations for it have been proposed. The healthy migrant hypothesis suggests that the paradox results from selection into the United States of healthy Latino migrants. Another migratory hypothesis, the salmon bias, proposes that many Latinos return to and eventually die in their country of birth, resulting in an artificially low US Latino mortality rate (Pablos-Méndez, 1994). A recent study that did not support either the salmon or healthy migrant hypotheses concluded that other factors, such as health behaviors, must account for the epidemiologic paradox (Abraído-Lanza, Dohrenwend, Ng-Mak, & Turner, 1999).

The purpose of the present study was to test the health behaviors and acculturation hypotheses. The health behavior hypothesis proposes that Latinos have more favorable health behaviors and risk factor profiles than do non-Latino whites, which result in their relative health advantage (Scribner, 1994; Markides & Coreil, 1986). For instance, Latinos are less likely to drink alcohol and smoke than are non-Latino whites (Pérez-Stable, Marin, & Marin, 1994; Singh & Siahpush, 2002).

These favorable health behaviors may be related to Latino cultural values and practices (e.g., dietary practices; proscriptions against smoking, drinking). These positive health behaviors, however, decline with acculturation (Clark & Hofsess, 1998; Vega & Amaro, 1994; Scribner, 1994). Acculturation refers to the process by which immigrants adopt the attitudes, values, customs, beliefs and behaviors of a new culture (Abraído-Lanza, White, & Vásquez, 2004). Alcohol consumption, smoking, and a number of other risky health behaviors increase with acculturation, as do rates of overall cancer, infant mortality, and other illnesses (see Clark & Hofsess, 1998; Vega & Amaro, 1994). Acculturation, however, is associated with some healthy behaviors, such as leisure-time physical activity (Crespo, Smit, Carter-Pokras, & Andersen, 2001). Few studies, however, examine the association between acculturation and health-promoting behaviors such as exercise.

There is also evidence that, among Latinos, the effect of acculturation on certain health behaviors, such as smoking, varies by sex, perhaps reflecting the prevailing gender norms in the United States (e.g., Pérez-Stable et al., 2001). Furthermore, more favorable risk profiles among Latinos than non-Latino whites are not found consistently. Some studies find that Latinos are more likely than non-Latino whites to be overweight (Singh & Siahpush, 2002), but in studies that stratify by sex, the difference occurs only among women (Shea et al., 1991; Winkleby, Fortmann, & Rockhill, 1993). Whereas some studies report that Latinos are less likely than whites to exercise on a regular basis (Crespo, Andersen, Carter-Pokras, & Ainsworth, 2000; Shea et al., 1991; Pérez-Stable et al., 1994), others find no differences between the groups (Winkleby et al., 1993).

Thus, there is mixed evidence for the health behavior and acculturation hypotheses. These issues, therefore, require further study. We tested the hypothesis that Latinos engage in more favorable health behaviors than do non-Latino whites, and examined whether these behaviors decline with greater acculturation. The specific health behaviors and risk factors examined were: current smoking status, alcohol use, exercise activity, and body mass index (BMI). We selected these specific indices given that more than half of the premature deaths in the United States result from these risk behaviors, particularly smoking (USDHHS, 1998),

obesity (US Department of Health and Human Services, 2001), alcohol use (Gilbert & Cervantes, 1996), and physical inactivity (Dubbart, 2002).

The health behavior hypothesis predicts that Latinos have better health behavior profiles than do non-Latino whites. Because these health behaviors are believed to be associated with Latino cultural norms, the acculturation hypothesis predicts that health behaviors become riskier with greater acculturation. Thus, the present study addressed a series of questions derived from these hypotheses. First, do Latinos differ from non-Latino whites on risk (i.e., smoking and alcohol use) and protective (i.e., maintaining a healthy body weight and engaging in any exercise) behaviors? Second, do these differences remain after controlling for sociodemo-graphic variables (SES and age)? Third, among Latinos, is acculturation associated with increased risk and decreased protective health behaviors, controlling for SES and age? Finally, do the effects of ethnicity and acculturation on risk and protective behaviors vary by gender?

Methods

Data source

We analyzed data from the 1991 National Health Interview Survey (NHIS) (National Center for Health Statistics, 1993). The NHIS is a nationwide, personal interview household survey conducted annually through the National Center for Health Statistics. It contains a representative sample of the civilian, non-institutionalized population in the United States. The NHIS employs a complex multistage design with oversampling for targeted subpopulations, in particular, minority populations. The NHIS contains core questions on demographic and health-related characteristics, which generally do not vary, and supplements which may change yearly. The 1991 NHIS included a Health Promotion and Disease Prevention (HPDP) Supplement, providing information on various health behaviors. The interviewed sample for the 1991 NHIS consisted of 46,761 households. The sample for the present study included 36,401 respondents aged 18 years or more, of whom 3154 (9.7%) were Latinos of any race and 33,247 (90.3%) were non-Latino whites. Of the Latinos in the sample, 54 were missing data on place of birth or length of time in the United States. Thus, analyses concerning acculturation were based on a sample of 3100 Latinos.

Although the HPDP Supplement questionnaire was in English, bilingual NHIS interviewers were utilized by the National Center for Health Statistics to minimize language barriers against completing the survey. Bilingual interviewers were assigned to areas that tend to be predominantly Spanish-speaking, which are very well known. To assure standardization, interviewers were provided with a Spanish translation of core questions in the NHIS interview. In cases where respondents spoke only Spanish and the interviewer did not, however, other household members or neighbors were used as interpreters. In these cases, strict guidelines were followed. Interviewers provided explicit instructions to the interpreter concerning proper procedures for serving as a translator, as well as on the use of the Spanish translation guide.¹ The 1991 NHIS response rate was 95.7% (of the 4.3% non-interviews, 2.7% was due to respondent refusal; and the remaining 1.6% was mainly due to the inability to find an eligible respondent at home after repeated attempts) (National Center for Health Statistics, 1993).

¹A limitation of the 1991 NHIS HPDP public use data set is that it does not include a variable to identify interviews conducted in Spanish with a bilingual interviewer or those that used a family member or neighbor as interpreters. Although interpreters are not subject to the intensive training provided to NCHS interviewers, strict procedures are followed to assure standardization when an interpreter is used. The interviewer first asks the question in English, and instructs the interpreter to read the question in Spanish from the Spanish translation guide. Interpreters are instructed that any questions asked by the respondent should be referred back to the interviewer and should not be answered by the interpreter. The interviewer also assures that the interpreter understands that entire answers should be translated to the interviewer verbatim.

