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Determinants of Breast, Cervical and Colorectal Cancer Screening Adherence in Mexican American Women

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Abstract

Despite the effectiveness of cancer screening procedures, its utilization among Latinas remains low. Guided, in part, by the Behavioral Model for Vulnerable Populations, this study examined the associations between predisposing, enabling, and need factors with self-reported breast, cervical, and colorectal cancer screening adherence. Participants were 319 Mexican American women, from a range of socioeconomic (SES) backgrounds, living near the United States-Mexico border. Women were adherent with breast cancer (BC) screening (≥ 42 years) if they had received at least one mammogram within the last two years, with cervical cancer (CC) screening (≥ 40 years) if they had received at least one Pap exam in the last three years, and with colorectal cancer (CRC) screening (≥ 52 years) if they had undergone one or more of the following: Fecal Occult Blood Test (FOBT) within the last year, or sigmoidoscopy in the last 5 years, or colonoscopy within the last 10 years. BC and CC screenings were higher in the current sample compared to national and state figures: 82% with mammography and 86% adherent with Pap exam screening. However, only 43% were adherent with CRC screening recommendations. Characteristics associated with mammography adherence included CC adherence and usual source of care. BC adherence was associated to CC adherence. Characteristics associated with CRC adherence included BC adherence, being premenopausal, and insurance coverage. A key correlate of cancer screening adherence was adherence to other preventive services. Results underscore the need for continued efforts to ensure that Latinas of all SES levels obtain regular and timely cancer screenings.

Keywords

Breast cancer screening; Cervical cancer screening; Colorectal cancer screening; Cancer disparities; Mexican Americans

Introduction

Breast, cervical, and colorectal cancer represent three of the most common chronic diseases affecting women in the United States (US) and globally ^{1, 2}, making knowledge regarding the factors that influence decisions to engage in cancer screening behaviors of utmost importance. In 2011, 230,480 US women are expected to be diagnosed with breast cancer (BC), 12,710 with cervical cancer (CC) and 52,400 with colorectal cancer (CRC) ¹. Early cancer detection can effectively reduce mortality and morbidity when cancer treatment or

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precancerous lesions have an enhanced probability of being treated effectively. Women diagnosed with early or local breast, cervical, or colorectal cancers have a 98%, 91% and 90% chance of surviving 5 years after diagnosis, respectively ¹. However, these 5-year survival rates significantly decrease with distant cancer at diagnosis.

Ethnic disparities exist in breast, cervical and CRC incidence, stage at diagnosis and survival rates ³, comprising preventable mortality and morbidity among ethnic minority women. BC is the primary cause of cancer death among US Latinas ⁴. Latinas tend to be diagnosed at later stages, which in part may contribute to their lower BC survival rates ⁵. Moreover, the incidence rate of CC is 61% higher in Latina than in non-Latina Whites. Among US Latinas, CRC is the second most common cancer and the third leading cause of cancer-related deaths. Although Latinos have lower rates of CRC compared to Whites, they are more likely to be diagnosed at later stages and have a lower probability of survival following diagnosis ⁵.

Breast, Cervical and Colorectal Cancer Screening in Latinas Mammography, Papanicolaou (Pap), and CRC screenings (FOBT, sigmoidoscopy, colonoscopy) are essential components of early detection and treatment, and mortality rates are substantially decreased when these cancers are treated at an early stage ⁵. However, although US cancer screening rates have increased over the past decade, these improvements have not affected all segments of the population equally. In particular, ethnic minority women are less likely to participate in breast ⁶, cervical, and CRC screening procedures ^{7; 8} than are non-Latina whites. Moreover, Latinas have some of the lowest BC screening rates of all ethnic groups ⁹. Among Latinas, Mexican women are the least likely to utilize mammography screening ¹. Although regular screening can prevent invasive CC, the prevalence of Pap exams also remains relatively low among Latinas ¹⁰. Previous studies have documented that Latinas, particularly Mexican women, have the lowest CC screening rates of any racial and ethnic group in the US ⁵.

Similarly, Latinos have lower CRC screening rates compared to non-Latino whites ⁵. Several factors have been identified to explain Latinas' lower cancer screening rates. These include: having lower income ¹¹ and education levels ^{6; 11}; lacking English proficiency ^{12; 13}; lacking health insurance coverage ¹⁴ or usual source of care ^{9; 15}; higher body mass index (BMI) ¹⁶ and not receiving physician recommendations ^{17; 18}. Disparities in access to health care ⁹, usual source of care ³, recent physician visits ¹², as well as dimensions of health status, such as poor or fair health status ¹⁶, appear to be some of the more prominent predictors of Latinas' cancer screening utilization.

