



Nina Mikhaïlenko. *Burmese*. Oil on canvas, 24" × 30".

Underutilization of mammography screening by Hispanic women living in the United States has resulted in poorer survival rates and increased likelihood of dying of breast cancer.

Acculturation and Mammography Screening Among Hispanic Women Living in Farmworker Communities

Richard C. Palmer, DrPH, Maria E. Fernandez, PhD, Guillermo Tortolero-Luna, MD, PhD, Alicia Gonzales, MSSW, and Patricia Dolan Mullen, DrPH

The relationship between acculturation and mammography screening practices among Hispanic women is unclear due to inconsistent study findings. The purpose of this research was to further investigate the effect of acculturation on mammography screening practices among Hispanic women and to explore the effect of biculturalism on mammography screening. Hispanic female farmworkers (N = 716) who were 50 years of age and older living in communities in Texas, New Mexico, and California were interviewed at their homes. Data collection was conducted from November 2001 to February 2002. Logistic regression models showed no significant effect for acculturation for the entire sample. Post hoc stratified analysis found that bicultural study participants in California were 3 times more likely to be adherent to screening compared to those with low acculturation. Study findings suggest that distinct differences might exist for Hispanic women living in farmworker communities in California, and perhaps other communities not on the United States-Mexico border. Women in such communities with low levels of acculturation can be targeted for interventions to increase mammography adherence.

Introduction

For Hispanic women in the United States, breast cancer remains the most frequent cause of cancer death.¹ They also experience poorer 5-year survival rates and are more

likely to die of breast cancer compared to non-Hispanic whites.²⁻⁵ This mortality differential is explained in part by underutilization of mammography screening. Studies comparing Hispanic subgroups have also found that women who self-reported their ethnic identification as

From The University of Texas-Houston, School of Public Health, Houston, Texas (RCP, MEF, GTL, PDM), and the National Center for Farmworker Health, Inc, Buda, Texas (AG).

Submitted February 19, 2005; accepted July 28, 2005.

Address correspondence to Richard C. Palmer, DrPH, USUHS-PMB 4301 Jones Bridge Road, Bethesda, MD 20814. E-mail: rpalmer@usubs.mil

This research was supported in part by a Behavioral Science Education Cancer Prevention and Control Training Grant, National Cancer Institute/NIH Grant #2R25CA57712 and the Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Program Announcement #97073, Cooperative Agreement U57/CCU614491.

Mexican have lower rates of breast cancer screening,^{6,8} suggesting that certain subgroups of Hispanic women may be at greater risk.

Cross-sectional studies conducted to investigate factors that potentially explain the underutilization of mammography screening among Hispanic women have identified factors that are important for screening. The factors most strongly and consistently associated with having a screening mammogram are health insurance and/or regular source of health care.^{6,9,10} Age,^{7,11-13} income,¹⁴ and education⁶ also appear to be associated with mammography screening in Hispanic women, although their relationship is not as consistent.

Over the past two decades, the effect of acculturation on health behaviors, including mammography screening, in Hispanics has received attention by health researchers. Studies have examined the role of acculturation with cigarette smoking,^{15,16} alcohol consumption,¹⁷⁻²² obesity,^{23,24} and birth outcomes.^{25,26} These studies have generally found that highly acculturated Hispanics are similar in knowledge and behavior to non-Hispanic whites, with the exception of obesity and birth outcomes where acculturation is associated with poorer health outcomes.

Studies have also examined acculturation and the use of health services. Results from these studies have been fairly consistent in reporting that low levels of acculturation for Hispanics are associated with the underutilization of preventive health services.²⁷⁻²⁹ Results of studies investigating the effect of acculturation on mammography screening have varied — some have found no or weak associations,³⁰⁻³² while others have found a consistent relationship.³³⁻³⁶ O'Malley and colleagues³⁷ found that after controlling for variables in demographics, socioeconomic, and access to health care, Hispanic women of Caribbean origin who were more acculturated had higher odds of receiving a mammogram than less acculturated women.