Dependent variables: health behaviors

Current smoking—Current smoking status was assessed based on responses to a series of three questions: (1) “Have you smoked at least 100 cigarettes in your entire life?” (2) “Do you smoke cigarettes now?” and (3) “Do you now smoke cigarettes every day or some days?”. We created a dichotomous variable with current smokers forming one category, including those respondents who have smoked at least 100 cigarettes in their entire life and now smoke either every day or some days. Non-current smokers included participants who have never smoked as well as former smokers.

Alcohol intake—To assess alcohol use, we created a dichotomous variable based on questions in the survey that ascertained (a) whether respondents drank in the past year, (b) the number of days respondents drank alcohol in the past 2 weeks, (c) the number of drinks per day in the past 2 weeks, and (d) whether drinking in the past 2 weeks was typical of the past 12 months. In this study, alcohol consumption was characterized as either none/low or moderate/high. The “none to low” category included individuals who (a) had not had any alcohol in the past year, or (b) had an average of one drink or less per day in the past 2 weeks and responded that this was typical behavior or that this was more than they usually drank. Moderate drinking was defined as having: (a) an average of between one and two drinks per day in the past 2 weeks that was typical of drinking in the past year or (b) an average of between one and three drinks per day in the past 2 weeks that was more than what the respondent typically drank. High alcohol intake was defined as having (a) more than an average of two drinks per day in the previous 2 weeks that was less than or typical of drinking in the past year, or (b) an average of more than three drinks per day that was less than typical drinking behavior. Based on the small proportion of respondents with moderate or high alcohol intake, a single category was created from these two groups. Thus, our “risk” category of moderate/high drinking essentially consisted of respondents who had more than an average of one drink per day over the past 2 weeks. Although this seems like a conservative definition, it consisted of only 9.6% of Latinos and 11.9% of non-Latino whites in the sample.

High body mass index—We created a dichotomous variable based on respondents’ BMI to assess overweight/obesity. The NHIS BMI variable was calculated as weight (in kilograms) divided by height (in meters), squared. Overweight is defined as BMI values between 25.0 and 29.9, and obesity as BMI of 30.0 or greater (Wadden, Brownell, & Foster, 2002). Therefore, in this study, respondents with a BMI greater than 25 were defined as having a high BMI.

Exercise activity—A dichotomous variable was created to assess whether respondents engaged in any recent physical fitness activities. Respondents were characterized as having engaged in recent exercise activity if they reported doing any one or more of the following during the past 2 weeks: walking for exercise, jogging or running, bicycle riding, aerobics or aerobic dancing, swimming, stair climbing, or any one or more of 11 types of sports activities (basketball; tennis; baseball or softball; hand-ball, racquetball or squash; downhill skiing; cross-country skiing; water skiing; soccer; volleyball; football; or any other exercise or sport). Prior research on acculturation and health behaviors has used very limited measures of exercise behavior. An advantage of our approach, therefore, is that we examined a broader spectrum of physical fitness activities.

Independent variables

Sociodemographic characteristics—Age was coded in years as a continuous variable. Family income and highest level of education completed were used as measures of SES. Family income ranged from 0 (less than \$1000) to 26 (\$50,000 and over). Education had a

possible range of 0 (no education or kindergarten only) to 6 (more than 4 years of college). Both family income and education were measured as discrete ordinal variables. For the purposes of analyses, both were treated as interval-scale variables.

Latino ethnicity—Race and ethnicity were based on respondents' self-reported information. For race, respondents were given a card listing various categories and asked, "What is the number of the group or groups which represents your race?" Additionally, respondents were asked to indicate their national origin or ancestry from a card listing Puerto Rican, Cuban, Mexican/Mexicano, Mexican American, Chicano, Other Latin American, Other Spanish. In this study, a dichotomous variable was created for Latino ethnicity based on these data. Respondents who indicated any of these national origins or ancestries were coded "1" for Latino. Participants who indicated their racial background as white with no Hispanic origins were coded "0" for non-Latino white.

Acculturation—Nativity status/length of time residing in the United States was used as a proxy measure of acculturation. These are standard indices for assessing acculturation in relation to health behaviors (e.g., Cantero, Richardson, Baezconde-Garbanati, & Marks, 1999; Crespo et al., 2001; Himmelgreen et al., 2004; Singh & Siahpush, 2002), and are the most frequently used single-dimension measures (Negy & Woods, 1992). Length of residence and nativity or generation status are valid proxy measures of acculturation, and show high correlations with other multidimensional scales, as well as language-based measures (r s range from .69 to .79) (Marín & Marín, 1991). In the NHIS, foreign-born respondents were asked how long they lived in the United States using a 5-category response format (1 = "less than 1 year", 2 = "1 year to less than 5 years", 3 = "5 years to less than 10 years", 4 = "10 years to less than 15 years", and 5 = "15 years or more"). Because the NHIS only assessed length of residence among foreign-born respondents, those born in the United States were coded "not applicable, US-born". Thus, in this study, Latinos classified as such were coded "US-born".

Because the NHIS response categories contained an unequal number of years, in this study, acculturation was coded as a dichotomous variable (low vs. high) based on nativity status and length of residence. Following other research using this variable (Stephen, Foote, Hendershot, & Schoenborn, 1994), respondents who were foreign-born and lived in the United States for less than 15 years were coded as "0" for a low level of acculturation. Those who were born in or lived in the United States for 15 or more years were coded as "1", denoting a high level of acculturation. We defined both US-born Latinos and those who had resided in the United States for 15 years or more as "high acculturated" based on the rationale that both groups had longer periods of exposure to (hence, greater chances to adopt) American culture compared with Latinos who had resided in the United States for less than 15 years.

Data analyses—To account for the survey design of the NHIS, all analyses adjusted for clustering, stratification, and oversampling using survey estimation techniques of the Stata program (StataCorp, 1999). We examined crude odds ratios comparing Latinos with non-Latino whites on cigarette smoking, alcohol consumption, obesity, and recent exercise activity in order to determine whether Latinos are more (or less) likely than non-Latinos to engage these behaviors. Multiple logistic regression analyses were used to examine these behaviors among Latinos compared with non-Latina whites, after controlling for age, education, and family income. In a final model of logistic regression, acculturation was examined among a sample of Latinos only, controlling for age and SES. All analyses were stratified by gender.

Results

Table 1 presents demographic data of the Latino and non-Latino white respondents, stratified by gender. Analyses of the full sample included 36,401 respondents aged 18 or over. Of these, 3154 (9.7%) were Latinos and 33,247 (90.3%) were non-Latino whites, with an average age of 37.0 and 45.4, respectively. Although the median education level for both Latinos and non-Latinos was “high school graduate”, one-quarter (25.3%) of Latinos had completed only elementary school or less years of education. Latinos were younger on average and had lower median family incomes than their non-Latino white counterparts.