Breast Cancer Screening recommendations

Considerable controversy exists regarding the frequency and minimal age for routine mammography screening. The ACS recommends that all women at average BC risk obtain a mammogram every year starting at age 40 ⁵, whereas the National Cancer Institute ¹⁹ recommends mammography screening every 1 to 2 years for women age 40 and older. More recently in 2009, the US Preventive Services Task Force ²⁰ recommended biennial mammography screening for women between the ages of 50 and 74 years.

Cervical cancer screening recommendations

In terms of CC screening, the ACS ⁵ recommends that women age 30 and older who have had 3 or more normal Pap exam results consecutively get screened every 3 years. Because data for the current study was conducted between 2006-2009, with most data collected prior to the revised 2009 USPSTF recommendations, analyses were based on the ACS and NCI recommendations for BC and CC screening practices.

Colorectal cancer screening recommendations

Screening can result in the detection and removal of colorectal polyps before they become cancerous and in detection of cancer at an early stage¹. The ACS recommends that women at average risk initiate screening at age 50. Specifically, these individuals should undergo one or more of several screening strategies, including annual fecal occult blood test (FOBT), or sigmoidoscopy every 5 years, or a colonoscopy every 10 years. The USPSTF²¹ recommends CRC screening for individuals aged 50 years and older, but does not recommend a preferred screening strategy.

Study Purpose and Theoretical Framework

A paucity of research on the characteristics of women who are adherent versus nonadherent to cancer screening exists, particularly Mexican American women, who have lower screening rates than other groups. Identification of socio-demographic characteristics, healthcare access, and behavioral factors that influence cancer screening is critical from a public health perspective, and can inform new strategies to improve screening rates in underserved groups. The purpose of the current study was twofold: first, to examine current adherence to breast, cervical, and CRC screening (self-reported) among a randomly selected, community sample of Mexican American women residing in the South Bay area of San Diego. Second, relying upon previous findings and the Behavioral Model for Vulnerable Populations²², to examine associations of screening behaviors with theoretically guided predictors of cancer screening adherence.

The Behavioral Model for Vulnerable Populations is a theoretical framework that categorizes factors likely to influence healthcare service utilization by vulnerable populations, including women and ethnic minorities. The model proposes that predisposing, enabling, and need characteristics either facilitate or impede the use of health services. The predisposing domain refers to characteristics (e.g., age, marital status, health beliefs, ethnicity, acculturation, education, and employment) that exist before the onset of illness. The need domain comprises both objective (e.g., medical conditions, BMI) and subjective indicators of health status (e.g., self-rated health) or illness. The enabling domain comprises factors that represent an individual's ability to use health care services (e.g., income, insurance status, and usual source of care). In the current study, three hypotheses were considered. First, in terms of the predisposing domain, we expected that age and language (proxy for acculturation) would be predictive of all three cancer screenings (i.e., BC, CC, CRC). Second, in terms of the need for care domain we expected that use of other preventive services (e.g., cancer screenings) would be predictive of all three cancer screenings. Third, in terms of the enabling domain and as suggested by previous findings, after accounting for use of other preventive services, we hypothesized that enabling domain factors (e.g., income, insurance status, and usual source of care) would be the strongest predictors of all three cancer screenings compared to predisposing and need factors.

Methods

Participants and Recruitment

Data for our analyses were collected in “Nuestra Salud” (“Our Health”), a cross-sectional study of sociocultural influences on cardiovascular disease risk in middle-aged Mexican American women living in the California/Baja-California US border region. Participants were randomly recruited via targeted telephone and mail procedures from Southern San Diego communities with high densities of Mexican American residents and a wide range of SES. A phone screening was performed and women were considered eligible if they were 40-65 years of age, Mexican American, able to read and write in English or Spanish, and

had no prior BC, CC, or CRC history or other major health problems. Detailed information regarding participant recruitment and study procedures are described elsewhere ²³.

Procedures

Institutional Review Board approval was obtained for all procedures and measures prior to implementation and all participants provided written informed consent. Participants completed measures (in English or Spanish) assessing socio-demographic information, access to care information, perceived health status, and breast, cervical and CRC screening information.

Measures

Socio-demographic information—Participants' self reported age (years), country of birth (Mexico, US), education (1= 0-8th grade, 2=less than high school; 3= high school/GED diploma; 4= some college; 5= 4 year college degree; 6=greater than 4 year college degree), marital status (0=unpartnered; 1=partnered), and annual household income (1= $\leq$ 15,000; 2= \$15,000-\$24,999; 3=\$25,000-\$34,999; 4=\$35,000-\$49,999; 5= \$50,000-\$74,999; 6= $\geq$ \$75,000).

