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Acculturation and Cancer Screening Among Latinas: Results From the National Health Interview Survey

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Abstract

Background—Although early detection of breast and cervical cancer is one of the most effective means of assuring timely treatment and survival, the cultural hypothesis proposes that traditional norms, values, and beliefs deter Latinas from being screened.

Purpose—We assessed whether acculturation is associated with Latinas' receipt of a recent mammogram, clinical breast examination (CBE), and Papanicolaou (Pap) test, and the contribution of acculturation to screening after adjusting for sociodemographic variables.

Methods—We used data from the Health Promotion and Disease Prevention Supplement of the 1991 National Health Interview Survey. The sample for analyses of Pap test utilization included 1,370 Latinas age 18 and over, and for mammography and CBE, 525 Latina women age 40 and over.

Results—Acculturation was associated with a higher likelihood of having had a recent mammogram, but this effect was not significant when controlling for sociodemographic factors. In both adjusted and unadjusted analyses, acculturation did not predict recent Pap smears. Acculturation was associated with greater likelihood of recent CBE, controlling for sociodemographic factors.

Conclusions—The association between acculturation and cancer screening is inconsistent. Theoretical models are needed to explain the mechanisms involved in the association (or lack thereof) between acculturation and screening.

INTRODUCTION

The United States Department of Health and Human Services identified cancer screening and management as one of the six target categories in the Initiative to Eliminate Health Disparities (1). Breast cancer is the primary cause of cancer death among Latinas in the United States. Latina women have a lower 5-year survival rate for breast cancer than White women (76% vs. 85%), despite lower incidence and mortality rates (2). For cervical cancer, although 5-year survival rates are similar, incidence among Latinas is twice that of non-Latinas (16.3 vs. 7.8 per 100,000 population), and mortality is about 40% higher (3.4 vs. 2.5 deaths per 100,000) (2,3). Because early detection of cancer is one of the most effective means of assuring timely treatment and survival, screening differences between Latina and non-Latina White women may contribute to later stage diagnoses (4–6) and breast and cervical cancer disparities.

Hypotheses on the factors that promote and create barriers to screening among Latina women can be categorized as “socioeconomic/structural” or “cultural” explanations. The former hypothesize that Latina women’s relatively low socioeconomic status (SES) and structural factors, such as lack of access to health care, create obstacles to screening (7). This explanation is supported by recent evidence that Latino ethnicity does not predict screening. Instead, factors confounded with ethnicity, such as SES, health insurance, and access to and quality of health care (e.g., having a regular health care provider) predict screening behavior (7–9).

Cultural explanations, however, propose that Latino cultural values and behavioral norms deter women from being screened for breast and cervical cancer. But there is little consensus on how to measure and assess these norms. Examples of cultural values and beliefs described in the literature include (among others) traditional norms about modesty, leading to embarrassment about exposing intimate parts of the body (10); attitudes about the family and other cultural traditions (11); and “fatalistic” orientations or attitudes, such as the belief that little can be done to change the course of one’s fate (12).

Perhaps because of the difficulty in assessing Latino cultural norms, especially as they pertain to breast and cervical cancer, the cultural hypothesis typically is tested by examining the effect of acculturation on screening. *Acculturation*, broadly defined, is the process by which immigrants adopt the attitudes, values, customs, beliefs, and behaviors of a new culture (13). According to the cultural hypothesis, if traditional Latino cultural norms, values, and beliefs deter women from being screened, then greater acculturation would increase screening levels.

Acculturation, however, is associated with age and higher SES (11,14,15). Therefore, it is important to consider the effects of acculturation on cancer screening after adjusting for potential sociodemographic confounders. Previous studies employing these methods generated mixed results. Consistent with the hypothesis that Latino culture affects screening behavior, in some studies lower acculturation is associated with lower odds of receiving breast and cervical cancer screening controlling for socioeconomic and structural factors (e.g., education, access to health care) (15,16). Other studies, however, report no associations between acculturation and rates of cancer screening when controlling for sociodemographic factors and other confounders (6,17–20), suggesting that SES and structural factors, rather than cultural factors, explain screening behavior.

