Prevalence and Correlates of Breast and Cervical Cancer Screening Among a Midwest Community Sample of Low-Acculturated Latinas

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Abstract

Background—Low adherence to cervical and breast cancer (CBC) screening recommendations contributes to high CBC mortality among Latinas.

Purpose—To estimate the prevalence of, and factors associated with, last 12-month Pap smear and mammogram receipt among a Midwest community sample of low-acculturated Latinas.

Methods—We conducted a cross-sectional study with 278 Latina immigrants in Dane County, Wisconsin. Participants completed a self-administered questionnaire. We estimated multivariate logistic regression models to identify factors associated with CBC screening receipt.

Results—Rates of last 12-month Pap smear and mammogram receipt were 56.8% and 39.4%, respectively. Age, knowledge of screening recommendations, and having a regular health care provider were independently associated with both Pap smear and mammogram receipt. Having ever used Planned Parenthood and fatalism beliefs were uniquely correlated with Pap smear and mammogram receipt, respectively.

Conclusions—Modifiable individual, structural, and cultural factors contribute to suboptimal rates of CBC screening among low-acculturated Latina immigrants.

Keywords

Latinas; breast cancer; cervical cancer; screening; Social Ecological Model

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Cancer is the second leading cause of death in the U.S., second only to heart disease. Approximately 24% of all deaths[1] in the U.S., nearly 600,000 deaths, are caused by cancer every year.[2] Cervical and breast cancer (CBC) are leading causes of cancer morbidity and mortality among U.S. women. Cervical cancer used to be the leading cause of cancer death for women in the U.S. Fortunately, the numbers have declined significantly over the last 40 years, due largely to increases in regular screening.[3] Still, every year, approximately 12,000 women in the U.S. are diagnosed with cervical cancer and almost 4,000 die from cervical cancer[4]. Breast cancer is currently the most common cancer among women of all races and

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ethnicities. Furthermore, breast cancer represents the leading cause of cancer death among Latinas (the terms Latino and Hispanic are used as synonymous in this paper to refer to individuals of Hispanic origin) and the second leading cause among non-Hispanic white, African American, Asian American/Pacific Islander, and American Indian/Alaska Native women.[4] About 211,000 women are diagnosed with breast cancer annually and over 40,000 die from this disease.[5]

There are important disparities in CBC incidence and mortality affecting ethnic and racial minority women, in comparison with non-Hispanic white women. Latinas are the group with the highest incidence rate for cervical cancer, with an incidence twice that of non-Hispanic Whites (11.8 *vs*. 7.8 per 100,000). Incidence rates are also elevated among African Americans (10.4% per 100,000) and Alaskan Indians/American Natives (10.1 per 100,000). The death rate as a result of cervical cancer is also higher among minority women, including Latinas (3.0 per 100,000), African Americans (4.3 per 100,000), and Alaskan Indians/Native Americans (3.5 per 100,000), than among their non-Hispanic white counterparts (2.2 per 100,000).[6]

Important disparities in breast cancer by ethnicity and race also exist. Breast cancer incidence (93.0 per 100,000) and mortality rates (14.9 per 100,000) are lower in Latinas than in non-Hispanic White women (123.3 and 22.4 per 100,000, respectively) and African American women (118.0 and 31.6 per 100,000, respectively). [6,7] However, breast cancer incidence rates among non-Hispanic Whites have decreased by 1.5% every year since 1997,[6] but only 0.9% for Latinas. Furthermore, incidence rates have remained virtually unchanged for African Americans and Asian Americans/Pacific Islanders.[8] Notably, breast cancer is still diagnosed at later stages in Latinas and African Americans, with approximately 55% of breast cancer cases diagnosed at the local stage among Latinas and 51% among African Americans *vs*. 63% among their non-Hispanic White counterparts.[6,9,10] Finally, Latinas are 20% more likely to die of breast cancer than White women when diagnosed at similar age and stage.[6,11] Likewise, African Americans women with breast cancer are less likely than non-Hispanic white women to survive 5 years after diagnosis (78% vs. 90%, respectively).[12]

Early detection of CBC through regular Pap smears and mammograms is critical to reduce CBC incidence and mortality.[13] The implementation of Papanicolaou screening programs in the U.S. has contributed to a 67% reduction in cervical cancer incidence and mortality rates for all racial and ethnic groups over the past three decades.[13,14] Breast cancer screening in the United States increased from the late 80s to the year 2000 and has remained relatively stable since 2006. In 2010, approximately 59.9% of women 40 years and older reported having received a mammogram within the past year.[13] Improvements in screening and treatment have been paralleled by a steady decline on breast cancer incidence and mortality rates in all racial and ethnic groups since 1990.[13] Current disparities in CBC incidence and mortality affecting ethnic and racial minority women in the U.S. are likely to reflect, at least partially, underutilization of these regular cancer screening services as well as delayed follow-up of abnormal screening.[15,16] Latinas have lower rates of recent Pap smear (75%) and mammogram receipt (46.8%) than non-Hispanic white women (79.6% and 54.2%, respectively) and African American women (81.5% and 52.2%). Lower rates of recent cervical and breast cancer screening have also been estimated for Asian Americans (63.8% and 52.2%) and Alaskan Indians/Native Americans (65.2% AND 42.2%).[13] These statistics call for actions to reduce disparities in cervical and breast cancer incidence, mortality, and screening among ethnic and racial minority women in the U.S., including furthering our understanding of barriers to cancer screening among these groups.