Access to Care Factors—Usual source of care was ascertained from responses to the following question: "Is there a particular place that you usually go to when you are sick or need advice about your health?" (no=0, 1=yes). Medical coverage was ascertained by asking respondents: "Which category or categories below best describe how you usually pay for your medical care?" (private insurance, Medicare, Medicaid, military or veterans administration-sponsored, no insurance/pay out of pocket, other), recoded for analyses into two categories (0= no private or public insurance coverage; 1= private or public insurance coverage).

Breast, Cervical, and Colorectal Cancer Screening—Cancer screening behaviors were measured via selected items from the Health Information National Trends Survey ²⁴. BC screening adherence was determined by asking participants: 1) "Have you ever had a mammogram" (no, yes); 2) "If yes, when did you have your most recent mammogram to check for breast cancer" (a year ago or less, more than 1 but not more than 2 years ago, more than 2 but not more than 5 years ago, over 5 years ago). CC screening was determined by asking participants: 1) "Have you ever had a Pap smear" (no, yes); 2) "If yes, when did you have your most recent Pap smear" (a year ago or less, more than 1 but not more than 3 years ago, more than 3 but not more than 5 years ago, over 5 years ago). CRC screening utilization was assessed based on the use of at home FOBT and the use of sigmoidoscopy or colonoscopy. For FOBT, respondents were asked, "A stool blood test, also known as Fecal Occult Test, is a test done to check for colon cancer. It is done at home using a set of 3 cards to determine whether the stool contains blood. Have you ever done this test using a home kit? Respondents who answered affirmatively ("Yes") were then asked about the timing of their last FOBT (1= a year ago or less; 2=more than 1 but not more than 2 years ago; 3=more than 2 but not more than 5 years ago; and 4=over 5 years ago). For endoscopic screening, respondents were asked, "A sigmoidoscopy and a colonoscopy are both tests that examine the bowel by inserting a tube in the rectum. Have you ever had either a colonoscopy or a sigmoidoscopy?" Individuals responding "Yes" to this question were asked to specify which procedure they underwent, and were asked, "When did you have your most recent sigmoidoscopy or colonoscopy to check for colon cancer" 1=a year ago or less, 2=more than 1 but nor more than 5 years ago, 3=more than 5 but not more than 10 years ago, 4=over 10 years ago).

Age inclusion for analyses was selected based on the rationale that there may be a delay from the age at which women are informed of their recommended cancer screenings to actual receipt of the cancer screening exam. Therefore, BC screening was examined among women in the sample who were ≥ 42 . CC screening was examined among women in the sample who were ≥ 40 (i.e., all women in the sample). Women 52 years of age and older were included the CRC screening analyses. To be classified as adherent, women should have obtained a mammogram within the past 2 years and a Pap exam within the past 3 years. We classified women as adherent to CRC screening if they reported undergoing either FOBT within the last year or a sigmoidoscopy within the past 5 years or a colonoscopy within the past 10 years. The timeframes used to determine adherence were based on the most recently published ACS recommendations²⁵. The three outcomes were coded as a dichotomous variable (0=nonadherent, 1=adherent). Participants who reported never having obtained a mammogram or Pap exam or CRC screening procedure were placed in the nonadherent category.

Health Information—Perceived self-rated health status was ascertained by asking respondents, “In general, would you say your health is...” with response options ranging from 1 (excellent) to 5 (poor) (so that higher scores reflect poor health). This single item has been used in previous studies to assess self-rated health status²⁶ and is predictive of objective physical health outcomes, including mortality²⁷. Menopausal status was ascertained by asking respondents, “Have you had a menstrual period in the past 12 months?” with response options of no (postmenopausal, coded 0) or yes (premenopausal, coded 1). Participants’ height was measured using a fixed, standard stadiometer. Weight was measured in light indoor clothing without shoes, using a digital scale. BMI, a widely used indicator of obesity was calculated as weight in kg/height in m².

Statistical Analyses

Descriptive statistics were computed for all study variables, including means and standard deviations for continuous data and frequency distributions for categorical variables. Pearson’s product moment correlations or point-biserial correlations were computed to examine bivariate associations among predisposing (age, questionnaire language version, education, and marital status), enabling (income, health insurance coverage and usual place for medical care), and need factors (perceived health status, BMI, menopausal status, and other cancer screening behaviors) with breast, cervical, and CRC screening procedures (using corresponding ages ≥ 42 for BC screening, ≥ 40 for CC screening, ≥ 52 CRC screening). Explanatory variables for the logistic regression models were selected a priori based on previously established predictors of cancer screening. Four main models for each cancer screening behavior were constructed to determine the association between predisposing (Model 1), need for care (Model 2), enabling characteristics (Model 3), and all explanatory variables (Model 4) and Latinas’ cancer screening adherence. An alpha coefficient of .05 was used to indicate statistical significance. All analyses were performed using PASW Statistics 18.0

Results

Demographic data for all study respondents are shown in Table 1. Participants ranged in age from 40 to 65 years ($M=49.8$, $SD = 6.6$). Most participants were born in Mexico (74%), were married or living with their partner (72.4), had a usual source of care (77%), and had one person they considered their health care provider (67%). Approximately 72% reported some type of insurance coverage (private or public). As shown in Table 2, 82% of the sample were adherent and obtained a mammogram within the last 2 years, 86% reported

obtaining a Pap exam within the last 3 years and 43% were adherent with colorectal cancer screening guidelines.