To date, there have been few systematic tests of the structural versus cultural hypotheses. Therefore, the purpose of this study was to assess whether acculturation is associated with the receipt of recent mammography, clinical breast examination (CBE), and Pap test screening, using a nationally representative sample of Latina women in the United States. We also examined the contribution of acculturation to screening after adjusting for sociodemographic variables. According to the cultural hypothesis, greater acculturation should predict a higher likelihood of screening, even when controlling for potential confounders (age and SES). If, however, sociodemographic characteristics account for the observed association between acculturation and screening, the structural hypothesis would be supported.

METHOD

Data Source

We analyzed data from the 1991 Health Promotion and Disease Prevention (HPDP) Supplement of the National Health Interview Survey (NHIS) (21). The NHIS is a nationwide, personal interview household survey conducted annually by the National Center

for Health Statistics (NCHS). It contains a representative sample of the civilian, noninstitutionalized population in the United States. The NHIS employs a complex multistage design with oversampling for targeted subpopulations, in particular, ethnic minority populations. The 1991 NHIS HPDP Supplement provided information on various health behaviors, including cancer screening. Although the questionnaire was in English, bilingual interviewers were used by the NCHS to minimize language barriers against completing the survey. Bilingual interviewers were assigned to areas that are known to be predominantly Spanish speaking. 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.¹ Although interpreters were not subject to the intensive training provided to NCHS interviewers, strict guidelines were followed when an interpreter was used. 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. The 1991 NHIS response rate was 95.7% (of the 4.3% noninterviews, 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) (21).

The total sample for the 1991 NHIS HPDP consisted of 43,732 respondents. To eliminate the potentially confounding effects of race, only White Latinas were included in the analyses for this study. Latinos are an ethnic group and may be Black, Asian, or of any other census-defined race. There were 431 Latina women excluded from the study based on this criterion. (We performed the identical analyses using the full sample of Latina women, and results remained essentially unchanged.) Race and ethnicity were based on respondents' self-reported information. Women who responded that they were White and indicated their national origin or ancestry as Puerto Rican, Cuban, Mexican or Mexicano, Mexican American, Chicano, Central or South American, or Other Hispanic were included in this study. Based on these criteria, the total sample size in the NHIS was 1,389 Latina women (53.2% Mexican American, 9.5% Puerto Rican, 9.2% Cuban, 27.7% Central or South American or Other Latina). We excluded 19 women with missing data on their length of residence in the United States; therefore, in this study, the sample consisted of 1,370 Latina women age 18 or older. Analyses on Pap smear screening was based on the full sample. Consistent with American Cancer Society guidelines in 1991 (22), breast cancer screening questions were only asked of women age 40 or older. Therefore, analyses of mammograms and CBEs included 525 Latinas.

Measures

Cancer screening tests—Outcome measures included recent receipt of three tests: Pap smear, CBE, and mammogram. In the NHIS, all female respondents age 18 and older were asked, “During the past 12 months, did you have a Pap smear or Pap test to check for cancer of the cervix?” For breast cancer screening, women age 40 and older were asked two questions: “During the past 12 months, have you had a breast physical exam in which a medical doctor or health professional checked your breasts for lumps?” and “During the past 2 years have you had a mammogram?” These time intervals were consistent with screening recommendations that were current in 1991 (22). Each of these three outcomes was coded as a dichotomous variable (0 = *no*, 1 = *yes*).

Acculturation—Nativity status/length of time residing in the United States was used as a proxy measure of acculturation. These are standard indexes for assessing acculturation in

¹Unfortunately, the 1991 NHIS HPDP public use data set does not include a variable to identify interviews conducted in Spanish with a bilingual interviewer or those that employed a family member or neighbor as interpreters.