This paper focuses on barriers and facilitators for CBC screening among Latinas. Latinos are the largest minority group in the U.S., making 16.3% of the total U.S. population and accounting for 56% of the nation's growth from 2000 to 2010.[17] As for the U.S. population, cancer is also the second leading cause of death among Latinos, accounting for 20% of death in this population.[6] Every year approximately 2,000 Latinas are diagnosed with uterine cervix cancer and 14,200 are diagnosed with breast cancer.[6] Cervical and breast cancer account for the death of 500 and 2,200 Latinas, respectively, every year.[6]

Multiple cultural, linguistic, legal, social, and structural barriers have been cited to explain Latinas' lower adherence to CBC screening recommendations and later initiation of cancer treatment. Immigrant women, particularly recent immigrants, women in low socioeconomic groups, and those who lack health insurance are generally less likely to regularly receive breast and cancer screening services.[13] These risk factors are particularly prevalent among Latina women. Approximately, 55% of them are foreign born, 20% live in poverty, 36% have less than a high school education, and 36%[18] lack health insurance (47% of the foreign-born Latinas).[19] Moreover, 45% of all Latinas speak English less than very well. Previous studies have found that low income,[20] low level of acculturation,[21,22] low literacy and low English proficiency,[22,23] limited knowledge about screening services and recommendations,[24–26] lack of health insurance[21,27] and access to culturally sensitive providers,[28] transportation barriers,[20] and cultural beliefs[26,29,30] hinder Latinas' access to and utilization of CBC screening services. Yet, most research conducted on this topic has lacked a solid theoretical foundation and a comprehensive approach to identify factors associated with CBC screening among Latinas. Furthermore, most studies have been conducted in the 90s and early 2000s and predominantly in urban areas in the West and Southwest U.S., with relatively large, long-established Latino communities.[31–34] During the last decade, the Latino population has continued growing and expanding geographically throughout the U.S. Although the Latino population grew in every region between 2000 and 2010, the most significant growth has taken place in the South (four times the growth of the total population in the South) and Midwest (more than twelve times the growth of the total population in the Midwest[35]). Consequently, the share of foreign-born Latinos has increased, as has the proportion of Latinos who live in the South and Midwest regions of the U.S.[36] Little is known about the health needs of Latinas living in areas with smaller, fast-growing communities of Latino immigrants in the Southern and Midwestern states. Given the recent nature and small size of these populations, there are fewer Spanish-speaking health care providers in these regions and providers of Latino origin compared with other areas with more established Latino communities.[37] Health care practices are also less likely to have appropriate interpretation and translation services available for monolingual Spanish-speaking populations.[38,39] These language and sociocultural barriers may result in lower rates of utilization of preventive services and a different constellation of factors associated with Latinas' receipt of CBC screening tests.

The Latino community resident in Wisconsin is a fast-growing and low-acculturated population that increased by 48% during the last decade,[35] becoming the largest minority population in the state (6.1% of the State's population).[40]

State data regarding CBC screening among Latinas in Wisconsin are based on small sample sizes (N=120 for cervical cancer; less than 100 cases for mammography utilization in year 2006), with no information available for particular counties.[41] This study sought to determine levels of, and factors associated with, CBC screening among a community sample of low-acculturated Latina immigrants residing in Dane county, Wisconsin. The Social Ecological Model (SEM) guided the selection and measurement of the study variables.[42] According to this model, uptake of CBC screening services is determined by sociodemographics, as well as factors at the individual level (e.g., knowledge, attitudes),

followed by interpersonal (e.g., social support, social networks), organizational (e.g., rules, structures, and incentives), community (e.g., social conditions, physical structures, leadership), public policies, and cultural factors.[43] Information on rates of recent CBC screening and factors associated with screening practices at various levels of the SEM may inform the need for, and design of, interventions aimed at improving CBC screening rates among new and fast growing communities of Latinas in the U.S.

Methods

Design

We used data from a cross-sectional survey that served as baseline for the evaluation of a community-based intervention aimed to increase CBC screening among low-acculturated Latinas in Dane County, Wisconsin. The intervention, called Cuidándome (Taking Care of Me) was led by the local chapter of Planned Parenthood of Wisconsin, Inc. (PPWI) and consisted on communitywide outreach and educational activities conducted by Latina lay health advisors, as well as use of media to increase awareness and promote CBC screening among Spanish-speaking Latinas. Only 15% of the population in Dane County lives in a rural area.[44] Accordingly, the intervention was concentrated in the city of Madison, where PPWI is located, and adjacent areas. A community-academic partnership between PPWI and the first authors' institution of affiliation was established to evaluate the effectiveness of the intervention.

Study participants and data collection

Lay health advisors used their own social networks to recruit women for participation in small-group educational sessions, referred to as home health parties. From May 2009 to June 2010, eligible women attending Cuidándome home health parties were informed about the study by research staff and invited to participate. Inclusion criteria were 18 years and older, fluent in Spanish, not pregnant within the last 12 months, living in Dane county at the time of the study, and not having attended a Cuidándome home health party previously. After providing written consent, participants completed a self-administered questionnaire in Spanish prior to the beginning of the educational activities included in the home health party. A cohort of 300 participants was targeted for the longitudinal study to ensure sufficient statistical power (>80%) to detect moderate-small (effect size >=0.3) intervention effects on CBC screening among program participants. A total of 353 women were recruited and completed a baseline questionnaire. Of these, 75 completed earlier versions of a baseline questionnaire, and 278 completed a revised, final version of this instrument. These 278 women form the analytical sample included in this study. Based on their ZIP code of residence and 2010 U.S. Census urban/rural classification[44] categories, 89.5% of the sample lived in urban areas, 8.9% lived in mixed rural-urban area; and 1.3% lived in a rural area. All study procedures were approved by the authors' Institutional Review Board.

Measures

The content and format of the final version of our self-administered baseline questionnaire was informed by the Social Ecological Model,[43] a review of the literature on CBC screening among Latinas in the U.S., input from a community research advisory board, and pilot testing with 75 early Cuidándome participants. The instrument included questions about CBC screening history; sociodemographics; knowledge and attitudes about CBC screening; interpersonal factors; structural factors; and acculturation and cultural beliefs related to CBC screening.