Table 3 displays the bivariate associations among the predisposing, enabling, and need factors with BC, CC, and CRC screening adherence. Bivariate results revealed that insurance coverage ($r=.19, p < .01$) and usual source of care ($r=.25, p < .01$) were associated with BC adherence. Second, younger age ($r=-.15, p < .05$), being premenopausal ($r=.19, p < .01$) and usual source of care ($r=.13, p < .05$) were significantly associated to CC adherence. Insurance coverage ($r=.27, p < .01$), and usual source of care ($r=.23, p < .05$) and being premenopausal ($r=.18, p < .05$) were positively related to CRC screening adherence.

Employing logistic regression, the probability of having obtained a mammogram within the last 2 years (BC adherence) was examined for associations with predisposing, enabling, and need-for care characteristics. Odds ratios and 95% confidence intervals are presented in Table 4. When predisposing variables (i.e., age, acculturation (questionnaire version), education, and marital status) were included in the model, none of the variables were significantly associated to BC adherence. When need for care characteristics (i.e., perceived health status, CC adherence, and menopausal status) were included in the model CC adherence and was significantly associated to BC adherence. When enabling characteristics (i.e., income, insurance coverage and usual source of care) were included in the model usual source of care was significantly predictive of BC adherence. Last, when all characteristics were simultaneously entered into the model, CC adherence and usual source of care remained significant predictors of BC adherence. In particular, women who reported CC adherence were 6.04 (CI₉₅= 2.62, 13.94) times more likely to report BC adherence. Finally, women who reported a usual source of care were 2.13 (CI₉₅=1.00, 4.57) times more likely to report BC adherence. The estimated Nagelkerke R-squared indicates that in aggregate, predisposing, need for care and enabling variables explained 24% of the variance in BC adherence. Furthermore, comparison of the Nagelkerke R-squares for the individual models revealed that the need for care characteristics model (13%) explained a greater proportion of the variance compared to the predisposing characteristics model (2%) and the enabling characteristics model (11%).

Employing logistic regression, the probability of CC adherence within the last 3 years was examined. Odds ratios and 95% confidence intervals are presented in Table 5. When entered in separate models, age, BC adherence, menopausal status and usual source of care were found to be significant predictors of CC adherence. When all variables were added simultaneously to the model, only BC adherence was significantly associated to CC adherence. More specifically, women who reported BC adherence were 6.05 (CI₉₅= 2.67, 13.69) times more likely to report CC adherence. In aggregate, this set of variables explained 22% of the variance in CC adherence. Moreover, comparison of the Nagelkerke R-squares for the individual models indicated that the need for care model (20%) explained a greater proportion of the variance compared to the predisposing model (4%) and the enabling characteristics (3%) model.

Employing logistic regression, the probability of CRC screening adherence was examined. Odds ratios and 95% confidence intervals are presented in Table 6. When entered in separate models, mammography adherence, and insurance coverage were significantly associated with CRC screening adherence. Last, when predisposing, enabling, and need-for care characteristics were simultaneously entered into the model, BC screening adherence and insurance coverage remained significant predictors of CRC screening adherence. In particular, women who reported BC screening adherence were 6.02 (CI₉₅ = 1.11, 32.63) times more likely to report CRC screening adherence. Also, women with insurance coverage were 3.06 (CI₉₅ = 1.00, 9.31) times more likely to report CRC screening adherence.

Premenopausal women were also found to be 10.73 ($CI_{.95} = 1.63, 70.75$) times more likely to report CRC screening adherence compared to postmenopausal women. The estimated Nagelkerke R-squared revealed that when all variables were included in the last model (Model 4), this set of variables explained 28% of the variance in CRC screening adherence. Furthermore, comparison of the Nagelkerke R-squares for individual models revealed that the need model (17%) explained a greater proportion of the variance compared to the predisposing model (4%) and enabling model (12%).