Tests of the health behaviors hypothesis

Table 2 shows the crude odds ratios for current smoking status, alcohol use, any exercise activity, and BMI in relation to ethnicity and stratified by gender. Compared with non-Latino whites, Latinos were less likely to be current smokers, to have moderate/high alcohol intake and to have engaged in any physical activity in the previous 2 weeks; and they were more likely to have a high BMI. These differences were not consistent across gender. Relative to non-Latina white women, Latinas were less likely to be a current smoker, have high alcohol consumption, or exercise in the previous 2 weeks, but more likely to have a high BMI. Latino men were also less likely to engage in any exercise activity in the previous 2 weeks relative to whites, but the gap was smaller than the differences between Latina and white women.

When age, education, and family income were included in the models (see Table 3), the differences between Latinos and non-Latino whites in the odds of current smoking, alcohol intake, and BMI were exacerbated; and the difference in exercise was mitigated slightly. Among women, Latinas had more favorable smoking and alcohol behaviors, but adverse profiles on BMI and exercise relative to whites. Latino men exhibited more favorable behaviors than white men on current smoking and alcohol intake; however, Latino men did not differ from whites on BMI or exercise adjusting for age and SES.

Table 3 also shows that of the sociodemographic predictors (age, education and income), education had the most consistent effect on health behaviors: increases in levels of education were associated with less likelihood of current smoking and high BMI, and greater odds of exercising recently.² Among women only, greater education was associated with a higher likelihood of moderate/high alcohol intake.

Test of the acculturation hypothesis

Demographic and health behavior data for Latinos stratified by gender and level of acculturation are presented in Table 4. Low-acculturation Latinos, who comprised almost one-third of the sample (29.8%), were foreign-born respondents who had lived in the US for less than 15 years (19.5% had a length of residence of 5 years or more but less than 15 years, and 10.3% resided in the US for less than 5 years). High-acculturation Latinos (70.2% of the sample) were either foreign-born respondents who lived in the US for 15 years or more (22.9%), or were born in the United States (47.3%). Relative to less acculturated Latinos, those with high acculturation were older and had higher levels of education and income.

The descriptive data in the lower portion of Table 4 revealed a general trend of greater smoking, alcohol intake, BMI, and recent exercise activity with higher acculturation. The

²In response to a reviewer's suggestion, we also conducted multiple regression analyses on the total sample treating BMI and exercise as continuous variables. The results of these analyses were nearly identical to those of the logistic regressions (i.e., Latino ethnicity and less education predicted higher BMI and less exercise), except that in the multiple regression models, greater age also predicted higher BMI and lower exercise.

effect of acculturation on health behaviors was examined controlling for age, education, and income. Table 5 demonstrates that the proxy index of acculturation was associated with all four health behaviors.³ Relative to less acculturated Latinos, those who were more acculturated were one and one-half times as likely to be a current smoker or have a high BMI, twice as likely to have moderate/high alcohol intake, and were more likely to have exercised in the previous 2 weeks when controlling for age and SES. The effects of acculturation were stronger for women than men on every measure. Compared with those who were less acculturated, high-acculturated Latinas were more than twice as likely to smoke, have moderate/high alcohol consumption, and to have exercised recently, and more than one and a half times as likely to have a high BMI, controlling for age and SES. Among men, greater acculturation increased the odds of high alcohol consumption and high BMI, accounting for age and SES. Greater education increased the likelihood of exercise activity, and lowered the odds of BMI in the full sample and among women (but not men), and increased the odds of moderate/high alcohol intake among women. Age and income had either nonsignificant or minimal effects on the health behaviors examined in this study.⁴

Discussion

Although the health behavior and acculturation hypotheses have received partial support in large-scale studies, the literature is replete with inconsistencies. Our use of a national data set allowed us to examine a number of health behaviors among Latinos and non-Latino whites, and the effect of acculturation on health behaviors among Latinos, while controlling for potential sociodemographic confounders.

Do Latinos have more favorable health behaviors compared with non-Latino whites?

We found mixed evidence for the health behaviors hypothesis. Latinos (both women and men) were less likely to smoke or drink alcohol than non-Latino whites, after controlling for age and SES. Because cigarette smoking and alcohol are risk factors for cancer and heart disease, the health behaviors hypothesis may help to at least partially explain the Latino mortality paradox. Relative to non-Latino whites, Latinos have a health advantage for cardiovascular disease, cancer from all causes, and cancers of various sites (e.g., lung) for which smoking is a known risk factor (Singh & Siahpush, 2002; Sorlie et al., 1993).

Our findings concerning exercise activity and BMI, however, did not support the health behavior hypothesis of more favorable profiles among Latinos. Relative to whites, Latinos were less likely to engage in any leisure-time physical activities and more likely to have a high BMI, controlling for age and SES. Gender-specific analyses, however, indicated that these observed differences were driven primarily by differences among women. Relative to non-Latina white women, Latinas had less favorable profiles regarding exercise activity and BMI, controlling for SES and age. In contrast, Latino men did not differ from whites in BMI or exercise activity. These findings are consistent with the higher mortality from certain diseases, such as diabetes, observed among Latinos relative to non-Latino whites (Sorlie et al., 1993), but are inconsistent with Latinos' lower mortality from heart disease, for which obesity and lack of exercise are risk factors (US Department of Health and Human Services,

³Although acculturation was associated with education, income, and age, the associations were not strong. Accordingly, multicollinearity statistics for the regression models showed that tolerance for education, income and age were very high (.80, .84, and .90, respectively), indicating that a large proportion of the variance of each of these variables was not accounted for by other independent variables in the equation.

⁴Among the Latino sample, we also conducted multiple regression analyses with BMI and exercise as continuous variables, as suggested by a reviewer. For BMI, these results were almost identical to the logistic regression findings (i.e., less education and greater acculturation predicted higher BMI), except that greater age also predicted higher BMI in the multiple regression model. For exercise, the logistic and multiple regression results were identical (i.e., lower age, and greater acculturation and education predicted greater exercise).

2001). Because we assessed leisure-time physical activities, however, it would be premature to conclude that Latinos engage in less overall physical activities relative to whites. Leisure-time measures do not take into account activities associated with physically demanding occupations, in which Latinos are overrepresented (US Department of Commerce, 1995), nor do they consider physical activities associated with unpaid work (e.g., housework). More Latinos than whites report engaging in 5 or more hours per day of physically demanding work activities, and increases in levels of arduous labor are associated with decreases in leisure-time physical activities (CDC, 2000). In addition, physically demanding occupations, which are characteristic of lower social status, offer less flexibility in work schedules and less opportunities for engaging in leisure activities than is typical of higher-status occupations. One study that examined leisure-time physical activities between Latinos (i.e., Mexican Americans) and non-Latino whites of similar occupational strata, however, yielded mixed results (Crespo et al., 2000). Among men employed in “white-collar, non-professional” occupations, there were no differences between the ethnic groups in leisure-time physical inactivity. Male and female Mexican Americans employed in “white-collar professional” or “blue-collar” occupations, however, engaged in less leisure-time activities than did their non-Latino white counterparts. Whether these differences reflect structural constraints (e.g., limited availability of or access to leisure-time facilities, safety concerns in local neighborhoods) or other factors is currently unknown (Crespo et al., 2000, 2001).