The earliest models of acculturation conceptualized the process as linear and unidimensional,^{38,39} ie, the immigrant would adopt the majority groups' culture and abandon native culture and beliefs. Expanded models of acculturation have also been proposed and refine the linear approach used in studying acculturation's effect on health behavior. These broader models of acculturation account for the possibility that individuals may adopt characteristics of the new host society (eg, second language, new behavioral norms, and shift in values) while retaining many elements of their cultural identity. Bidimensional models suggest that gaining new cultural characteristics does not necessarily come at the expense of the culture of origin. Researchers have suggested that bicultural individuals may have better health status due to lower acculturative stress and by receiving support from both the original and new host society.^{40,41} Only one published study to date has examined the influence of biculturalism on cancer screening. In a study conducted with low-income Hispanics of Mexican origin in

Phoenix, Arizona, Harmon and colleagues³⁵ found that compared to low acculturated women, bicultural and high-acculturated women were significantly more likely to have undergone recent Pap testing.

In the present study, we explore the relationship of acculturation on mammography adherence among Hispanic women living in farmworker communities in the Western United States. Specifically, we investigate what influence biculturalism may have on mammography adherence. Overall, findings from this current study conducted in farmworker communities consisting of Hispanics of primarily Mexican origin can help plan more effective and targeted interventions to increase mammography screening rates among this highly disadvantaged Hispanic subgroup.

Methods

Study Sample

Eligibility was restricted to women 50 years of age or older who had not been diagnosed previously with breast or cervical cancer. The study population was selected from neighborhoods in cities along the Texas-Mexico border (Eagle Pass in Texas and Anthony in New Mexico) and from the central valley in California (Merced and Watsonville). These cities were selected based on having high percentages of farmworker families residing within them and being within 20 miles of health care facilities that offer cancer screening examinations. Neighborhoods within these cities were selected and identified by interviewing migrant health clinic staff and community leaders. In all, 716 women were interviewed, which includes an additional 135 women who were oversampled based on their nonadherence to breast and cervical cancer screening recommendations. The sample was obtained by using the EPI Sampling Quadrants Scheme developed by Bennett et al.⁴² Only one woman per household was eligible; if more than one met the criteria, the woman with the nearest birth date to the current date was selected. Study participants gave written consent before they completed the interview, and they were given a \$20 incentive upon completion.

Survey Instrument and Data Collection

The survey developed for the *Cultivando la Salud* baseline study consisted of 265 items, including demographic, general health, knowledge and attitudes about mammography, and cancer screening questions. The instrument was refined after pilot testing with 200 Hispanic farmworker women. The instrument was also evaluated by experts for content validity and was translated to Spanish and then translated back to English. Surveys were conducted in Spanish and lasted approximately 2 hours. All interviewers were Hispanic women who were bilingual and had attended a two-day interviewer training on how to interview and complete the survey instrument.

Study Variables

Adherence to Mammography Screening Guidelines

Mammography adherence was assessed by two questions in the survey. The first question asked the specific month and year of the participant's last mammogram. Participants who were unable to remember the date of their last mammogram were then asked to estimate their last mammogram by the number of years (<1, 1, <2, or >2 years) that had elapsed. Respondents who had a screening mammogram within 2 years of the interview date were classified as adherent to screening guidelines. Those who never had a mammogram or who had a mammogram more than 2 years before the interview were classified as nonadherent.

Acculturation

The Bidimensional Acculturation Scale for Hispanics developed by Marin and Gamba⁴³ was used to measure acculturation. The scale consists of 24 items that measure two cultural domains: Hispanic and non-Hispanic. The scale was tested with and performs well with Hispanics from Mexico and Central America and has demonstrated high internal consistencies for both the Hispanic domain (Cronbach's alpha = .89) and the non-Hispanic domain (Cronbach's alpha = .98). Acculturation is calculated by averaging the scores on questions that measure the Hispanic and non-Hispanic domains. The two scores are used to define the categorical level of acculturation of study participants. A score of 2.5 or above in each domain was interpreted as signifying biculturalism. A score of 2.5 or above in the Hispanic domain and below 2.5 in the non-Hispanic domain was considered low acculturation. Conversely, a score equal of 2.5 or above in the non-Hispanic domain and below 2.5 in the Hispanic domain was categorized as high acculturation. Scores below 2.5 in each domain were considered low-acculturation.