Discussion

The goal of this study was to use the Behavioral Model for Vulnerable Populations as a framework through which to examine factors predicting rates for breast, cervical, and CRC screening adherence among a socioeconomically diverse group of Mexican American women. Seventy-nine percent of women were adherent with BC screening, 86% were adherent with CC screening and 43% were adherent with CRC screening. BC screening rates in the current sample were higher compared to the national screening rates (67% in 2008:²⁵, state screening rates (64% in 2008:²⁵, and rates identified in previous studies of Latinas (68%-69%:³. CC screening rates were also higher than national screening rates (78.3% in 2008:²⁵ state screening rates (83.8% in 2008:²⁵, and rates identified in previous studies with Latinas (81%-83%:^{3; 10}. The higher observed rates may reflect participants' diverse socioeconomic backgrounds (low to high income levels), and the fact that higher-SES women may have greater access to medical services. The high proportion of women receiving CC screening may reflect the lower cost associated with this test and state programs (e.g., California's Cancer Detection Program: Every Woman Counts) that provide eligible women with free or low cost exams.

Only 42.5% of women reported being up to date with CRC screening recommendations compared to 53% of US women, and 62% of women in the state of California²⁵. Lower screening rates arguably reflect poor CRC prevention practices among Mexican American women. These low rates stand in contrast to the BC and CC screening adherence levels found in the current sample. Previous research suggests that rates for BC and CC screenings tend to be higher than those for CRC²⁸. One explanation may be the normalization of BC and CC screening, inasmuch as mammography and Pap exams are tests that most women know about and receive²⁹.

Consistent with previous findings this study found that use of other screening (cervical cancer) tests³⁰ and usual source of care³ were associated with BC screening adherence. The association between use of other screening tests and BC and CC adherence may reflect increased awareness about the importance of preventive cancer screening behaviors among women who participate in multiple cancer screenings. In addition, possession of health insurance coverage may increase the likelihood of having a usual source of care and consequently, use of preventive cancer services.

Consistent with previous findings, use of other cancer screening tests³⁰ was associated with CC screening adherence. The finding that premenopausal women were more likely be adherent to CC guidelines may reflect the fact that women of child-bearing years may be more likely to receive routine gynecological care (e.g., for purposes of family planning, or birth control) and, perhaps maintenance of routine Pap exams.

In terms of CRC screening, other cancer screening adherence was the most important factor influencing adherence followed by insurance coverage and menopausal status. As mentioned above, previous research has found that women who participate in preventive services or other health behaviors (e.g., refraining from smoking, exercise) are more likely to obtain

other cancer screenings than nonadherent women³¹. The finding that premenopausal women were more likely to be up to date with CRC screening may be an indication that they are more likely to also have had recent physician visits compared to postmenopausal women. Finally, consistent with previous finding^{16; 28}, insurance coverage was a strong enabling determinant of CRC screening adherence. Insured women may be more likely to practice a general catalog of healthier behaviors including cancer screenings. Overwhelming evidence suggests that insurance coverage is one of the more salient predictors of timely CRC and other cancer screening for Latinos and other under screened groups. This poses an immense public health challenge since insurance coverage in Latino communities, particularly among low-income immigrants, is notably low³².

Low CRC screening adherence in the current sample raise important public health concerns, with more than half (57%) of the current sample reporting non-adherence. A number of factors may contribute to the lower CRC screening rates. First, Latinos of Mexican origin are less likely to receive guideline-recommended preventive care services than non-Latino whites and other Latino subgroups⁷. Second, existent cancer screening interventions including preventive public campaigns may be more likely to focus on promoting breast and CC screening as opposed to CRC screening. Third, cost may be relevant since CRC screening exams such as a colonoscopy are often more costly than mammograms and Pap exams.

Overall, support for the first hypothesis that utilization of other screening tests would be predictive of screening adherence was found. However, the hypothesis that enabling characteristics (i.e., income, health insurance coverage, usual source of care) would be the most salient predictors of cancer screening adherence was only partially supported. Specifically, income was not predictive of cancer screening adherence. Health insurance coverage and usual source of care related to BC adherence but not CC adherence. The finding that enabling characteristics (e.g., access to care factors) did not explain the majority of variance in screening behaviors may reflect the fact that the majority of women in this study had insurance coverage. However, the proportion of uninsured (28%) participants in the current sample was comparable to the number of uninsured Latinas in previously published studies (26%-41%)³³.

In order to increase the likelihood of screening, women must be familiar with what screening procedures entail, know others who have been tested, and should not associate the need for testing with stigmatizing behaviors²⁹. For example, some women may believe that cancer screening may put them at risk of “feeling threatened” and imply that they have done something wrong (e.g., immoral behavior)³⁴. Other barriers to screening procedures include embarrassment^{28; 29}, fear of the procedures (e.g., fear the colonoscopy would be painful), feeling that the test is unpleasant, and fear of finding cancer^{35; 36}. Further research to uncover the impact of these cultural and psychological barriers in cancer screening particularly CRC screening is warranted.