Is acculturation associated with less healthy behaviors?

Acculturation had both negative and positive effects on health behaviors. After adjusting for the effects of age and SES, higher acculturation was associated with a greater likelihood of high alcohol intake, current smoking, and a high BMI. Acculturation, however, was also associated with greater likelihood of engaging in any recent exercise. Therefore, we found partial support for the acculturation hypothesis, in that greater acculturation was associated with less healthy profiles for three behaviors under study (alcohol use, smoking, and BMI), but with improvement in the fourth (exercise activity).

Consistent with other research, we found that the effect of acculturation on health behaviors varied by gender. For both Latino men and women, the likelihood of moderate/high alcohol intake was greater for those who were more acculturated. Other studies also report that acculturation is associated with increased alcohol intake (Cantero et al., 1999; Marín & Posner, 1995). The Hispanic Health and Nutrition Examination Survey (HHANES), a national study of Mexican Americans, Puerto Ricans and Cubans, found that acculturation was related to greater alcohol use, especially among women (Marks, Garcia, & Solis, 1990; Markides, Ray, Stroup-Benham, & Treviño, 1990). With regard to smoking, however, our results revealed different effects of acculturation among men and women. Acculturation was associated with a greater likelihood of current smoking among women, but not men. Similarly, HHANES data indicated that acculturation was associated with increased cigarette smoking rates among Mexican American women, but not men (Haynes, Harvey, Montes, Nickens, & Cohen, 1990). Several studies find that more acculturated women have a greater likelihood of smoking relative to those who are less acculturated (Marín, Pérez-Stable, & Marín, 1989). The association between acculturation and smoking among men, however, has been less consistent. Two studies showed an opposite effect, that low acculturation among men was associated with a higher likelihood of smoking (Marín et al., 1989; Pérez-Stable et al., 2001). These findings, combined with those of our study, suggest that as Latino men and women acculturate, they espouse the gender norms concerning alcohol use and smoking in the United States.

Our findings indicated that, for both Latino men and women, the likelihood of having a high BMI was greater among those who were more acculturated. These results replicate other findings concerning acculturation and greater BMI among women (Cantero et al., 1999;

Himmelgreen et al., 2004). Reasons underlying increased BMI with greater acculturation are currently unknown, but may include the adoption of a less healthy diet. The consumption of low-fat foods such as beans, rice, and vegetables, which are part of traditional Hispanic cuisine, tends to decrease with greater acculturation (Gordon-Larsen, Harris, Ward, & Popkin, 2003).

Relatively less research has focused on the association between acculturation and exercise. In our study, leisure-time exercise behavior was lower among low-acculturated than acculturated Latina women. Acculturation, however, was not associated with physical activity among men. Although few studies have examined the association between acculturation and exercise, our results replicate those of prior research. In a study of Latina women, Cantero et al. (1999) found increasing rates of exercise behavior with greater acculturation. Whereas our findings of the beneficial effect of acculturation on exercise activity was limited to women, Crespo et al.'s (2001) analyses of NHANES data indicated that, for both men and women, US-born Mexican Americans or those who were predominantly English-speaking reported less physical inactivity during leisure time relative to their less-acculturated counterparts. The higher rate of physical activity with greater acculturation may be due to the adoption of health beliefs about the benefits of exercise, greater knowledge about or ability to exercise, or other factors. Combined, our results concerning BMI and exercise form an interesting pattern in that acculturation is associated with increased BMI, but greater physical activity. Although it is difficult to speculate on the mechanisms underlying this pattern of findings, the development of theories and further tests of such hypotheses as the “Descending limb” may shed light on these observations. For example, the “Descending limb” hypothesis (Stern et al., 1991), proposed to explain changes in health behaviors that are associated with diabetes prevalence among Mexican Americans (Stern et al., 1991), posits that modernization and striving for affluence (i.e., the “ascending limb”) involve increased intake of unhealthy diets (e.g., greater consumption of total calories, fat, and sucrose) and decreased physical exercise. Once affluence and stability are achieved, trends are reversed towards better health behaviors (i.e., “the descending limb”). Although the hypothesis has received mixed support, it represents one of very few theoretical formulations concerning the relationship between acculturation and health. The hypothesis may help to explain why acculturation is associated with *both* greater BMI and exercise behavior. High BMI rates might occur at the “height” or “crest” of the limb, and exercise may increase during the “descending limb”, or “postmodernization” curve, when there is a tendency to “reverse some of the perceived maladaptive features of classic modernization, thereby reversing the trend toward increasing obesity” (Stern et al., 1991, p. 650).

The effect of education on health behaviors also merits more research attention, as suggested by our findings of increased likelihood of moderate/high drinking with greater education among women. Other studies report similar findings (Gilbert & Cervantes, 1996; Marks et al., 1990). Some research points to the importance of the social context and network in understanding drinking patterns (Agar, 1997). Among educated Latinas, e.g., educational attainment may provide a shift to social networks where alcohol consumption is accepted. Furthermore, this shift may involve exposure to environments that offer more drinking opportunities. We should note, however, that in our study, the rate of moderate or high drinking among women was quite low, representing only 2.7% of Latina respondents, and 5.5% of non-Latina whites.

Limitations

Some limitations of the 1991 NHIS should be noted. First, despite the scope of national surveys such as the NHIS, it was not possible to analyze health behaviors by Latino subgroups because of limited sample sizes of smaller groups (e.g., Cubans). A limitation of