Sociodemographic and Access-to-Care Variables

Sociodemographic variables for the present analysis included age, which was categorized into three groups (50-59, 60-69, and 70+ years), years of education also categorized into three groups (≤ 5 , 6-11, and ≥ 12 years), marital status (married vs not), and annual household income ($\leq \$5,000$, $\$5,001-\$9,999$, $\$10,000-\$19,999$, $\geq \$20,000$, and don't know). Place of birth (United States, Mexico, Central America) was collapsed into two categories (United States and Other). Length of stay in the United States was converted into a proportion of lifetime spent in the United States and categorized into four groups (≤ 25 , 26-50, 51-75, and ≥ 76). Variables in access to health care included source of regular care (yes vs no) and health insurance status (yes vs no).

Site

A site variable was created to reflect the differences that could be associated with screening mammography due to

variations attributable to site. The two cities along the United States-Mexico border — Eagle Pass and Anthony — were combined to form the “border sites.” Similarly, Merced and Watsonville, both located in the central valley of California and away from the border, were combined to form the “California sites.”

Data Analysis

This analysis is based on interviews with 702 women aged 50 years and older. Fourteen participants were excluded because data for mammography adherence and/or date of birth were missing. Descriptive statistics were generated to characterize the study sample with respect to sociodemographic variables. Bivariate analyses examining the relationship of screening status to sociodemographic variables, access to care, and acculturation were performed by conducting chi-square tests. Additional bivariate tests examined whether differences existed between sociodemographic characteristics, access to health, and mammography screening across study sites. Further analyses examining the relationship of acculturation across study sites were conducted by performing chi-square tests for categorical variables and *t* tests for continuous variables. To examine the independent effect of acculturation, multivariate logistic regression was performed using the Glimmix macro.⁴⁴ Study participants with missing data were excluded using pair-wise deletion for bivariate analysis. For logistic regression, study participants with missing data were excluded from the analysis using list-wise deletion ($n = 21$). Data were analyzed using the SAS v8.2 program (SAS Institute Inc, Cary, NC).

Results

Characteristics of Study Sample

Almost half of the study participants were in the 50-59 year age group, with a mean age of 62 years (SD = 9.1) and a range of 50 to 92 years of age (Table 1). More than half of the sample reported a total family income of less than \$10,000 a year, two thirds were married, and the majority had less than a high school education. More than three quarters of study participants reported being born in Mexico, and approximately half have spent more than half of their lives in the United States. Half of the sample reported either having private or public health insurance, and 90% of study participants reported having a usual source of care. Additionally, with the oversampling for nonadherence, more than half of the study participants were adherent to screening guidelines.

Site

There were significant differences in age, education, income, and mammography adherence between study participants in California and border sites (Table 1). Participants in California were younger, had less education, and

generally had lower incomes. There were no significant differences between California and border study participants for having a regular source of care or health insurance.

Mammography Adherence

Mammography adherence did not differ significantly across age groups, marital status, education, country of birth, or proportion of life spent in the United States (Table 2). There was a significant difference across income levels for mammography adherence. Additionally, there were significant differences for access-to-care variables. Greater proportions of study participants who were adherent had health insurance or a regular source of care.

Acculturation

Nearly three quarters of the sample, 74.1%, were categorized as having low levels of acculturation. The individu-

als in the remaining one quarter of the sample were bicultural. No individuals were found to be highly acculturated. There was a significant difference between the California and border sites on levels of acculturation ($\chi^2(1) = 7.52, P = .006$). There also were significant differences between bicultural and low acculturation groups for several variables but not on mammography adherence (Table 3). Those who were bicultural had higher incomes, had more education, were more likely to have been born in the United States, and were more likely to have spent more years in the United States. Additionally, there was also a significant difference for health insurance, with more bicultural women having insurance.

Logistic Regression

Regression models showed no significant effects for acculturation when controlling for sociodemographics, access-to-care variables, and site (Table 4). Post hoc analyses were then conducted for border and California sites adjusting for sociodemographic and access-to-care variables since study site was found to be significant. Stratified analysis by site found that bicultural study participants in California were 3 times more likely to be adherent compared to those with low acculturation.