Study Limitations

As with any study, findings must be interpreted in light of relevant limitations. First, the data are cross-sectional, precluding causal or directional conclusions regarding the associations among socio-demographics, health status, and access to care, and cancer screenings. Second, we relied on self-report screening data and studies have suggested that there are yea-saying tendencies in Latinos. A review of medical records may provide more reliable information³⁷. Third, the retrospective nature of the study may have led to recall biases in terms of screening practices. Last, our study was conducted with individuals of Mexican descent, living in a single geographic area, and therefore may not be representative of women from other Latino subgroups or living in other parts of the US.

Despite these design limitations, this study provides a significant contribution to the literature by assessing cancer screening behaviors among Mexican women from socioeconomically diverse backgrounds, in whom research is lacking. Previous studies examining breast, cervical, and CRC screening among Latinas have focused primarily on low income, underinsured and underserved groups³³, and have examined Latinos as a single entity rather than focusing on ethnic subgroups⁷. This practice is problematic given the heterogeneous socio-demographic and health profile of the US Latino population³⁸. Latinas in the current study represented a wide range of socioeconomic backgrounds that mapped on roughly to those in the targeted recruitment area. Also, to our knowledge this is the first study that has relied upon the Behavioral Model for Vulnerable Populations as a framework through which to understand comprehensive screening practices among Mexican American women²². Use of a theoretical model is important because it clearly guides the specification of research questions, subsequent data analysis, and interpretation of results³¹. Furthermore, the use of theoretical models provides guidance in developing new efforts to comprehensively understand and improve targeted interventions aimed at improving breast, cervical and in CRC screening adherence in Latinas³⁹.

Conclusions

By minimizing the proportion of late-stage diagnoses, breast, cervical, and CRC screening form a key strategy in comprehensive cancer control⁴⁰. This study used theoretically-driven analyses to determine significant predictors of breast, cervical, and CRC screening utilization among Mexican American women 40 years and older in San Diego County, California. Although this sample of Latinas had higher than average breast and CC screening adherence and lower CRC screening adherence when compared with national and state figures, additional work is needed to ensure that this and other population groups meet current adherence standards. Expansion of interventions aimed at increasing screening knowledge can substantially reduce disparities. Particular attention should be paid to modifiable factors that could become the focus of interventions aimed at increasing cancer-screening adherence. The fact that breast, cervical, and CRC continue to be the leading causes of cancer deaths among Mexican American women indicates the need for innovative strategies to motivate women to participate in cancer detection procedures. The majority of research has concentrated on understanding and explaining the utilization of one specific preventive service. The current study clearly illustrates the importance of examining multiple cancer screening behaviors as opposed to focusing on a single screening behavior. In light of these findings, health promotion campaigns need to consider whether promotion of multiple cancer screenings compared to promotion of individual cancer screening exams is more effective in increasing cancer adherence. Results also underscore the importance of having access to preventive health care services as a primary determinant of ensuring that all Latinas obtain regular and timely cancer screenings. Findings are important as policymakers aim to improve healthcare throughout the population. One viable solution would be to ensure that all groups have full access to life saving cancer screening procedures.

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Table 1

Sample Demographic Characteristics'

Variables	All women (N=319)
	N (%)
Place of origin	
Mexico	234 (74)
USA	84 (26)
Questionnaire Language	
English	135 (42.3)
Spanish	184 (57.7)
Marital Status	
Partnered	231 (72)
Unpartnered	88 (28)
Education Level	
0-8 grade	52 (16)
< High school	55 (17)
High school/GED diploma	40 (13)
Some college	102 (32)
4 year college degree	49 (15)
Graduate degree	20 (6)
Income (6 groups)	
≤ 15,000	33 (11)
\$15,001-\$24,999	43 (14)
\$25,000-\$34,999	53 (17)
\$35,000-\$49,999	55 (18)
\$50,000-\$74,999	62 (20)
≥\$75,000	66 (21)
Insurance Coverage	
Yes	229 (72%)
No	90 (28%)
Usual source of health care	
Yes	247 (77)
No	72 (23)
Personal Doctor	
Yes	215 (67)
No	104 (33)
	Mean (SD)
Age (years)	49.8 (6.6)
Time in the US (years; non-US born only, N=234)	26.1 (11.9)

Note. Percentages may not add to 100% due to rounding and participant non-response. Results presented in this table include the overall sample.