relation to screening (9,19,20,23). Length of residence and nativity or generation status are frequently used indexes of acculturation and show high correlations with other scales, such as language-based measures (r s range from .69 to .79) (24). In the NHIS, foreign-born respondents were asked how long they lived in the United States, using a 5-category response of 1 (*less than one 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, Latina women 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 (25), 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. A similar acculturation variable based on length of residence in the United States was used in Zambrana et al.’s (20) study of cancer screening using national data sets. That study, however, employed a 10-year-or-more length of residence cutoff in defining high acculturation. As described further in the Results section, the frequency distribution of respondents’ nativity status and length of time in the United States supported our decision to use a 15-year instead of 10-year cutoff. Specifically, only 18.1% of the sample had resided in the United States for less than 10 years. We defined both US-born Latinas and those who had resided in the United States for 15 years or more as “high acculturated” based on the rationale that both groups of women had longer periods of exposure to (hence, greater chances to adopt) American culture compared with women who had resided in the United States for less than 15 years. A similar strategy has been implemented in other studies of acculturation and screening (9).

Sociodemographic characteristics—Age was coded in years as a continuous variable. SES was assessed as family income and highest level of education completed, and both were treated as continuous variables in the analyses. Family income was measured on a scale of 0 (*less than \$1,000/year*) to 26 (*\$50,000/year and over*), with lower codes (0 to 19) containing intervals of approximately \$1,000 (e.g., 19 = *\$19,000–\$19,999/year*), and higher codes (20 to 25) representing intervals of approximately \$5,000 (e.g., 25 = *\$45,000–\$49,999*). Highest level of education completed was coded as 0 (*no education or kindergarten only*), 1 (*elementary school*), 2 (*some high school*), 3 (*high school graduate*), 4 (*some college*), 5 (*college graduate*), or 6 (*postcollege*).

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 (26). Initial analyses of crude odds ratios were conducted to determine if less acculturated Latina women were less likely than highly acculturated Latinas to receive cancer screening tests. Next, multiple logistic regression analyses were used to examine cancer screening among less acculturated Latinas compared with highly acculturated Latinas, with age, education, and family income included in the model. These analyses, therefore, assessed the effect of acculturation on screening, controlling for the sociodemographic variables. All analyses of crude and adjusted odds ratios were conducted with survey procedures in Stata, which allow for sampling weights and multistage sampling adjustments.

RESULTS

Descriptive Statistics

Of the full sample of 1,370 women, almost half (47.7%) were born in the United States, about one fourth (23.0%) lived in the United States for 15 years or more, and the remainder reported living in the United States for less than 15 years (9.7% reported their length of residence as 10 to less than 15 years; 8.9% reported 5 to less than 10 years, and 9.2% indicated they had lived in the United States for less than 5 years). These proportions reflect the population demographics of Latinos in the United States, many of whom were either born in or resided in the United States for long terms (27). The average age of the sample was 38.2 years ($SD = 15.6$), with a median family income of \$19,000–\$20,000/year. The median education level was high school graduate, but slightly over one fourth (26.8%) had completed only elementary school or fewer years of education.

Shown in Table 1 are the demographic characteristics and descriptive data of the study respondents, grouped by screening age categories and level of acculturation. Of the women age 18 or over ($n = 1,370$), 343 (25.0%) had a low level of acculturation and 1,027 (75.0%) had a high level of acculturation, with an average age of 32.7 and 40.4 years, respectively. The sample of women age 40 and over ($n = 525$) included 72 (13.7%) low-acculturated and 453 (86.3%) high-acculturated Latinas, whose mean ages were 51.7 and 55.2 years, respectively. Table 1 also shows that acculturation was associated with age and SES. In both age categories (18 years and older; 40 years and older), women with a high level of acculturation were older, were more educated, and had higher incomes than their less acculturated counterparts.

We assessed the unadjusted odds ratios for screening in relation to acculturation. Although rates of Pap smears were slightly higher among highly acculturated (58.6%) than among less acculturated Latinas (50.7%), these differences were not significant (odds ratio [OR] = 1.38, 95% confidence interval [CI] = 0.99, 1.92). Higher acculturated Latinas were significantly more likely than less acculturated Latinas (50.4% vs. 34.4%, respectively) to have had a recent mammogram (OR = 1.93; CI = 1.04, 3.59). For CBE, the odds of screening were also significantly higher among high-acculturated (63.0%) relative to low-acculturated Latinas (44.2%) (OR = 2.15; CI = 1.23, 3.74).