not stratifying by subgroups is that there are differences between Latino groups in sociodemographic and other factors (Falcón et al., 2001) that may be associated with health behaviors. There is evidence that the effect of acculturation on some health behaviors (e.g., obesity), varies among the groups, as well as the rates of smoking, alcohol use, and obesity (Kahn, Sobal, & Martorell, 1997; Kerner, Breen, Tefft, & Silsby, 1998; Marín & Posner, 1995; Marks et al., 1990; Pérez-Stable et al., 2001). Second, acculturation was assessed via a proxy measure, nativity status/length of time in the United States. Although these are commonly used indices, acculturation can be measured in a number of other ways (e.g., language use, generation status, proportion of friends who are Latino). Use of multicomponent scales would have provided a more comprehensive measure of acculturation than the single dimension of nativity status/years living in the US, but such measures were not available in the 1991 NHIS. Nevertheless, length of residence and nativity status are valid measures of acculturation and are the most frequently used single-dimension indices (Marín & Marín, 1991; Negy & Woods, 1992). Furthermore, despite the limitation of our acculturation measure, it is notable that our findings corroborate those of other studies that used different proxy measures of acculturation. For example, language-based acculturation indices are associated with increased rates of smoking, alcohol use, BMI, and leisure-time physical activity (Cantero et al., 1999; Crespo et al., 2001; Marks et al., 1990; Marín & Posner, 1995; Pérez-Stable et al., 2001). Third, some of the health behavior measures in the study were limited (e.g., it was not possible to measure either exercise intensity or frequency), and these were not linked to mortality outcomes. Therefore, results cannot be used to reject hypotheses that other factors account for mortality differences between Latinos and non-Latinos. Other risk and protective behaviors, including diet (Lin, Bermudez, & Tucker, 2003) and other health practices (e.g., cancer screening; Zambrana, Breen, Fox, & Gutierrez-Mohamed, 1999), as well as non-behavioral factors (e.g., cultural values and beliefs; Myers & Rodriguez, 2003) should be examined. Finally, our study employed a secondary data analysis of a survey conducted in 1991. Although the Latino population has grown since that time, there are currently very few data sets that contain: (a) national, representative samples of Latinos in the United States, (b) sufficient information on multiple health behaviors such as smoking, alcohol use, exercise, and BMI, (c) sociodemographic characteristics, and (d) acculturation variables. Thus, the benefits of using the 1991 NHIS for our analyses outweighed the limitations. There is a critical need to collect more data on the health and health behaviors of Latinos in the United States.

Despite these limitations, this study contributes to the literature on health behaviors among Latinos and non-Latino whites in several ways. First, use of the HPDP Supplement of the 1991 NHIS was advantageous as it consists of a representative sample of the United States population. Importantly, this allows for generalizability of research findings based on this data set. The majority of the literature on acculturation and health behaviors either focuses specifically on Mexican Americans, or on the West and Southwest regions of the United States where the Latino population is predominantly of Mexican origin (e.g., Cantero et al., 1999; Crespo et al., 2000, 2001; Markides, Krause, & Mendes de Leon, 1988, 1990; Pérez-Stable et al., 1994). Second, the NHIS contains data on key SES and demographic variables, as well as a number of health behaviors. With few exceptions (e.g., Cantero et al., 1999; Marks et al., 1990), studies in this area have been limited by focusing exclusively on only one health behavior. Third, the 1991 NHIS contains data on nativity status and foreign-born respondents' length of residence in the United States, which can be used as proxy measures of acculturation. Finally, to our knowledge, our study is the first to use a nationally representative sample of the adult United States population to: (1) compare Latinos and non-Latino whites on four health behaviors (smoking, alcohol use, leisure-time physical activity, and BMI), and (2) examine whether acculturation is associated with these health behaviors among Latino men and women. Thus, the results provide a unique contribution to the ongoing debate concerning the health of non-Latino whites and Latinos in the United States.

Conclusion

As Franzini et al. (2001) noted, “If reasons [for the paradox] are largely cultural, the paradox will only exist for as long as a large percentage of Hispanics remain culturally distinct from the rest of the US population and do not adopt Anglo norms” (p. 515). The implications of our findings are that the health behaviors and acculturation hypotheses may help to partially explain the Latino mortality paradox. The mechanisms accounting for the relationship between acculturation and health behaviors among Latinos, however, have yet to be identified.

Acknowledgments

This research was supported by a grant to the first author from the National Cancer Institute (1R03CA81619). Support for preparing this manuscript was provided to the second author by a National Research Service Award for predoctoral training from the National Center for Complementary and Alternative Medicine (1F31AT0001401), and to the third author by the Initiative for Minority Student Development (IMSD) at Columbia's Mailman School of Public Health (1R25GM62454). We are grateful to Adria N. Armbrister for providing comments on this manuscript. This study was made possible by the National Center for Health Statistics (NCHS), by providing for public use the National Health Interview Survey. The analyses, interpretations and conclusions presented here do not necessarily reflect the views or opinions of the NCHS, which is responsible only for the initial data. Special thanks to Ms. Veronica Benson and colleagues at the NCHS for providing technical assistance and information concerning the National Health Interview Survey.

References

- Abraído-Lanza AF, Dohrenwend BP, Ng-Mak DS, Turner JB. The Latino mortality paradox: A test of the “salmon bias” and healthy migrant hypotheses. *American Journal of Public Health*. 1999; 89:1543–1548. [PubMed: 10511837]
- Abraído-Lanza, AF.; White, K.; Vásquez, E. Immigrant populations and health.. In: Anderson, N., editor. *Encyclopedia of health and behavior*. Sage; Newbury Park, CA: 2004. p. 533-537.
- Adler NA, Boyce T, Chesney MA, Cohen S, Folkman S, Kahn RL, Syme SL. Socioeconomic status and health. *American Psychologist*. 1994; 49:15–24. [PubMed: 8122813]
- Agar M. Recasting the “ethno” in “epidemiology”. *Medical Anthropology*. 1997; 16:391–403. [PubMed: 8628120]
- Cantero PJ, Richardson JL, Baezconde-Garbanati L, Marks G. The association between acculturation and health practices among middle-aged and elderly Latinas. *Ethnicity & Disease*. 1999; 9:166–180. [PubMed: 10421079]
- Centers for Disease Prevention and Control (CDC). Prevalence of leisure-time and occupational physical activity among employed adults—United States. *Morbidity and Mortality Weekly Report*. 2000; 49(19):420–424. [PubMed: 10905821]
- Clark, L.; Hofstess, L. Acculturation.. In: Loue, S., editor. *Handbook of immigrant health*. Plenum Press; New York, NY: 1998. p. 37-59.
- Crespo CJ, Smit E, Andersen RE, Carter-Pokras O, Ainsworth BE. Race/ethnicity, social class and their relation to physical inactivity during leisure time: Results from the Third National Health and Nutrition Examination Survey, 1988–1994. *American Journal of Preventive Medicine*. 2000; 18:46–53. [PubMed: 10808982]
- Crespo CJ, Smit E, Carter-Pokras O, Andersen RE. Acculturation and leisure-time physical inactivity in Mexican American adults: Results from NHANES III, 1988–1994. *American Journal of Public Health*. 2001; 91:1254–1257. [PubMed: 11499114]
- Dubbert PM. Physical activity and exercise: Recent advances and current challenges. *Journal of Consulting and Clinical Psychology*. 2002; 70:526–536. [PubMed: 12090367]
- Falcón, A.; Aguirre-Molina, M.; Molina, CW. Latino health policy: Beyond demographic determinism.. In: Aguirre-Molina, M.; Molina, C.; Zambrana, RE., editors. *Health issues in the Latino community*. Jossey-Bass; San Francisco, CA: 2001. p. 3-22.
- Franzini L, Ribble JC, Keddi AM. Understanding the Hispanic paradox. *Ethnicity & Disease*. 2001; 11:496–518. [PubMed: 11572416]