Table 1. — Study Sample Characteristics for California and Border Sites (N = 702)

	Site		P Value
	California n (%)	Border n (%)	
Sociodemographic Variables			
Age (years)			<.001
50–59	163 (57.4)	180 (43.1)	
60–69	64 (22.5)	135 (32.3)	
70+	57 (20.1)	103 (24.6)	
Income			<.001
\$5,000	68 (23.9)	88 (21.1)	
≤\$5,001–\$9,999	107 (37.7)	96 (23.0)	
\$10,000–\$19,999	79 (27.8)	93 (22.2)	
≥\$20,000	19 (6.7)	35 (8.4)	
Don't know	11 (3.9)	106 (25.4)	
Education (years)			<.001
≤5	188 (68.9)	202 (48.6)	
6–11	64 (23.4)	171 (41.1)	
≥12	21 (7.7)	43 (67.2)	
Marital Status			.85
Married	188 (66.2)	279 (66.9)	
Not married	96 (33.8)	138 (33.1)	
Place of Birth			<.001
United States	33 (11.6)	115 (27.6)	
Other	251 (88.4)	302 (72.4)	
Proportion of Life Spent in the United States			<.001
≤25	82 (29.5)	38 (9.0)	
26–50	78 (28.2)	117 (27.4)	
51–75	85 (31.0)	144 (34.0)	
≥76	32 (11.3)	126 (29.6)	
Access-to-Health-Care Variables			
Insurance			.54
Yes	171 (60.2)	242 (57.9)	
No	113 (39.8)	176 (42.1)	
Regular Source of Care			.86
Yes	255 (89.8)	377 (90.2)	
No	29 (10.2)	41 (9.8)	
Mammography Adherence*			<.001
Yes	202 (71.1)	212 (50.7)	
No	82 (28.9)	206 (49.3)	

* Prevalence estimate derived from oversampling.

Table 2. — Study Sample Characteristics for California and Border Sites (N = 702)

	Adherent n (%)	Nonadherent n (%)	P Value
Sociodemographic Variables			
Age (years)			.220
50–59	203 (49.0)	140 (48.6)	
60–69	125 (30.2)	74 (25.7)	
70+	86 (20.8)	74 (25.7)	
Income			.006
≤\$5,000	79 (19.1)	77 (26.7)	
\$5,001–9,999	132 (31.9)	71 (24.7)	
\$10,000–19,999	111 (26.8)	61 (21.2)	
≥\$20,000	34 (8.2)	20 (6.9)	
Don't know	58 (14.0)	59 (20.5)	
Marital Status			.455
Married	134 (32.4)	101 (34.8)	
Not married	280 (67.6)	187 (65.2)	
Education (years)			.131
≤5	239 (58.4)	150 (53.9)	
6–11	28 (31.3)	107 (38.2)	
≥12	42 (10.3)	22 (7.9)	
Site			<.001
Border: Eagle Pass, Texas	95 (22.9)	127 (44.1)	
Border: Anthony, New Mexico	117 (28.3)	79 (27.4)	
California: Merced	59 (14.3)	22 (7.5)	
California: Watsonville	143 (34.5)	60 (20.8)	
Access-to-Health-Care Variables			
Insurance			<.001
Yes	273 (65.9)	140 (48.6)	
No	141 (34.1)	148 (51.4)	
Regular Source of Care			<.001
Yes	362 (87.4)	271 (93.8)	
No	52 (12.5)	17 (6.2)	

Discussion

Previous studies of the association of acculturation and a variety of health-related behaviors among Hispanics suggest its importance on health behaviors.^{11,15-23,26,30,33-37,45,46} However, results of research examining acculturation and mammography screening have varied in finding an effect of acculturation and mammography screening.^{16,30,32,34,37,47,48} In the current study we investigated the relationship of acculturation with mammography screening and chose to use a bidimensional scale that allowed for the measurement of bidirectional change in acculturation. Examining biculturalism has significant public health merit, given the increases in immigration to the United States from Latin American countries. However, we did not find a significant effect for biculturalism on mammography screening. Our nonsignificant findings could be

related to the lack of distribution found across the dimensions of the Bidimensional Acculturation Scale in this study since the study sample was fairly homogenous; this may have reduced the power to find an effect.