Last 12-month CBC screening history—Participants were asked whether they had ever had a Pap smear and, if applicable, when was the last time they had a Pap smear.

Similar questions inquired about history of mammogram receipt. Based on answers to these questions, women were classified as having or not having ever received a Pap smear / mammogram; and as having or not having received a Pap smear / mammogram within 12 months prior to the survey. Self-reported CBC screening history tend to be over-reported[45,46] and meta-analysis on validation studies have found high sensitivity, but only moderate specificity for mammography and Pap smear, respectively.[47,48] Participants were first provided with a very short description of these tests to ensure the participants's comprehension, increase the validity of these measures, and reduce misclassification for the main outcome.

Sociodemographic factors—Within this category, we examined the role of age (years), educational attainment (less than high school *vs*. high school or higher), and marital status (married/cohabiting *vs*. other).

Knowledge and attitudes—Participants' knowledge about Pap smear / mammogram screening recommendations and fear of the procedure were assessed. Knowledge about breast cancer screening recommendations was measured with a 3-question composite scale (range 0 -3; Cronbach's α=.24). Participants were asked what a mammogram is for, the age at which women should start having regular mammograms, and the frequency with which women should have a mammogram, using a multiple-choice answer format. A seven-question composite scale with similar questions asked about knowledge on cervical cancer screening recommendations (range 0-7; Cronbach's α=.58). An additional question asked the extent to which fear that the test could be painful would deter them from getting a Pap smear / mammogram. Response options ranged from 1 (Not al all) to 5 (Very much), but were dichotomized for analyses (1 *vs*. more than 1). Given that the ongoing Cuidándome program may have influenced participants' knowledge and attitudes towards Pap smear / mammogram screening, additional questions asked about the respondents' awareness of the Cuidándome campaign ("Had you ever heard about the Cuidándome program before you were invited to participate in this home health party?") and last 12-month exposure to messages promoting BCC screening tests on community health fairs, radio ads or talk shows, printed media, and ads running in public buses (i.e. the media used by the Cuidándome campaign). Media exposure questions were collapsed into a dichotomous variable reflecting exposure to messages on one or more of these media during the last 12 months.

Interpersonal factors—The questionnaire included perceived partner's disapproval as a potential barrier to CBC screening. Participants were asked: "If you wanted to get a mammogram/Pap smear, how much would you worry about your partner's disapproval?" Response options ranged from 1 (Not at all) to 5 (Very much), but were dichotomized for analyses (1 *vs*. more than 1).

Structural factors—The questionnaire included a list of questions to assess the degree to which participants perceived characteristics of the health care system and other structural factors as possible barriers to obtain CBC screening. Participants were asked "If you wanted to get a mammogram / Pap smear, how much would you worry about...?" The list of potential organizational and public policy barriers covered the cost associated with the procedure, schedule conflicts, lack of English proficiency, fear about immigration status, and unavailability of childcare. Response options to each item ranged from 1 (Not at all) to 5 (Very much) and were dichotomized for analyses (1 *vs*. more than 1). In addition, we assessed availability of a regular health care provider (Yes/No) and health insurance status at the time of the survey. The latter was based on two consecutive questions asking about insurance status (Yes/No) and type of insurance ("none", "public insurance, such as

Medicare, Medicaid, or BadgerCare", "private insurance paid for by your employer or a relative's employer", "private insurance paid for by yourself or a relative", and "other type of insurance"). Those answering "no" to the first question or "none" to the second one were classified as not having health insurance. Finally, two questions inquired about having heard of Planned Parenthood of Wisconsin, Inc. before being invited to the home health party (Yes/No) and having ever used their services (Yes/No).

Acculturation and cultural factors—Level of acculturation or assimilation to the U.S. mainstream culture was assessed through various measures, including length of residency in the U.S. (US-born, more than 10 years, 6-10 years, 1-5 years, and less than one year) and an adapted version of the "language use" subscale of the 12-item Short Acculturation Scale for Hispanics developed by Marin et al.[49] This 5-item subscale has shown good psychometric properties among various Hispanic groups[50] and has been used in previous research on acculturation and Latino health behaviors.[51] Our adapted version of the subscale consisted of 5 items: (1) In general, what language(s) do you use and speak? (2) What was the language(s) you used as a child? (3) What language(s) do you usually speak at home? (4) In which language(s) do you usually think? and (5) What language(s) do you usually speak with your friends?. The response options for the first question were "only Spanish", "Spanish better than English", "both equally", "English better than Spanish", and "only English". The options for answering questions 2-4 were "only Spanish," "more Spanish than English," "both equally," "more English than Spanish," and "only English." Our adapted subscale ranged 1-5 and showed good internal reliability (Cronbach's α=.83). The questionnaire also included two questions aimed to capture cultural beliefs described in the literature as potential barriers to CBC screening: embarrassment/sexual modesty (i.e., concern about a professional examining intimate parts of their body) and fatalism with regard to cancer diagnosis (i.e., concern that the test found something abnormal). Participants were asked the degree to which each of these factors would deter them from obtaining a Pap smear or mammogram (1 = Not at all; 5 = Very much). Responses were dichotomized for analyses (1 *vs.* more than 1).