- Gilbert MJ, Cervantes RC. Patterns and practices of alcohol use among Mexican Americans: A comprehensive review. *Hispanic Journal of Behavioral Sciences*. 1996; 8:1–60.
- Gordon-Larsen P, Harris KM, Ward DS, Popkin BM. Acculturation and overweight-related behaviors among Hispanic immigrants to the United States: The National Longitudinal study of adolescent health. *Social Science & Medicine*. 2003; 57:2023–2034. [PubMed: 14512234]
- Haynes SG, Harvey C, Montes H, Nickens H, Cohen BH. Patterns of cigarette smoking among Hispanics in the United States: Results from HHANES 1982–1984. *American Journal of Public Health*. 1990; 80(Supplement):47–53. [PubMed: 9187582]
- Himmelgreen DA, Pérez-Escamilla R, Martinez D, Brettnall A, Eells B, Peng Y, Bermúdez A. The longer you stay, the bigger you get: Length of time and language use in the US are associated with obesity in Puerto Rican Women. *American Journal of Physical Anthropology*. 2004; 25:90–96. [PubMed: 15293335]
- Hummer RA, Rogers RG, Amir SH, Forbes D, Frisbie WP. Adult mortality differentials among Hispanic subgroups and non-Hispanic whites. *Social Science Quarterly*. 2000; 81:459–476. [PubMed: 17879490]
- Hunt KJ, Resendez RG, Williams K, Haffner SM, Stern MP, Hazuda HP. All-cause and cardiovascular mortality among Mexican-American and non-Hispanic white older participants in the San Antonio Heart Study—Evidence against the “Hispanic Paradox”. *American Journal of Epidemiology*. 2003; 158:1048–1057. [PubMed: 14630600]
- Kahn LK, Sobal J, Martorell R. Acculturation, socioeconomic status, and obesity in Mexican Americans, Cuban Americans, and Puerto Ricans. *International Journal of Obesity*. 1997; 21:91–96. [PubMed: 9043961]
- Kerner JF, Breen N, Tefft MC, Silsby J. Tobacco use among multi-ethnic Latino populations. *Ethnicity & Disease*. 1998; 8:167–183. [PubMed: 9681283]
- Lin H, Bermudez OI, Tucker KL. Dietary patterns of Hispanic elders are associated with acculturation and obesity. *Journal of Nutrition*. 2003; 133:3651–3657. [PubMed: 14608089]
- Lin CC, Rogot E, Johnson NJ, Sorlie PD, Arias E. A further study of life expectancy by socioeconomic factors in the National Longitudinal mortality Study. *Ethnicity & Disease*. 2003; 13:240–247. [PubMed: 12785422]
- Marín, G.; Marín, BV. *Research with Hispanics*. Sage; Newbury Park, CA: 1991.
- Marín G, Pérez-Stable EJ, Marín BV. Cigarette smoking among San Francisco Hispanics: The role of acculturation and gender. *American Journal of Public Health*. 1989; 79:196–198. [PubMed: 2913840]
- Marín G, Posner SF. The role of gender and acculturation on determining the consumption of alcoholic beverages among Mexican-Americans and Central Americans in the United States. *The International Journal of the Addictions*. 1995; 30:779–794. [PubMed: 7558470]
- Markides KS, Coreil J. The health of Hispanics in the Southwestern United States: An epidemiologic paradox. *Public Health Reports*. 1986; 101:253–265. [PubMed: 3086917]
- Markides KS, Krause N, Mendes de Leon CF. Acculturation and alcohol consumption among Mexican Americans: a three-generation study. *American Journal of Public Health*. 1988; 78:1178–1181. [PubMed: 3407815]
- Markides KS, Ray LA, Stroup-Benham CA, Treviño F. Acculturation and alcohol consumption in the Mexican American population of the Southwestern United States: Findings from HHANES 1982–84. *American Journal of Public Health*. 1990; 80(Supplement):42–46. [PubMed: 9187581]
- Marks G, Garcia M, Solis JM. Health risk behaviors of Hispanics in the United States: Findings from HHANES, 1982–84. *American Journal of Public Health*. 1990; 80(Supplement):20–26. [PubMed: 9187577]
- Myers, H.; Rodriguez, N. Acculturation and physical health in racial and ethnic minorities.. In: Chun, KM.; Balls Organista, P.; Marín, G., editors. *Acculturation: Advances in theory, measurement and applied research*. American Psychological Association; Washington, DC: 2003. p. 163-185.
- National Center for Health Statistics. 1991 National Health Interview Survey. [Database on CDROM], CDROM Series 10, No. 5. SETS Version 1.21. US Government Printing Office; Washington: 1993.