Post hoc analyses suggest that acculturation may differ by site. The analysis by site found that acculturation was a significant predictor of screening adherence with study participants in California. Analysis examining bicultural differences in California found that greater proportions of adherent women were bicultural, 58% vs 47%. The opposite was found in the border sites, 62% vs 73%. Given the locations of study participants, California and the Texas/New Mexico/Mexico border, it seems plausible that participants might experience acculturation differently because of the different environments. The need to assimilate into more mainstream society is potentially lower for those who live along the border. Residing near the border reinforces Hispanic culture. Many border residents can freely migrate between the United States and Mexico for goods and services, including health care. In the California communities, which are approximately 450 miles from the border, the push for functional integration into mainstream society is more likely greater.

Results of this study are also limited by how acculturation was measured. In this study, acculturation is inferred by language use, an agreed upon and accepted proxy. However, most instruments measuring acculturation have focused on language (eg, Spanish vs English proficiency) because language use and preference have been found to explain 45% to 75% of the variance in acculturation measures across Hispanic subgroups.^{38,39,49,50} It seems plausible that a language-based instrument does not necessarily capture acculturation, but rather some other element that is associated with acculturation. Given that acculturation involves a series of changes in behavioral, cognitive, and affective domains, more comprehensive measures of acculturation are needed that take into account the many processes of change that individuals go through.

In our study, we also note the importance of separating the relationship of acculturation with cancer screening from the variance explained by socioeconomic factors such as income and education. Analyses showed that acculturation was strongly related to socioeconomic conditions. Past studies of acculturation that have not controlled for these socioeconomic factors may be flawed by the confounding of education and income with acculturation. In our study, when income and education were not controlled for in post hoc analyses, mammography adherence was significantly related to acculturation.

Several limitations should be acknowledged in the present study. The sample was selected from only four communities, and generalizing findings to migrant and seasonal Hispanic farmworkers nationally must be done cautiously. Data about mammography were self-reported and not validated. However, most studies of self-reported cancer screening behaviors among Hispanic women find self-

Table 3. — Bivariate Associations Between Mammography Adherence and Other Variables (N = 702)

	Acculturation		P Value
	Bicultural no. (%)	Hispanic no. (%)	
Sociodemographic Variables			
Age (years)			.426
50–59	83 (45.6)	260 (50.1)	
60–69	58 (31.9)	140 (27.0)	
70+	41 (22.5)	119 (22.9)	
Income			<.001
≤\$5,000	27 (14.8)	128 (24.7)	
\$5,001–9,999	45 (24.7)	158 (30.4)	
\$10,000–19,999	48 (26.4)	124 (23.9)	
≥\$20,000	28 (15.4)	26 (5.0)	
Don't know	34 (18.7)	83 (16.0)	
Marital Status			.145
Married	113 (62.1)	353 (68.0)	
Not married	69 (37.9)	166 (32.0)	
Education (years)			<.001
≤5	39 (21.7)	350 (69.0)	
6–11	84 (46.7)	150 (29.6)	
≥12	57 (31.7)	7 (1.4)	
Place of Birth			<.001
United States	102 (56.0)	45 (8.7)	
Other	80 (44.0)	474 (91.3)	
Proportion of Life Spent in United States			<.001
≤25	0 (0)	120 (23.4)	
26–50	17 (9.4)	177 (34.5)	
51–75	42 (23.2)	185 (36.1)	
Access-to-Health-Care Variables			
Insurance			<.001
Yes	130 (71.4)	282 (54.3)	
No	52 (28.6)	237 (45.7)	
Regular Source of Care			<.08
Yes	158 (86.8)	474 (91.3)	
No	24 (13.2)	45 (8.7)	
Mammography Adherence*			.89
Yes	74 (40.7)	214 (41.2)	
No	108 (59.3)	305 (58.8)	

* Prevalence estimate derived from oversampling.