Statistical analyses

Descriptive statistics, means, standard deviations, and percentages, were computed to describe the prevalence of lifetime and last 12-month Pap smear and mammogram receipt and to examine the theoretical correlates of Pap smear / mammogram screening described above. Next, we estimated two sets of univariate logistic regressions to estimate the crude association between each of these correlates and last 12-month receipt of a Pap smear and a mammogram. Factors showing a crude statistical association with a probability (p value) equal or lower than .30 in the unadjusted models were included in two subsequent multiple logistic regression models to estimate the adjusted association between the theoretical correlates and the prevalence of last 12-month Pap smear and mammogram receipt. We used the backward stepwise (conditional) method to optimize the level of statistical power. Analyses on Pap smear receipt were conducted with all study participants. Analyses on mammogram receipt were conducted with the subset of participants who were 40 years old and older. All analyses were conducted using IBM SPSS Statistics Version 20 (IBM, Armonk, NY).

Results

Prevalence of CBC screening

The prevalence of lifetime receipt and last 12-months receipt of Pap smear among all study participants was 92.5% (95% CI: 89.3, 95.6) and 57.0% (95% CI: 51.0, 63.0), respectively. The prevalence of lifetime receipt of mammogram among women 40 years old and older

was 74.2% (95% CI: 62.9, 85.4) and last 12-months receipt was 39.0% (95% CI: 26.0, 51.0). Last 3-year receipt rates were 83.4% for Pap smear and 39.7% for mammogram tests (Table 1).

Distribution of possible determinants of CBC screening

The distribution of sociodemographic characteristics and other possible determinants of CBC screening among study participants are shown in Table 1. The mean age among the entire sample was 34.58 years (SD = 10.43). Most women in the sample were married or cohabiting with a partner (74.9%). Only 36.1% had completed high school or a higher degree. Approximately 27.5% had health insurance at the time of the survey and 51.7% reported having a regular health care provider. The majority was foreign born (98.6%), with 18.1%, 53.4%, 17.3%, and 9.7%, having resided in the U.S. for more than 10 years, 6-10 years, 1-5 years, and less than a year, respectively. On a 1-5 scale, the average level of acculturation was 1.33 (SD=.52), with 60% being monolingual Spanish speaking.

On a scale of 0-7, women were generally knowledgeable about Pap smear recommendations (Mean=5.16, SD = 1.48; Table 1). About two out of three (66.1%) reported fear of the Pap smear procedure. Only 6.3% reported concern about partner disapproval of the procedure. Concern about cost of the procedure (76.4%), limited clinic schedules (48.4%), and lack of English fluency (56.7%), were widespread. To a lesser extent, unavailability of childcare (36.1%) and fear of immigration-related legal issues resulting from seeking a Pap smear (26.6%) were reported by this sample of women. Close to half (44.6%) of participants reported some level of concern regarding having a health care professional examining intimate parts of their body and 81.7% feared that a Pap smear could find something abnormal.

Sixty-eight participants (24.46% of the entire sample) were 40 years old or older. Of them, two failed to provide data on recent mammogram receipt and were not included in analyses concerning prevalence or correlates of mammogram receipt. In general, participants 40 years old and over were similar to the overall sample, but slightly less likely to be married or cohabiting (64.2%), more likely to be health insured (36.4%), and more likely to be monolingual Spanish speaking (74.2%; Table 1).

On a scale of 0-3, knowledge about mammogram recommendations was 2.34 (SD=0.78; Table 1). Over 60% of this subsample (60.3%) were fearful of the procedure. Perceptions of partner disapproval were held only by 9.1% of them. Concern about the cost of getting a mammogram (70.3%), limited clinic schedules (47.7%), and lack of English fluency (63.6%) were common among this sample of Latinas. Close to a quarter reported concerns regarding experiencing immigration-related legal trouble (25.8%) and unavailability of childcare (22.7%) as possible deterrents of mammogram seeking behaviors. Concerns about sexual modesty (39.1%) and fatalism (72.3%) with regard to mammogram receipt were also reported by a substantial proportion of women in our sample.

About 45.2% of women in the study sample reported having heard about the Cuidándome program prior to their being invited to the home health party and 83.6% had been exposed to messages promoting the use of Pap smears. Among women 40 years or older, 39.4% had heard about Cuidándome and 77.9% had been exposed to messages promoting mammograms during the last 12 months. The results also indicated that 55.1% of women in the study had heard about PPWI before (33.3% of those 40 years or older) and 35.3% had ever used PPWI services (15.4% of those 40 years or older).

Factors associated with last 12-month Pap smear receipt

Simple logistic regression models indicated that age (OR = 0.98, 95% CI = 0.96, 1.00), knowledge of Pap smear recommendations (OR=1.19, 95% CI=1.00, 1.42), awareness of the Cuidándome campaign (OR=1.91, 95% CI=1.17, 3.13), having health insurance (OR = 1.83, 95% CI = 1.05, 3.18), having a regular health care provider (OR=2.62, 95% CI=1.60, 4.29), knowing about PPWI (OR=3.19, 95% CI=1.94, 5.25), and having ever used PPWI services (OR=2.86, 95% CI=1.67, 4.89) were factors individually correlated with last 12 months receipt of Pap smear among the study sample (Table 2). Multivariate logistic regression models showed that age (AOR = 0.95, 95% CI = 0.92, 0.98), knowledge of Pap smear recommendations (AOR=1.30, 95% CI = 1.05, 1.59), having a regular health care provider (AOR = 2.86, 95% CI = 1.59, 5.15), and having used PPWI services (AOR=2.49, 95% CI=1.28, 4.82) were positive and significant predictors of the likelihood of reporting last 12-month receipt of a Pap smear (Table 2).