- Negy C, Woods DJ. The importance of acculturation in understanding research with Hispanic-Americans. *Hispanic Journal of Behavioral Sciences*. 1992; 14:224–227.
- Pablos-Méndez A. Letter to the Editor. *Journal of American Medical Association*. 1994; 271:1237–1238.
- Patel KV, Eschbach K, Ray LA, Markides KS. Evaluation of mortality data for older Mexican Americans: Implications for the Hispanic paradox. *American Journal of Epidemiology*. 2004; 159:707–715. [PubMed: 15033649]
- Pérez-Stable EJ, Marin G, Marin BV. Behavioral risk factors: a comparison of Latinos and Non-Latino Whites in San Francisco. *American Journal of Public Health*. 1994; 84:971–976. [PubMed: 8203695]
- Pérez-Stable EJ, Ramirez A, Villareal R, Talavera GA, Trapido E, Suarez L, Marti J, McAlister A. Cigarette smoking behavior among US Latino men and women from different countries of origin. *American Journal of Public Health*. 2001; 91:1424–1430. [PubMed: 11527775]
- Scribner R. Letter to the Editor. *Journal of American Medical Association*. 1994; 271:1238.
- Shea S, Stein AD, Basch CE, Lantigua R, Maylahn C, Strogatz DS, Novick L. Independent associations of educational attainment and ethnicity with behavioral risk factors for cardiovascular disease. *American Journal of Epidemiology*. 1991; 134:567–582. [PubMed: 1951262]
- Singh GK, Siahpush M. Ethnic-immigrant differentials in health behaviors, morbidity, and cause-specific mortality in the United States: An analysis of two national data bases. *Human Biology*. 2002; 74:83–109. [PubMed: 11931581]
- Sortie PD, Backlund E, Johnson NJ, Rogot E. Mortality by Hispanic status in the United States. *Journal of American Medical Association*. 1993; 270:2464–2468.
- StataCorp. Stata statistical software: Release 6.0. Stata Corporation; College Station, TX: 1999.
- Stephen, EH.; Foote, K.; Hendershot, GE.; Schoenborn, CA. Health of the foreign-born population: United States, 1989–90. Advance data from vital and health statistics; no. 241. National Center for Health Statistics; Hyattsville, MD: 1994.
- Stern MP, Knapp JA, Hazuda HP, Haffner SM, Patterson JK, Mitchell BD. Genetic and environmental determinants of Type II diabetes in Mexican Americans: Is there a “descending limb” to the modernization/diabetes relationship? *Diabetes Care*. 1991; 14(Supplement):648–654.
- US Department of Commerce. (September). The Nation's Hispanic Population—1994. Bureau of the Census, Economics and Statistics Administration, SB/95-25; 1995.
- US Department of Health and Human Services (USDHHS). Tobacco use among US racial/ethnic minority groups: African Americans, American Indians and Alaska Natives, Asian American and Pacific Islanders, Hispanics. A report of the Surgeon General. 1998/1998
- US Department of Health and Human Services. [July 1, 2003] The Surgeon General's call to action to prevent and decrease overweight and obesity 2001. 2001. <http://www.surgeongeneral.gov/topics/calltoaction/CalltoAction.pdf>
- Vega WA, Amaro H. Latino outlook: Good health, uncertain prognosis. *Annual Review of Public Health*. 1994; 15:39–67.
- Wadden TA, Brownell KD, Foster GD. Obesity: Responding to the global epidemic. *Journal of Consulting and Clinical Psychology*. 2002; 70:510–525. [PubMed: 12090366]
- Winkleby MA, Fortmann SP, Rockhill B. Health-related risk factors in a sample of Hispanics and whites matched on sociodemographic characteristics. *American Journal of Epidemiology*. 1993; 137:1365–1375. [PubMed: 8333418]
- Zambrana RE, Breen N, Fox SA, Gutierrez-Mohamed ML. Use of cancer screening practices by Hispanic women: Analyses by subgroup. *Preventive Medicine*. 1999; 29:466–477. [PubMed: 10600427]

Table 1

Characteristics of study sample: Latinos and non-Latino Whites

	All respondents, N = 36,401		Women, N = 20,810		Men, N = 15,591	
	Latino	Non-Latino	Latina	Non-Latina	Latino	Non-Latino
N	3154	33,247	1820	18,990	1334	14,257
%	9.7	90.3	9.6	90.4	9.8	90.2
Mean age (<i>se</i>)	37.0 (.40)	45.4 (.18)	37.6 (.53)	46.3 (.23)	36.4 (.49)	44.4 (.21)
Education (<i>median</i>)	HS graduate	HS graduate	HS graduate	HS graduate	HS graduate	HS graduate
Elementary or less (%)	25.3	6.9	26.2	6.8	24.3	6.9
Some high school (%)	17.5	10.2	17.9	10.8	17.1	9.6
High school grad. (%)	29.6	38.7	29.6	41.0	29.6	36.3
Some college (%)	18.0	21.7	16.8	22.3	19.3	21.0
College or more (%)	9.5	22.5	9.4	19.1	9.7	26.1
Income (<i>median</i>)	\$19–20k	\$25–30k	\$18–19k	\$25–30k	\$20–25 k	\$30–35k

Note: The differences between Latinos and non-Latinos in age, education, and income are significant at *p* .000; HS = High School.

All values, except for Ns, are weighted.

Data source: National Center for Health Statistics, National Health Interview Survey, 1991.

Table 2

Unadjusted odds ratios of health behaviors

	<i>N</i> (%) Yes		Unadjusted OR (95% CI)
	Latino	Non-Latino	
<i>Total sample</i>			
Current smoker	673 (20.9%)	8691 (26.5%)	.73 (.66, .82)
Moderate/high alcohol intake	305 (9.6%)	3838 (11.9%)	.78 (.66, .93)
High BMI	1548 (49.6%)	14,397 (45.4%)	1.18 (1.06, 1.31)
Recent exercise activity	1829 (57.8%)	22,547 (67.2%)	.67 (.60, .75)
<i>Women only</i>			
Current smoker	329 (16.2%)	4689 (25.1%)	.58 (.49, .67)
Moderate/high alcohol intake	55 (2.7%)	1038 (5.5%)	.47 (.35, .63)
High BMI	804 (44.4%)	6697 (36.0%)	1.42 (1.24, 1.62)
Recent exercise activity	1029 (55.3%)	12,926 (67.4%)	.60 (.52, .68)
<i>Men only</i>			
Current smoker	344 (26.0%)	4002 (28.0%)	.90 (.79, 1.03)
Moderate/high alcohol intake	250 (17.1%)	2800 (19.0%)	.88 (.73, 1.06)
High BMI	744 (55.1%)	7700 (55.7%)	.98 (.85, 1.12)
Recent exercise activity	800 (60.5%)	9621 (67.0%)	.76 (.65, .88)

Note: All values, except for *N*s, are weighted. Significant odds ratios are highlighted in boldface.

Data source: National Center for Health Statistics, National Health Interview Survey, 1991.

Table 3

Adjusted odds ratios (95% confidence intervals) of health behaviors, including Latino ethnicity, age, and socioeconomic status, for the total sample and by sex

	Current smoker OR (95% CI)	Moderate/high alcohol intake OR (95% CI)	High BMI OR (95% CI)	Recent exercise activity OR (95% CI)
<i>Total sample</i>				
Latino ethnicity	.42 (.37, .49)	.69 (.59, .81)	1.25 (1.11, 1.40)	.82 (.73, .91)
Age	.98 (.98, .98)	.99 (.98, .99)	1.01 (1.01, 1.02)	1.00 (.99, 1.00)
Education	.72 (.70, .74)	1.03 (1.00, 1.07)	.90 (.88, .92)	1.35 (1.32, 1.39)
Income	.99 (.98, .99)	1.01 (1.00, 1.02)	1.01 (1.01, 1.02)	1.00 (1.00, 1.01)
<i>Women only</i>				
Latino ethnicity	.34 (.28, .41)	.42 (.31, .57)	1.38 (1.31, 1.57)	.72 (.63, .83)
Age	.98 (.97, .98)	.99 (.99, 1.00)	1.01 (1.01, 1.02)	1.00 (.99, 1.00)
Education	.73 (.70, .76)	1.14 (1.07, 1.21)	.83 (.80, .86)	1.36 (1.32, 1.41)
Income	.99 (.98, .99)	1.00 (.99, 1.02)	.99 (.98, 1.00)	1.00 (1.00, 1.01)
<i>Men only</i>				
Latino ethnicity	.52 (.44, .61)	.75 (.62, .91)	1.09 (.93, 1.30)	.94 (.79, 1.11)
Age	.98 (.98, .98)	.99 (.98, .99)	1.01 (1.01, 1.02)	.99 (.99, 1.00)
Education	.71 (.68, .74)	.99 (.95, 1.02)	.93 (.90, .95)	1.34 (1.30, 1.39)
Income	.98 (.98, .99)	1.00 (.99, 1.01)	1.04 (1.03, 1.04)	1.00 (1.00, 1.01)