Table 4. — Logistic Regression Models Predicting Mammography Adherence With Acculturation

	Entire Sample		California		Border	
	OR	95% CI	OR	95% CI	OR	95% CI
Acculturation						
Bicultural	1.24	.80–1.93	3.03**	1.22–7.69	.95	.55–1.65
Low acculturation	Referent		Referent		Referent	
Age						
50–59	1.77*	1.51–4.73	1.02	.42–2.50	2.22**	1.17–4.17
60–69	1.88**	1.16–3.05	1.14	.86–3.06	2.37**	1.32–4.24
70+	Referent		Referent		Referent	
Income						
≤\$5,000	Referent		Referent		Referent	
\$5,001–9,999	.86	.50–1.50	.79	.17–3.69	.81	.43–1.53
\$10,000–19,999	1.54	.91–2.621	1.69	.37–7.82	1.47	.80–2.70
≥\$20,000	1.49	1.16–2.56	1.40	.20–6.68	1.59	.87–2.97
Don't know	1.34	.62–2.84	1.41	.22–9.18	1.40	.59–3.34
Education						
≤5 years	.80	.39–1.65	.99	.28–3.52	.70	.28–1.68
6–11 years	.75	.37–1.48	1.70	.52–5.7	.52	.17–1.18
≥12 years	Referent		Referent		Referent	
Insurance						
Yes	2.38**	1.63–3.57	3.44**	1.69–6.61	2.12**	1.26–3.44
No	Referent		Referent		Referent	
Regular Source of Care						
Yes	2.45**	1.31–4.59	1.27	.47–3.44	3.70**	1.65–8.29
No	Referent		Referent		Referent	
Site						
Border	.42**	.21–.84				
California	Referent					

* $P \leq .05$.
** $P \leq .01$.

report to be fairly accurate for recent time periods, although women may overestimate the frequency of screening.⁵¹⁻⁵³ Also, since interviews were entirely in Spanish, English proficiency was not observed. Lastly, the present study may include possible interviewer effects and social desirability. To reduce systematic errors, interviewers attended training sessions and learned how to minimize influencing responses of respondents.

Conclusions

Findings from this study have several implications for cancer prevention and control within Hispanic populations. Results show that acculturation was significantly associated with mammography screening only among study participants from the California cities. Results also suggest that distinct differences might exist for Hispanic women living in farmworker communities in different locations within the United States. Additionally, level of acculturation may be an important variable for audience segmentation for health promotion efforts targeting Hispanic women who live in farmworker communities in central California and perhaps other communities not on the United States-Mexico border. Women in such communities with low levels of acculturation can be targeted for interventions to increase mammography adherence.

References

1. American Cancer Society. *Cancer Facts and Figures for Hispanics, 2003-2005*. Atlanta, Ga: American Cancer Society; 2003.
2. Chen F, Trapido EJ, Davis K. Differences in stage at presentation of breast and gynecologic cancers among whites, blacks, and Hispanics. *Cancer*. 1994;73:2838-2842.
3. Boyer-Chammond A, Taylor TH, Anton-Culver H. Survival differences in breast cancer among racial/ethnic groups: a population-based study. *Cancer Detect Prev*. 1999;23:463-473.
4. Vernon SW, Tilley BC, Neale AV, et al. Ethnicity, survival, and delay in seeking treatment for symptoms of breast cancer. *Cancer*. 1985;55:1563-1571.
5. Richardson JL, Langholz B, Bernstein L, et al. Stage and delay in breast cancer diagnosis by race, socioeconomic status, age and year. *Br J Cancer*. 1992;65:922-926.
6. Zambrana RE., Breen N, Fox SA, et al. Use of cancer screening practices by Hispanic women: analyses by subgroup. *Prev Med*. 1999;29(6 pt 1): 466-477.
7. Ramirez AG, Suarez L, Laufman L, et al. Hispanic women's breast and cervical cancer knowledge, attitudes, and screening behaviors. *Am J Health Promot*. 2000;14:292-300.
8. Ramirez AG, Talavera GA, Villarreal R, et al. Breast cancer screening in regional Hispanic populations. *Health Educ Res*. 2000;15:559-568.
9. Mandelblatt JS, Gold K, O'Malley AS, et al. Breast and cervix cancer screening among multiethnic women: role of age, health, and source of care. *Prev Med*. 1999;28:418-425.
10. Coughlin SS, Uhler RJ. Breast and cervical cancer screening practices among Hispanic women in the United States and Puerto Rico, 1998-1999. *Prev Med*. 2002;34:242-251.
11. Balcazar H, Castro FG, Krull JL. Cancer risk reduction in Mexican American women: the role of acculturation, education, and health risk factors. *Health Educ Q*. 1995;22:61-84.
12. Calle EE, Flanders WD, Thun MJ, et al. Demographic predictors of mammography and Pap smear screening in US women. *Am J Public Health*. 1993;83:53-60.
13. Wu ZH, Black SA, Markides KS. Prevalence and associated factors of cancer screening: why are so many older Mexican American women never screened? *Prev Med*. 2001;33:268-273.
14. Smith RA, Haynes S. Barriers to screening for breast cancer. *Cancer*. 1992;69(7 suppl):1968-1978.