Factors associated with last 12-month mammogram receipt

Unadjusted regression models on last 12-months receipt of a mammogram indicated that having completed high school (OR = 3.73, 95% CI = 1.27, 10.9), knowledge of mammogram recommendations (OR=2.46, 95% CI= 1.09, 5.55), concern about the cost of the procedure (OR = 0.25, 95% CI = 0.08, 0.79), lack of English fluency (OR = 0.2, 95% CI = 0.07, 0.60), having a regular health care provider (OR=4.94, 95% CI=1.53, 15.9), and being monolingual Spanish (OR=.32, 95% CI=.10, .99) were factors significantly associated with the likelihood of having received a mammogram in the last 12 months among women 40 year old or older (Table 3). Results from the multiple regression model showed that, after adjusting for other variables in the model, reported receipt of last 12-month mammogram was positively and significantly associated with age (AOR = 1.18, 95% CI = 1.03, 1.34) level of knowledge about mammogram recommendations (AOR=5.78, 95% CI= 1.53, 21.7), and having a regular health care provider (ARO=4.91, 95% CI=1.01, 23.7; Table 3). In addition, last 12-month mammogram receipt was negatively related to concern that the procedure could find something abnormal (AOR=0.17, 95% CI=0.03, 0.90).

Discussion

This paper estimated the prevalence of, and factors associated with, recent Pap smear and mammogram receipt among a network-driven sample of low acculturated Latinas living in a Midwestern community. The results suggest relatively high levels of lifetime Pap smear and mammogram receipt, but suboptimal levels of recent receipt of these cancer screening services among this population. Only about 57% of Latinas in this sample had received a Pap smear in the last 12 months; and a mere 39% of the subset aged 40 and over had received a mammogram in the last 12 months.

In recent years, cervical cancer screening recommendations have been updated to maximize benefits and reduce harms associated with over-screening and over-diagnosis. New guidelines have sought to target women most likely to benefit from screening and extend screening intervals.[52] Updated screening recommendations from American Cancer Society and the U.S. Preventive Services Task Force call for women with no other risk factors and above age 21 to receive a Pap smear every three years.[53] Among our study sample, approximately 83.4% of the women had received a Pap smear in the last three years; this percentage remained virtually unchanged for women aged 21 and over (84.2%; data not shown). Both figures are just slightly below last three-year Pap test receipt levels in the state of Wisconsin (86.6%) and very close to national estimates for women 21 years and older in the U.S. (83.6%).[52] These findings seem to suggest that, despite limited levels of health insurance coverage, recent Latina immigrants in this Midwestern community are not at

disadvantage in terms of their access to cervical cancer screening services compared with other women in Wisconsin and nationwide. Furthermore, our data would suggest these women do better in terms of Pap smear receipt than their counterparts in their Latin American countries of origin. For instance, rates of last 12-month receipt of Pap smear in Mexico, the country of origin for most Latinas in the U.S. and in our sample, range from 27.4% to 48.1%, depending on the state.[54] While these results are positive, early detection of cervical cancer and precancerous lesions is only the first step in the process of reducing mortality rates associated with cervical cancer among Latinas. Appropriate treatment and follow up are also necessary to achieve this end. Whether adequate levels of treatment and follow up are present among Latina recent immigrants in this and similar communities remains to be seen. Low rates of health insurance and limited availability of a regular health care provider among this population, as evidenced by data from our study, may seriously jeopardize Latina immigrants' ability to realize the maximum benefits associated with adherence to these cervical cancer screening recommendations. Future studies should investigate this issue in order to develop a more complete picture of the factors contributing to disparities in cervical cancer mortality rates affecting Latinas in the U.S.

For mammogram receipt, our estimates suggest lower last 12-month receipt rates among our sample of low-acculturated Latinas (39%) compared with non-Hispanic Whites (51.5%) and all women in the U.S. (50.8%). The American Cancer Society recommends that women 40 years of age and over receive mammography screening on an annual basis.[55] Different agencies have issued recommendations that entail less frequent mammography screening and starting at an older age.[53,56] Nonetheless, the data found in our sample seem to suggest ample room for improvement and missed opportunities to detect and treat breast cancer early among low-acculturated Latinas in this midwestern community. Even if the definition of *recent mammography screening* is extended to include the last three years, as other expert guidelines recommend,[57] the receipt rate among our sample still suggests suboptimal breast cancer screening rates among recent Latina immigrants. These results are consistent with national statistics indicating that recent immigrants have lower prevalence of mammography compared with U.S.-born women and more established immigrant women.[52]

Our analysis of factors associated with recent Pap smear and mammography receipt yielded both common and unique correlates for the receipt of these two screening services. For Pap smear, our final models revealed a significant role played by sociodemographic, cognitive, and structural factors. In general, and consistent with a social-ecological approach, recent Pap smear receipt was significantly associated with age, knowledge of cervical cancer screening recommendations, knowledge of the Cuidándome campaign, and having a regular health care provider. Older women in our sample were less likely to report a recent Pap test, regardless of other cognitive and structural factors. The decline in Pap smear rates with age has been observed in national statistics[58] and may be related to lower perception of risk among older women or less contact with the health care system after childbearing. In contrast, women with greater knowledge of cervical cancer screening recommendations and those with access to a regular health care provider were more likely to report a recent Pap smear, independently from other factors included in our models. Previous statistics have shown that cervical cancer screening through Pap smears among women in the U.S.[52] and other samples of Latinas[6] tend to be less likely among those without health insurance coverage. Our unadjusted analyses also indicated a significant relationship between health insurance and recent Pap smear receipt. However, this relationship became not significant after other variables, including having a regular health care provider and having used PPWI services, were controlled for in the model. Rather than negating the relevance of health insurance coverage, our results suggest that some of the influence health insurance has on cervical cancer screening may be mediated by access to a regular health care provider and/or availability of low-cost health services such as those offered by PPWI. In our sample, health

insurance coverage and regular health care provider were highly correlated (Pearson's r = 0.513, p<.001; data not shown), both variables were significantly associated with recent pap smear receipt in univariate analyses, but the effect of health insurance disappeared after including a regular health care provider in the model. This pattern of findings conforms to the conditions required for a meditational model.[59]

With regard to recent mammography, factors at different levels of the social-ecological model were also identified as significant predictors of receipt of this screening test, including age, education, knowledge of breast cancer screening recommendations, concern about the cost of the procedure, perceived lack of English fluency, having a regular health care provider, and monolingual Spanish status. Adjusted final models indicated that women who were older, had greater knowledge of mammography recommendations, or access to a regular health care provider were significantly more likely to report a recent mammogram, independently of other factors. On the other hand, fatalism, as indicated by reported concern that the procedure could find something abnormal, reduced significantly the odds of reporting a recent mammogram. Similar to what we observed for Pap smear, having health insurance did not emerge as significant factor in our final model for mammography receipt, after controlling for other factors. As for Pap smear receipt, being aware of screening recommendations significantly increased the odds of having received a recent mammogram.