Note: *Latino ethnicity* was coded (1), “yes”, based on self-reported Puerto Rican, Cuban, Mexican, Mexican American, Chicano, other Latin American, or other Spanish national origin or ancestry. *Age* was coded in years. *Education* had a possible range of 0 (no education or kindergarten only) to 6 (more than 4 years of college). *Family income* ranged from 0 (less than \$1,000) to 26 (\$50,000 and over). Odds ratios for each variable are adjusted for all other variables in the model. Odds ratios for continuous independent and interval-scale variables denote change in the odds of the health behavior per unit change in the independent variable. Significant odds ratios are highlighted in boldface.

Data source: National Center for Health Statistics, National Health Interview Survey, 1991.

Table 4

Characteristics and health behaviors of Latinos by gender and acculturation

	All Latinos, N = 3100		Latina women, N = 1787		Latino men, N = 1312	
	Low acculturation	High acculturation	Low acculturation	High acculturation	Low acculturation	High acculturation
N	850	2250	466	1321	384	929
%	29.80	70.20	28.70	71.30	31.00	69.00
Mean age (se)	31.7 (.37)	39.2 (.34)	33.0 (.64)	39.3 (.60)	30.5 (.84)	39.1 (.54)
Education (median)	Some HS	HS graduate	Some HS	HS graduate	Some HS	HS graduate
Elementary or less (%)	40.0	18.5	41.1	19.7	39.4	17.2
Some high school (%)	19.3	16.7	19.9	17.3	19.0	16.2
High school graduate (%)	21.6	33.1	19.6	33.7	23.8	32.7
Some college (%)	10.8	21.0	11.7	19.2	10.0	23.2
College or more (%)	7.6	10.4	7.5	10.1	7.7	10.6
Income (median)	\$15–16k	\$20–25k	\$15–16k	\$19–20 k	\$15–16 k	\$20–25 k
Health behaviors N (%)	Yes					
Current smoker	157 (18.6%)	507 (22.0%)	55 (9.6%)	272 (19.2%)	102 (27.5%)	235 (25.1%)
Moderate/high alcohol intake	57 (6.2%)	246 (11.2%)	10 (1.4%)	45 (3.3%)	47 (10.9%)	201 (20.0%)
High BMI	369 (43.0%)	1157 (52.5%)	183 (39.1%)	608 (46.7%)	186 (46.9%)	549 (58.8%)
Recent exercise activity	376 (46.1%)	1430 (63.3%)	181 (36.6%)	837 (63.4%)	195 (55.4%)	593 (63.2%)

Note: The differences between low- and high-accultured Latinos in age, education, and income are significant at $p < .001$; HS = high school. All values, except for N s, are weighted. The full sample of Latinos consisted of 3154 individuals, but 54 respondents who lacked data on place of birth or length of time in the United States were excluded from analyses concerning acculturation. Respondents were defined as having *low acculturation* if they were foreign-born and had lived in the United States for less than 15 years, or *high acculturation* if they were foreign-born and lived in the United States for more than 15 years or if they were US-born.

Data source: National Center for Health Statistics, National Health Interview Survey, 1991.

Table 5

Adjusted odds ratios (95% confidence intervals) of health behaviors among Latinos, including age, socioeconomic status, and acculturation, for the total sample and by sex

	Current smoker OR (95% CI)	Moderate/high alcohol intake OR (95% CI)	High BMI OR (95% CI)	Recent exercise activity OR (95% CI)
<i>Total sample</i>				
Age	.99 (.98, 1.00)	.99 (.98, 1.00)	1.02 (1.01, 1.03)	.99 (.98, .99)
Education	.95 (.85, 1.05)	1.00 (.89, 1.12)	.87 (.82, .94)	1.36 (1.26, 1.47)
Income	.99 (.98, 1.00)	1.00 (.98, 1.03)	.99 (.98, 1.01)	1.02 (1.00, 1.03)
Acculturation	1.46 (1.14, 1.88)	1.98 (1.36, 2.90)	1.46 (1.19, 1.81)	1.72 (1.39, 2.13)
<i>Women only</i>				
Age	.99 (.98, 1.00)	.98 (.96, 1.00)	1.02 (1.01, 1.03)	1.00 (.99, 1.01)
Education	1.01 (.87, 1.16)	1.37 (1.06, 1.77)	.79 (.71, .87)	1.38 (1.24, 1.53)
Income	.99 (.98, 1.01)	.98 (.93, 1.02)	.97 (.96, .99)	1.01 (.99, 1.02)
Acculturation	2.43 (1.66, 3.56)	2.70 (1.13, 6.42)	1.62 (1.23, 2.13)	2.63 (1.92, 3.60)
<i>Men only</i>				
Age	.99 (.98, 1.01)	.99 (.98, 1.00)	1.02 (1.01, 1.04)	.98 (.97, .99)
Education	.90 (.78, 1.03)	.94 (.83, 1.07)	.95 (.86, 1.07)	1.39 (1.24, 1.56)
Income	.98 (.96, .99)	.99 (.97, 1.02)	1.01 (.99, 1.04)	1.02 (1.00, 1.04)
Acculturation	1.12 (.78, 1.60)	2.27 (1.44, 3.58)	1.23 (1.04, 1.83)	1.14 (.80, 1.62)

Note: *Latino ethnicity* was coded (1), “yes”, based on self-reported Puerto Rican, Cuban, Mexican, Mexican American, Chicano, other Latin American, or other Spanish national origin or ancestry. *Age* was coded in years. *Education* had a possible range of 0 (no education or kindergarten only) to 6 (more than 4 years of college). *Family income* ranged from 0 (less than \$1,000) to 26 (\$50,000 and over). Odds ratios for each variable are adjusted for all other variables in the model. Odds ratios for continuous independent and interval-scale variables denote change in the odds of the health behavior per unit change in the independent variable. Significant odds ratios are highlighted in boldface.

Data source: National Center for Health Statistics, National Health Interview Survey, 1991.