15. Perez-Stable EJ, Ramirez A, Villareal R, et al. Cigarette smoking behavior among US Latino men and women from different countries of origin. *Am J Public Health*. 2001;91:1424-1430.
16. Elder JP, Campbell NR, Litrownik AJ, et al. Predictors of cigarette and alcohol susceptibility and use among Hispanic migrant adolescents. *Prev Med*. 2000;31(2 pt 1):115-123.
17. Lipton, R. The relationship between alcohol, stress, and depression in Mexican Americans and non-Hispanic whites. *Behav Med*. 1997;23:101-111.
18. Caetano R, Mora ME. Acculturation and drinking among people of Mexican descent in Mexico and the United States. *J Stud Alcohol*. 1988;49:462-471.
19. Caetano R. Acculturation and drinking patterns among U.S. Hispanics. *Br J Addict*. 1987;82:789-799.
20. Cantero PJ, Richardson JL, Baezconde-Garbanati L, et al. The association between acculturation and health practices among middle-aged and elderly Latinas. *Ethn Dis*. 1999;9:166-180.
21. Dawson DA. Beyond black, white and Hispanic: race, ethnic origin and drinking patterns in the United States. *J Subst Abuse*. 1998;10:321-339.
22. Neff JA, Hoppe SK. Acculturation and drinking patterns among U.S. Anglos, blacks, and Mexican Americans. *Alcohol Alcohol*. 1992;27:293-308.
23. Sundquist J, Winkleby M. Country of birth, acculturation status and abdominal obesity in a national sample of Mexican-American women and men. *Int J Epidemiol*. 2000;29:470-477.
24. Hazuda HP, Mitchell BD, Haffner SM, et al. Obesity in Mexican American subgroups: findings from the San Antonio Heart Study. *Am J Clin Nutr*. 1991;53(6 suppl):1529S-1534S.
25. Balcazar H, Krull JL. Determinants of birth-weight outcomes among Mexican-American women: examining conflicting results about acculturation. *Ethn Dis*. 1999;9:410-422.
26. Jones ME, Bond ML. Predictors of birth outcome among Hispanic immigrant women. *J Nurs Care Qual*. 1999;14:56-62.
27. Kirkman-Liff B, Mondragon D. Language of interview: relevance for research of southwest Hispanics. *Am J Public Health*. 1991;81:1399-1404.
28. Moore P, Hepworth JT. Use of perinatal and infant health services by Mexican-American Medicaid enrollees. *JAMA*. 1994;272:297-304.
29. Wells KB, Golding JM, Hough RL, et al. Acculturation and the probability of use of health services by Mexican Americans. *Health Serv Res*. 1989;24:237-257.
30. Suarez, L. Pap smear and mammogram screening in Mexican-American women: the effects of acculturation. *Am J Public Health*. 1994;84:742-746.
31. Solis JM, Marks G, Garcia M, et al. Acculturation, access to care, and use of preventive services by Hispanics: findings from HHANES 1982-84. *Am J Public Health*. 1990;80(suppl):11-19.
32. Marks G, Solis J, Richardson JL, et al. Healthy behavior of elderly Hispanic women: does cultural assimilation make a difference? *Am J Public Health*. 1987;77:1315-1319.
33. Elder JP, Castro FG, de Moor C, et al. Differences in cancer-risk-related behaviors in Latino and Anglo adults. *Prev Med*. 1991;20:751-763.
34. Stein JA, Fox SA. Language preference as an indicator of mammography use among Hispanic women. *J Natl Cancer Inst*. 1990;82:1715-1716.