Multiple Regression Analyses

The adjusted odds of cervical and breast cancer screening after controlling for age, education, and family income are shown in Table 2. Regarding the sociodemographic factors in these models, higher levels of education were associated with greater odds of having received a recent Pap smear (OR = 1.18) and mammogram (OR = 1.27), but not CBE. Age and education were not associated with screening. As in the unadjusted analyses, the multiple logistic regression analyses showed no effect of acculturation on Pap smear. More acculturated Latinas were still more likely to have had a mammogram, but the difference was no longer significant when adjusting for age, education, and family income. Of interest, the effect of acculturation was more pronounced for CBE when controlling for age, education, and family income. Relative to Latinas who had lived in the United States for less than 15 years, more acculturated Latinas were about twice as likely to have had a CBE in the past year (OR = 2.26), accounting for sociodemographic factors.

DISCUSSION

We examined the effects of acculturation, controlling for socioeconomic and demographic variables, on three cancer screening behaviors among Latina women. The findings of this study highlight three themes to pursue in future research on acculturation as well as on

cancer screening behaviors among Latina women: (a) the importance of considering socioeconomic factors, (b) the differential associations between acculturation and various screening behaviors, and (c) the need to develop theoretical models to explain the effects (or lack thereof) of acculturation on screening.

A comparison of the univariate models with the multiple regression models indicated that in the analyses of mammogram screening, acculturation was overestimated in the model that did not account for SES. In contrast, the effect of acculturation on CBE was underestimated in the model that did not control for SES. These results underscore the importance of accounting for socioeconomic factors in assessing the effect of acculturation on screening. In addition, education, but not acculturation, was a significant predictor of Pap smear and mammogram screenings in the multivariate models that included age, income, and acculturation. These findings support “socioeconomic/structural” hypotheses concerning screening. Formal education may be associated with greater knowledge of screening guidelines and recommended time intervals.

That acculturation remained significant when age, education, and income were included in the model on CBE is consistent with prior observations (15). This finding, which suggests that the effects of acculturation on screening cannot be explained by the confound between acculturation and sociodemographic factors, provides support for the cultural hypothesis. Specific components of Latino culture associated with CBE, however, are subject to further inquiry. At present, the literature on screening among Latinas has provided few clues as to potential cultural norms, attitudes, values, or beliefs associated with screening.

There is a critical need to develop and test theories concerning the differential effects of acculturation on various screening and health behaviors. This, in turn, can guide the development of appropriate acculturation measures. Various measures of acculturation predict screening behaviors differently, even when adjusting for sociodemographic confounders. In one study (11), holding traditional attitudes toward family structure was significantly associated with *greater* likelihood of recent mammogram but not Pap smear, and other indexes of acculturation (i.e., language use, value of cultural origin, and interaction with mainstream society) were not related to either mammogram or Pap screening. Zambrana et al. (20) found that neither length of time in the United States nor nativity status predicted having received a recent Pap smear, mammogram, or CBE, but language of interview was associated with CBE screening. In Wu et al.’s (28) study of women age 65 years and older, language acculturation (i.e., English language use and preference) predicted ever having had a Pap smear but not a mammogram. Finally, Ramirez et al. (23) reported that neither language acculturation nor nativity status predicted receipt of recent mammography. However, both acculturation measures predicted recent Pap smear screening but in opposite directions: English preference predicted greater and U.S. birth predicted less screening. In this study, the effects of acculturation varied for each of the three screening behaviors examined. Acculturation, assessed as nativity status/length of residence in the United States, was associated with receipt of a recent CBE but not Pap smear or mammogram. Although there are relatively few studies on acculturation and cancer screening, the existing literature is fraught with inconsistent and contradictory findings. To reconcile disparate findings and advance our understanding of acculturation and screening, a more systematic and theory-driven approach is necessary.