In general, the limited role of health insurance in explaining mammography receipt is surprising. Our measure of health insurance was limited to the time of the survey and did not capture continuity or availability of health care insurance. These limitations may have reduced the role of this variable as a determinant of cancer screening services among Latinas. Alternatively, the result may be due to the availability of the Wisconsin Well Woman Program, a program funded by the Centers for Disease Prevention and Control and administered by the Wisconsin Department of Health Services, that offers selected health screening services, especially breast cancer screening, to women with little or no health insurance coverage in Wisconsin. While Latina immigrants may still face barriers to benefit from this program, due to unauthorized immigration status or reluctance to use public health care services, this program has made strides increasing access to preventive health services among low-income and minority women in Wisconsin.[60] Access to low cost services provided by PPWI may have also played a role in reducing the impact of health insurance status, particularly with regard to cervical cancer screening, a service offered by this organization. PPWI also connects patients to local breast cancer screening resources, but does not offer mammograms. Therefore, it would not be expected for this variable to impact similarly access to breast cancer screening. In general, access to PPWI may represent a regular source of health care for underserved women. Among women in our sample, knowing about PPWI was significantly related with reported availability of a regular source of care (Chi square = 4.58, df=1, p=.032; data not shown). Collectively, the Wisconsin Well Women Program and PPWI may have made health insurance less of a relevant factor for Latinas in this region and increased the importance of having a regular health care provider as a determinant of cervical and breast cancer screening practices. With the potential to access these screening services regardless of health insurance status or income, health care providers' recommendations to get these cancer screening services may serve as critical cues to action for this population.

The prominent role of knowledge of screening recommendations has important implications for future interventions to promote breast and cervical screening. First, it suggests that educating women regarding when and how frequently they should receive these preventive screening services is an effective strategy to increase regular Pap smear and mammography receipt. Second, it raises concerns about the effects of potential confusion resulting from recent changes in recommendations and multiple clinical practice guidelines for breast and

cervical cancer screening. For decades, women in the U.S. have consistently been encouraged to receive these tests annually starting at age 40 for mammograms and at age 21 or shortly after initiating sexual practices for Pap smears. These were relatively simple, clear, and easily implementable messages for both women and health care providers. Recently, screening guidelines for both mammograms and Pap smears have changed and become more nuanced. While these changes may make sense to achieve maximum benefits and minimize over-diagnosis and unnecessary treatments, they must be accompanied by a strong public health campaign to ensure providers adhere to updated guidelines and continue recommending these screening services to their female patients. Similarly, renewed public health efforts are necessary to ensure women remain aware of the value of regular Pap smears and mammograms and become knowledgeable of the new recommendations and how they apply to them. This education may be particularly critical for minority and immigrant women, who may have limited contact with the health care system and, therefore, be less likely to be prompted by health care providers to receive these screening tests.

Research on predictors of CBC screening among Latinas have suggested the role of cultural factors, particularly level of acculturation and cultural beliefs, such as sexual modesty and fatalism.[24–26,29] Our analyses indicated that concern that the procedure could find something abnormal, a proxy measure of fatalism, was associated with decreased odds of receiving a mammogram. This result has implications for future campaigns to promote breast cancer screening among Latinas, pointing at the need for dissemination of information regarding the possibility of treating and curing many cases of breast cancer. Other than for this variable, our study did not reveal a significant role of other cultural factors among this low-acculturated sample of Latina immigrants, after adjusting for other sociodemographic, cognitive, and structural factors. Low levels of acculturation among our study sample may have resulted in insufficient variance in these cultural variables. Measurement of additional acculturation dimensions, such as media use and ethnic relations, could have yielded different results. Additionally, associations found in other studies may have been confounded by other relevant sociodemographic, cognitive, and structural factors not controlled for in previous analyses. Scholars have called for a better operationalization of acculturation and culture-related variables,[61] use of theory-driven models, and consideration of broader structural factors, in addition to cultural forces, to better explain if and how acculturation may affect health among Latinos.[62,63] Consistent with these calls, we have used multiple measures of acculturation and cultural beliefs and examined their role while simultaneously controlling for other theory-based sociodemographic, cognitive, interpersonal, and structural factors. Our results suggest, that once other factors are included in our models, most cultural factors do not play a significant role on the receipt of breast and cervical cancer screening among this sample of Latina immigrants.

Overall, our study suggests the need for health promotion interventions increasing awareness of cervical and cancer screening recommendations among Latinas along with a reduction of structural barriers, such as increasing the proportion of Latina immigrants who have access to a regular health care provider and supporting programs and organizations offering free or low-cost screening services to underserved communities, to promote regular Pap smear and mammogram receipt among this population. A series of updated systematic reviews by the Community Preventive Services Task Force suggests the effectiveness of education and reduction of structural barriers to increase screening for CBC among females in the U.S.[64] According to our results, older Latina women are at increased need for these interventions, as receipt of CBC screening tests seems to decrease with age. Interventions simultaneously promoting both types of cancer screening, as opposed to only one of them, may be more efficient and, perhaps more effective. Among our sample, approximately 93% of women 40 years and over who had not received a mammogram in the last three years,

reported not having had a Pap smear during that period either (data not shown). To date, few studies have tested community interventions with this dual purpose.