35. Harmon MP, Castro FG, Coe K. Acculturation and cervical cancer: knowledge, beliefs, and behaviors of Hispanic women. *Women Health*. 1996;24:37-57.
36. Coe K, Harmon MP, Castro FG, et al. Breast self-examination: knowledge and practices of Hispanic women in two southwestern metropolitan areas. *J Community Health*. 1994;19:433-448.
37. O'Malley AS, Kerner J, Johnson AE, et al. Acculturation and breast cancer screening among Hispanic women in New York City. *Am J Public Health*. 1999;89:219-227.
38. Cuellar I, Harris LC, Jasso R. An acculturation scale for Mexican American normal and clinical Populations. *Hisp J Behav Sci*. 1980;2:199-217.
39. Deyo RA, Diehl AK, Hazuda H, et al. A simple language-based acculturation scale for Mexican Americans: validation and application to health care research. *Am J Public Health*. 1985;75:51-55.
40. Keefe S, Padilla AM, eds. *Chicano Ethnicity*. 1st ed. Albuquerque, NM: University of New Mexico Press; 1987.
41. Rogler LH. International migrations. A framework for directing research. *Am Psychol*. 1994;49:701-708.
42. Bennett S, Radalowicz A, Vella V, et al. A computer simulation of household sampling schemes for health surveys in developing countries. *Int J Epidemiol*. 1994;23:1282-1291.
43. Marin G, Gamba RJ. A new measurement of acculturation for Hispanics: the Bidimensional Acculturation Scale for Hispanics (BAS). *Hisp J Behav Sci*. 1996;18:297-316.
44. Wolfinger RD, O'Connell M. Generalized linear mixed models: a pseudo-likelihood approach. *J Statist Comput Simul*. 1993;48:233-243.
45. Hazuda HP, Haffner SM, Stern MP, et al. Effects of acculturation and socioeconomic status on obesity and diabetes in Mexican Americans: the San Antonio Heart Study. *Am J Epidemiol*. 1988;128:1289-1301.
46. Perez-Stable EJ, Otero-Sabogal R, Sabogal F, et al. Self-reported use of cancer screening tests among Latinos and Anglos in a prepaid health plan. *Arch Intern Med*. 1994;154:1073-1081.
47. Perez-Stable EJ, Sabogal F, Otero-Sabogal R. Use of cancer-screening tests in the San Francisco Bay area: comparison of Latinos and Anglos. *J Natl Cancer Inst Monogr*. 1995;18:147-153.
48. Suarez L, Pulley L. Comparing acculturation scales and their relationship to cancer screening among older Mexican-American women. *J Natl Cancer Inst Monogr*. 1995;18:41-47.
49. Olmedo EL, Padilla AM. Empirical and construct validation of a measure of acculturation for Mexican Americans. *J Soc Psych*. 1978;105:179-187.
50. Marin G, Sabogal F, Marin BV, et al. Development of a short acculturation scale for Hispanics. *Hisp J Behav Sci*. 1987;9:183-205.
51. Zapka JG, Bigelow C, Hurley T, et al. Mammography use among sociodemographically diverse women: the accuracy of self-report. *Am J Public Health*. 1996;86:1016-1021.
52. Suarez L, Goldman DA, Weiss NS. Validity of Pap smear and mammogram self-reports in a low-income Hispanic population. *Am J Prev Med*. 1995;11:94-98.
53. Hiatt RA, Perez-Stable EJ, Quesenberry C. Jr, et al. Agreement between self-reported early cancer detection practices and medical audits among Hispanic and non-Hispanic white health plan members in northern California. *Prev Med*. 1995;24:278-285.