Table 2**Self-reported Health Status and Cancer Screening Behaviors**

Variables	All women (N=319)
N (%)	
Health Status	
Fair	28 (9)
Good	106 (33)
Very Good	139 (44)
Excellent	46 (14)
Mammogram (≥42)	
≤ 1 year	164 (61)
>1 year but less than 2 year	58 (22)
> 2 but not more than 5 years	26 (10)
5+ years	6 (2)
Never	16 (6)
Pap Exam (≥40)	
≤ 1 year	183 (58)
>1 year but less than 2 year	90 (28)
> 2 but not more than 5 years	18 (6)
5+ years	20 (6)
Never	7 (2)
Colorectal Cancer Screening (≥52)	
Ever had FOBT	
Yes	41 (38)
No	66 (62)
Ever had a sigmoidoscopy or colonoscopy	
Yes	46 (43)
No	61 (43)
If yes,	
≤ 1 year	11 (23)
>1 year but less than 5 years	23 (48)
> 5 but not more than 10 years	9 (19)
10+ years	5 (10)

Note. Percentages may not add to 100% due to rounding and participant non-response.

Table 3
Results of bivariate associations among predisposing, need for care and enabling characteristics (Overall sample)

	Age	Version	Education	Partner	Health Status	BMI	Menopause Status	Income	Insured	Source of care	BC adherence	CC adherence
Age	-											
Version	.04	-										
Education	-.06	-.42**	-									
Partner	-.14*	-.02	.03	-								
Health Status	-.02	-.13*	.29**	.00	-							
BMI	.03	-.01	-.14*	-.01	-.20**	-						
Menopause Status	-.68**	-.08	.08	.04	.11*	-.08	-					
Income	-.07	-.43**	.47**	.40**	.28**	-.11*	.04	-				
Insured	-.01	-.30**	.21**	.05	.06	.01	.02	.27**	-			
Source of care	0.05	-.20**	.13*	.00	-.10	.03	-.02	.22**	.25**	-		
BC Adherence	.05	-.10	.05	.04	-.01	-.08	-.02	.11	.19**	.25**	-	
CC adherence	-.15**	-.02	.06	-.01	.07	-.08	.19**	.03	.056	.13*	.28**	-
CRC adherence	.02	-.06	.12	.14	.00	.09	.18	.11	.27**	.18*	.29**	.08

Table 4

Results of logistic regression analyses regressing BC adherence on predisposing, need for care, and enabling characteristics (n=291; age >=42 years)

Variables	Predisposing characteristics			Need for care characteristics			Enabling characteristics			Predisposing, need for care, and enabling characteristics		
	β (SE)	Exp(B)	95% CI	β (SE)	Exp (B)	95% CI	β (SE)	Exp (B)	95% CI	B (SE)	Exp (B)	95% CI
<i>Predisposing</i>												
Age (years)	0.26 (0.26)	1.03	0.98, 1.08							0.05 (0.04)	1.06	0.98, 1.14
Version	-0.53 (0.36)	0.59	0.29, 1.18							-0.57 (0.44)	0.57	0.24, 1.34
Education 6 groups	0.02 (0.11)	1.02	0.82, 1.26							-0.08 (0.14)	0.92	0.71, 1.20
Partner	0.26 (0.33)	1.29	0.67, 2.49							0.20 (0.42)	1.22	0.53, 2.78
<i>Need-for-care</i>												
Perceived health status				-0.15 (0.20)	0.86	0.56, 1.27				-0.22 (0.23)	0.81	0.52, 1.26
BMI				-0.03 (0.02)	0.97	0.93, 1.02				-0.04 (0.03)	0.96	0.91, 1.01
CC adherence (no=0, yes=1)				1.81 (0.40)**	6.13	2.82, 13.34				1.80 (0.43)**	6.04	2.62, 13.94
Menopausal status (postmenopause=0, premenopause=1)				-0.41 (0.35)	0.66	0.33, 1.32				-0.02 (0.49)	0.98	0.37, 2.57
<i>Enabling</i>												
Yearly income 6 groups							0.05 (0.10)	1.05	0.86, 1.28	0.10 (.14)	1.10	0.84, 1.44
Insurance (no =0, yes=1)							0.65 (0.35)	1.91	0.96, 3.77	0.67 (0.38)	1.95	0.92, 4.12
Usual source of care (no=0, yes=1)							1.08 (0.35)**	2.96	1.49, 5.88	0.76 (0.39)*	2.13	1.00, 4.57
-2 Log likelihood	268			235			248			211		
Cox and Snell R-squared	0.02			0.08			0.06			0.14		
Nagelkerke R-squared	0.02			0.13			0.11			0.24		

* Note. p < 0.05

** p < 0.01

Table 5

Results of logistic Regression regressing CC screening on predisposing, need for care and enabling characteristics (n=319; age >=40 years)