Limitations

This study is subject to several limitations. Data are based solely on self-report. CBC screening reports tend to overestimate the prevalence of these practices, especially in minority populations.[45] We tried to decrease overreporting by measuring recent (last 12 months) screening, which has been showed to improve accuracy on mammogram recall,[46] and having questions on Pap smear and mammogram receipt be preceded by a brief written description of these tests. The potential for overreporting extends to other studies and national surveys relying on self-reported data. Thus, this issue should not affect the comparability of our findings to those from previous research on this subject. The validity of some of our measures of interpersonal, structural, and cultural barriers (i.e. fatalism) has not been established. The cross-sectional nature of the survey precludes conclusions on the direction and causality of the associations found by our analyses. For instance, it is possible that women who received a Pap smear or a mammogram became more aware of screening recommendations as a result of their experience with these tests. Similarly, responses to the items on barriers for cancer screening, such as fear of the screening procedure, may be influenced by women's experiences (or lack thereof) while seeking and receiving these tests. Longitudinal and experimental designs may help confirm findings from this study. Study participants were recruited by lay health advisors and other Latinas who participated in the educational intervention to promote cervical and breast cancer screening. Non-probability, network-based participant selection and small sample sizes, particularly for the subset 40 year old and older, may have reduced the variability of some study variables and limited the extent to which the study findings may be generalized to the larger population of recent Latina immigrants in this and other midwestern regions. Likewise, the majority of the sample lived in urban or mixed rural-urban areas and the results may not apply to Latinas living in rural areas. We explored factors associated with Pap smear and mammogram receipt during the last 12 months. The results remained virtually unchanged when we extended the timeframe to the last three years. Finally, our study examined the role of multiple factors, at various levels of the social ecological framework, in relation to Pap smear and mammogram use among Latinas. However, it did not cover all of the potentially important cognitive, interpersonal, or structural factors that may impinge upon these practices. Future studies must expand this work to increase our understanding of the determinants of breast and cervical cancer screening among this population.

Conclusion

Receipt of regular cervical and breast cancer screening through Pap smears and mammograms remain critical elements to reduce the incidence and mortality associated with these cancers. Modifiable individual, structural, and cultural factors contribute to suboptimal rates of CBC screening among low-acculturated Latina immigrants residing in the Midwest. Multilevel, culturally appropriate interventions addressing these factors, particularly through education and reduction of structural barriers, are necessary to increase CBC screening rates and reduce the excess impact CBC may have on this underserved population.

Acknowledgments

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Table 1

Prevalence of factors examined as potential correlates of last-12 months Pap smear and mammogram receipt among a community-based sample of Latinas in Dane County, Wisconsin, 2009-2010

	Pap Smear Receipt			Mammogram Receipt[*]		
	Yes (N=158)	No (N=120)	All (N=278)	Yes (N=26)	No (N=40)	All (N=66)
Sociodemographics						
Age, Mean (SD)	33.5 (9.34)	35.9 (11.6)	34.58 (10.43)	51.4 (8.33)	47.8 (6.36)	49.2 (7.28)
Completed high school or higher, %	34.6	38.3	36.1	52.0	22.5	32.8
Marital status						
-Married/cohabiting, %	77.1	72.6	74.9	65.4	66.7	64.2
-Single/never married, %	10.8	12.8	12.0	3.8	10.3	9.0
-Other, %	12.1	14.5	13.1	30.8	23.1	26.9
Knowledge and attitudes						
Knowledge scale score, Mean (SD)	5.33 (1.33)	4.95 (1.64)	5.16 (1.48)	2.62 (0.74)	2.20 (0.76)	2.34 (0.78)
Fear that procedure is painful, %	63.0	69.6	66.1	58.3	60.0	60.3
Knowledge of Cuidándome campaign, %	52.0	36.1	45.2	40.0	35.9	39.4
Exposure to media promoting screening, %	84.2	83.3	83.6	80.8	75.0	77.9
Interpersonal Factors						
Partner may disapprove, %	6.50	6.10	6.3	16.0	5.00	9.1
Structural Factors						
Concern about cost , %	74.3	78.6	76.4	45.8	71.8	70.3
Concern about clinic schedule, %	43.8	53.4	48.4	40.0	55.0	47.7
Concern about lack of English fluency, %	53.2	61.1	56.7	43.5	65.8	63.6
Concern about immigration status, %	24.7	29.6	26.6	24.0	25.6	25.8
Concern about childcare, %	38.5	33.6	36.1	32.0	22.5	22.7
Has health insurance, %	32.7	21.0	27.5	48.0	28.2	36.4
Has regular health care provider, %	62.3	38.7	51.7	80.0	44.7	58.5
Knowledge of PPWI, %	67.5	39.5	55.1	36.0	33.3	33.3
Has used PPWI services, %	45.6	22.7	35.3	8.3	20.5	15.4

Acculturation and Cultural Beliefs

Length of residence in the U.S.