Theoretical approaches that identify specific factors, components, or mechanisms associated with the “cultural hypothesis” would be useful. In its simplest form, the cultural hypothesis predicts that breast and cervical cancer screening practices in general are lower among less acculturated women relative to those who are more acculturated. However, our analyses of cervical cancer and mammography screening revealed no differences between the two

samples. These null findings may be explained by a combination of several social, cultural, and medical factors. In accordance with published screening recommendations, the question regarding receipt of Pap smear was asked of the full sample of women age 18 and older, whereas mammogram screening was assessed only among women age 40 and older. For the sample on Pap smears, the average age of respondents was 38.2 ($SD = 15.6$), and the modal age was 28 years; for the sample on mammograms, the mean was 54.6 ($SD = 11.8$), with a modal age of 48 years. Thus, these two samples differed in age and life stage. Our finding that Pap test use was relatively high in the low acculturated group may reflect the generally routine nature of Pap examinations for women of childbearing age. In some studies, Latina women who received Pap smears reported that it was part of a regular checkup (17). Unlike mammography testing, which may require scheduling an additional appointment and consultation of a specialist with additional fees or copayments, Pap smears are most commonly performed by an obstetrician or gynecologist. The similar rates of recent Pap tests between the high- and low-acculturation groups may also reflect similarities in parity and fertility. Although fertility may decrease with greater acculturation (29), Latina women have relatively high fertility and parity rates, higher than those of non-Latina White women (27). These greater fertility and parity rates, in turn, influence the frequency of visits to obstetricians or gynecologists and, perhaps, the likelihood of maintaining a routine schedule of such visits.

Use of the 1991 NHIS is advantageous for several reasons. First, the NHIS consists of a representative sample of the U.S. population. This contributes significantly to the ability to generalize research findings based on this data set. The vast majority of the literature on acculturation and breast and cervical cancer screening is based on samples of Latina women living in the West (6,17,19) and Southwest (11,28) regions of the United States, areas in which the Latino population is predominantly of Mexican origin. To our knowledge, only one published study (20) examined screening and acculturation factors on a national sample, and acculturation was not a major focus of that study. Second, the NHIS contains data on key SES and demographic variables, as well as breast and cervical cancer screening. Third, the 1991 NHIS contains data on nativity status and foreign-born respondents' length of residence in the United States.

Some limitations of the study warrant mention. First, analysis of differences between high and low acculturated Latinas in this study may have been impaired by the low number of participants available for study. Although the NHIS provides one of the largest, nationally representative samples of Latinas, once the sample was stratified for level of acculturation and age, we were left with a small subsample of low acculturated Latinas in the analyses on mammogram and CBE. Second, our analyses combined all Latina groups. Analyzing cancer screening behaviors by Latino subgroups using existing national surveys is extremely difficult, as stratification results in limited sample sizes of proportionately smaller groups of Latinos (e.g., Cubans). These issues are important, as there are differences between Latino groups in sociodemographic and other factors (27) that may be associated with screening. Third, in this study, acculturation was assessed as nativity status/length of time in the United States, commonly used indexes of acculturation. Because acculturation is a multifaceted construct, it can be measured in a number of ways. Indexes of acculturation have included, for example, language use, generation status, nativity status, length of time living in the United States, proportion of friends who are Latino, ethnic composition of neighborhood, adherence to traditional values, and behaviors or preferences in various life domains (e.g., Spanish vs. American food, music, and television) (30). Because these various components may predict different cancer-related health behaviors, use of a multicomponent would have provided a more comprehensive measure of acculturation than the single dimension based on nativity status and years living in the United States. Furthermore, greater length of residency in the United States may result in greater exposure but not necessarily adherence

to American belief systems and ways of life. Nevertheless, length of residence and generation or nativity status are valid proxy measures of acculturation and are the most frequently used single-dimension indexes (14,24). Finally, our study employed a secondary data analysis of a survey conducted in 1991. Although the Latino population has experienced considerable growth since that time, there are currently very few large, national data sets that contain information on (a) breast and cervical cancer screening behaviors, (b) sociodemographic characteristics, and (c) acculturation variables. Therefore, the multiple advantages of using the NHIS for our study far outweighed its limitations. There is a pressing need to collect richer and more extensive data on Latinos in the United States (7,31). It is our hope that the results of our study and that of other researchers, combined with the clear explication and acknowledgment of the limitations of these national data sets, will help illustrate the need to devote more resources to collect national data, and to support research, advocacy and policies aimed at eliminating health disparities in cancer.