Variables	Predisposing characteristics			Need for care characteristics			Enabling characteristics			Predisposing, need for care, and enabling characteristics		
	β (SE)	Exp(B)	95% CI	β (SE)	Exp (B)	95% CI	β (SE)	Exp (B)	95% CI	B (SE)	Exp (B)	95% CI
<i>Predisposing</i>												
Age (years)	-0.06 (0.02)*	0.94	0.90, 0.99							-0.04 (0.04)	0.96	0.89, 1.03
Version	0.11 (0.38)	1.12	0.53, 2.33							0.29 (0.46)	1.34	0.54, 3.31
Education 6 groups	0.11 (0.12)	1.12	0.88, 1.43							0.06 (0.14)	1.07	0.80, 1.42
Partner	-0.20 (0.38)	0.82	0.39, 1.70							-0.06 (0.47)	0.94	0.38, 2.34
<i>Need-for-care</i>												
Perceived health status				0.28 (0.22)	1.32	0.87, 2.02				0.37 (0.24)	1.44	0.90, 2.30
BMI				-0.02 (0.03)	0.99	0.94, 1.04				-0.01 (0.03)	0.99	0.94, 1.04
BC adherence (no=0, yes=1)				1.75 (0.38)**	5.76	2.73, 12.14				1.80 (0.42)**	6.05	2.67, 13.69
Menopausal status (postmenopausal=0, premenopausal=1)				1.35 (0.39)**	3.86	1.79, 8.32				1.01 (0.54)	2.74	0.96, 7.82
<i>Enabling</i>												
Yearly income 6 groups							-0.00 (0.10)	1.00	0.82, 1.22	-0.04 (0.15)	0.96	0.71, 1.29
Insurance (no =0, yes=1)							0.09 (0.37)	1.09	0.53, 2.25	-0.21 (0.44)	0.82	0.35, 1.92
Usual source of care (no=0, yes=1)							0.77 (0.37)*	2.17	1.06, 4.45	0.63 (0.45)	1.88	0.77, 4.58
-2 Log likelihood	251			208			252			203		
Cox and Snell R-squared	0.03			0.11			0.02			0.12		
Nagelkerke R-squared	0.04			0.20			0.03			0.22		

* Note. p < .05

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Table 6

Results of logistic regression regressing CRC screening on predisposing, need for care and enabling characteristics (n=123; age >=52 years)

Variables	Predisposing characteristics			Need for care characteristics			Enabling characteristics			Predisposing, need for care, and enabling characteristics		
	β (SE)	OR	95% CI	β (SE)	OR	95% CI	β (SE)	OR	95% CI	β (SE)	OR	95% CI
<i>Predisposing</i>												
Age (years)	0.02 (0.49)	1.02	0.93, 1.12							0.07 (0.06)	1.08	0.95, 1.22
Version English Spanish	-0.09 (0.42)	0.91	0.40, 2.08							0.23 (0.56)	1.26	0.42, 3.76
Education 6 groups	0.13 (0.13)	1.14	0.88, 1.48							0.20 (0.18)	1.22	0.87, 1.72
Partner	0.54 (0.40)	1.71	0.79, 3.78							0.98 (0.58)	2.65	0.86 8.19
<i>Need-for-care</i>												
Perceived health status				-0.01 (0.23)	0.99	0.63, 1.56				-0.16 (0.27)	0.85	0.50, 1.45
BMI				0.03 (0.03)	1.03	0.97, 1.10				0.03 (0.03)	1.03	0.97, 1.10
BC adherence (no=0, yes=1)				2.00 (0.82)	7.41	1.49, 36.87				1.80 (0.86)*	6.02	1.11, 32.63
CC adherence (no=0, yes=1)				-0.31 (0.56)	0.73	0.24, 2.21				-0.19 (0.59)	0.83	0.26, 2.63
Menopausal status (postmenopausal=0, premenopausal=1)				1.56 (0.83)	4.77	0.95, 24.07				2.37 (0.96)*	10.73	1.63, 70.75
<i>Enabling</i>												
Yearly income 6 groups							0.01 (0.12)	1.01	0.80, 1.29	-0.12 (0.20)	0.89	0.60, 1.32
Insurance (no =0, yes=1)							1.18* (0.49)	3.26	1.26, 8.46	1.12 (0.57)*	3.06	1.00, 9.31
Usual source of care (no=0, yes=1)							0.64 (0.55)	1.89	0.65, 5.52	0.21 (0.64)	1.23	0.35, 4.34
-2 Log likelihood	163			144			154			130		
Cox and Snell R-squared	0.03			0.12			0.09			0.21		
Nagelkerke R-squared	0.04			0.17			0.12			0.28		

* Note. p < .05