	Pap Smear Receipt			Mammogram Receipt [*]		
	Yes (N=158)	No (N=120)	All (N=278)	Yes (N=26)	No (N=40)	All (N=66)
-Born in the US, %	.60	2.5	1.4	0	0	0
->10 years, %	18.5	17.6	18.1	32.0	20.0	23.9
-6-10 years, %	58.6	46.2	53.4	40.0	47.5	44.8
-1-5 years, %	17.2	17.6	17.3	8.00	15.0	13.4
-Less than 1 year, %	5.1	16.0	9.7	20.0	17.5	17.9
Acculturation scale score, Mean (SD)	1.33 (.49)	1.33 (.56)	1.33 (.52)	1.28 (.47)	1.18 (.41)	1.21 (.43)
Monolingual Spanish, %	57.0	62.4	59.5	60.0	82.5	74.2
Sexual modesty, %	41.1	49.2	44.6	38.5	42.5	39.1
Fatalism, %	80.5	82.9	81.7	60.0	81.1	72.3

[*] Women 40 years old and over

Table 2

Factors associated with last-12 months Pap smear receipt among a community-based sample of Latinas in Dane County, Wisconsin, 2009-2010 (N=278)

	Unadjusted OR (95% CI)	p	Adjusted OR^a (95% CI)	p
Sociodemographics				
Age	0.98 (0.96, 1.00)	.058	0.97 (0.94, 0.99)	.023
Completed high school or higher	0.85 (0.52, 1.40)	.524		
Marital status				
-Married/cohabiting	Ref.			
-Single/never married	0.80 (0.38, 1.68)	.550		
-Other	0.79 (0.39, 1.60)	.505		
Knowledge and attitudes				
Knowledge on screening recommendations (score)	1.19 (1.00, 1.42)	.052	1.30 (1.05, 1.61)	.018
Fear that procedure is painful	0.75 (0.45, 1.25)	.261		
Knowledge of Cuidándome campaign	1.91 (1.17, 3.13)	.010		
Exposure to media promoting Pap smear	1.06 (0.56, 2.02)	.850		
Interpersonal Factors				
Partner may disapprove	1.05 (0.39, 2.86)	.917		
Structural Factors				
Concern about cost	0.79 (0.44, 1.40)	.413		
Concern about clinic schedule	0.68 (0.42, 1.10)	.117		
Concern about lack of English fluency	0.73 (0.44, 1.19)	.204		
Concern about immigration status	0.78 (0.45, 1.34)	.371		
Concern about childcare	1.23 (0.75, 2.04)	.412		
Has health insurance	1.83 (1.05, 3.18)	.033		
Has regular health care provider	2.62 (1.60, 4.29)	.000	3.18 (1.73, 5.86)	.000
Knowledge of PPWI	3.19 (1.94, 5.25)	.000		
Has used PPWI services	2.86 (1.67, 4.89)	.000	2.49 (1.28, 4.82)	.007
Acculturation and Cultural Beliefs				
Length of residence in the U.S.				
-Born in the US	Ref.			
->10 years	4.14 (0.40, 42.7)	.232		
-6-10 years	5.02 (0.51, 49.4)	.167		
-1-5 years	3.86 (0.37, 39.8)	.257		
-Less tan 1 year	1.26 (0.11, 14.05)	.849		
Acculturation scale	0.99 (0.63, 1.58)	.996		
Monolingual Spanish	0.80 (0.49, 1.31)	.369		
Sexual modesty	0.72 (0.45, 1.17)	.183		
Fatalism	0.85 (0.46, 1.59)	.616		

OR (95%CI) = Odds Ratio (95% Confidence Interval)

[b] Mean (Standard Deviation)

[a] Adjusted odds ratios and 95% CIs based on hierarchical multivariate logistic regression models, using conditional backward stepwise procedures. Only factors included in the final model are shown in this column.

Table 3

Factors associated with last-12 months mammogram receipt among a community-based sample of Latinas 40 years or older in Dane County, Wisconsin, 2009-2010 (N=66)

	Unadjusted OR (95% CI)	p	Adjusted OR[a] (95% CI)	p
Sociodemographics				
Age	1.07 (0.99, 1.15)	.054	1.18 (1.03, 1.34)	.014
Completed high school or higher	3.73 (1.27, 10.9)	.017		
Marital status				
-Married/cohabiting	Ref.			
-Single/never married	0.38 (0.04, 3.72)	.408		
-Other	1.36 (0.44, 4.22)	.595		
Knowledge and attitudes				
Knowledge on screening recommendations (score)	2.46 (1.09, 5.55)	.030	5.78 (1.53, 21.8)	.010
Fear that procedure is painful	0.56 (0.20, 1.55)	.266		
Knowledge of Cuidándome campaign	1.19 (0.42, 3.35)	.741		
Exposure to media promoting mammogram	1.40 (0.42, 4.69)	.586		
Interpersonal Factors				
Partner may disapprove	7.24 (0.76, 69.0)	.085		
Structural Factors				
Concern about cost	0.25 (0.08, .79)	.018		
Concern about clinic schedule	0.51 (0.18, 1.43)	.198		
Concern about lack of English fluency	0.20 (0.07, 0.60)	.004		
Concern about immigration status	1.61 (0.48, 5.40)	.442		
Concern about childcare	1.44 (0.42, 4.94)	.558		
Has health insurance	2.35 (0.82, 6.71)	.111		
Has regular health care provider	4.94 (1.53, 15.9)	.007	4.91 (1.01, 23.7)	.048
Knowledge of PPWI	1.13 (0.39, 3.23)	.827		
Has used PPWI services	0.35 (0.07, 1.82)	.213		
Acculturation and Cultural Beliefs				
Length of residence in the U.S.				
-Born in the US	N/A			
->10 years	Ref.			
-6-10 years	0.53 (0.15, 1.83)	.312		
-1-5 years	0.33 (0.05, 2.18)	.251		
-Less tan 1 year	0.71 (0.16, 3.23)	.662		
Acculturation scale	1.68 (0.54, 5.27)	.374		
Monolingual Spanish	0.32 (0.10, 0.99)	.049		
Sexual modesty	0.46 (0.15, 1.36)	.158		
Fatalism	0.40 (0.13, 1.22)	.108	0.17 (0.03, 0.90)	.038

OR (95%CI) = Odds Ratio (95% Confidence Interval)

[b] Mean (Standard Deviation)