Additional work is needed to understand the mechanisms by which acculturation is associated with cancer screening, as well as cancer-related health behaviors, and general health. Surprisingly, there are very few theories on acculturation and health outcomes (32). Ruiz and colleagues (18) provided evidence for a model whereby language acculturation exposes Latina women to health information about breast and cervical cancer screening recommendations, which in turn predicts screening. It is important to note that the limited literature on acculturation and cancer screening has largely proceeded from a “deficit model,” that is, by outlining the values and beliefs that are detrimental to health (in this case, screening). There is a significant body of evidence, however, that greater acculturation is related to worse health and health behaviors among Latinos (13,14,33,34). The mechanisms accounting for these findings are not clear but may include loss of protective cultural health beliefs, behavioral practices, identity and values, and responses to continued discrimination (13,35). Acculturation, therefore, presents some interesting challenges, especially as it concerns cancer screening and cancer-related behaviors. Research is needed on the contexts under which acculturation has adverse versus beneficial effects on health. Certain cultural values (e.g., traditional norms concerning the family) and behaviors (e.g., the tendency to bear children at young ages) may serve as protective factors against breast cancer, and there is some evidence that traditional attitudes concerning the family predict greater mammography screening (11). More theory and research is needed on the potentially protective effects of *low* acculturation (e.g., maintaining Latino cultural values and traditions). The development of cultural resilience models (36), in particular, may help to explain why Latinos fare relatively well, despite great economic and other hardships (37). There are a host of important and interesting issues, therefore, to be addressed in future research on acculturation and screening, as well as breast and cervical cancer risk and survival.

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TABLE 1

Characteristics of Study Samples

| | Women 18 Years of Age ^a | | Women 40 Years of Age ^b | |
|----------------------|------------------------------------|--------------------|------------------------------------|--------------------|
| | Low Acculturation | High Acculturation | Low Acculturation | High Acculturation |
| n | 343 | 1,027 | 72 | 453 |
| % | 25.0 | 75.0 | 13.7 | 86.3 |
| Age | | | | |
| <i>M</i> | 32.7 | 40.4 | 51.7 | 55.2 |
| <i>SD</i> | 12.3 | 16.2 | 12.4 | 11.6 |
| Range | 18–83 | 18–90 | 40–83 | 40–90 |
| Education (median) | some H.S. | H.S. graduate | Elementary | H.S. graduate |
| Income (median) | \$14–15K | \$19–20K | \$15–16K | \$16–17K |
| % screened | | | | |
| Pap smear | 50.7 | 58.6 | | |
| Mammogram | — | — | 34.4 | 50.4 |
| Clinical breast exam | — | — | 44.2 | 63.0 |

Note. Data Source: National Center for Health Statistics, National Health Interview Survey, 1991. The differences between low- and high-acculturated Latinas in age, education, and income are significant at $p < .05$. Dashes indicate that questions on mammogram and clinical breast exam were only asked of women aged 40 or older. H.S. = high school.

^a $n = 1,370$.

^b $n = 525$.

TABLE 2

Odds Ratios (95% Confidence Intervals) of Cancer Screening Tests Adjusting for Sociodemographic Variables

| | Pap Smear | Mammogram | Clinical Breast Exam |
|---------------|-------------------|-------------------|-----------------------------|
| Age | 0.99 (0.98, 1.00) | 1.02 (1.00, 1.04) | 1.02 (0.99, 1.04) |
| Education | 1.18 (1.03, 1.36) | 1.27 (1.06, 1.52) | 1.10 (0.90, 1.36) |
| Family income | 1.02 (0.99, 1.04) | 1.01 (0.98, 1.05) | 1.03 (0.98, 1.08) |
| Acculturation | 1.41 (1.00, 1.99) | 1.76 (0.92, 3.38) | 2.26 (1.17, 4.36) |

Note. Data source: National Center for Health Statistics, National Health Interview Survey, 1991. Odds ratios for each variable are adjusted for all other variables in the model. Odds ratios for continuous independent variables denote change in the odds of screening per unit change in the independent variable.