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Physician and Family Recommendations to Obtain a Mammogram and Mammography Intentions: The Moderating Effects of Perceived Seriousness and Risk of Breast Cancer

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Abstract

A growing body of literature has demonstrated psychosocial factors enable mammography intentions and usage among Latinas. Although these factors (e.g., family recommendations, breast cancer perceptions) likely influence one another, little research has examined interactive effects. The current study assessed the moderating effect of perceived breast cancer seriousness and risk on associations between recommendations to obtain mammography and mammography intentions. This sample included 97 Latinas in rural Eastern Washington State. After adjusting for age, two significant interactions emerged: perceived seriousness x physician recommendation and perceived risk x family recommendation. This exploratory study provides important directions for future communication research and planning to improve screening disparities.

Keywords: Mammography; Latina; Family recommendations; Physician recommendations; Perceived risk

Introduction

Breast cancer is the leading cause of death for Latina women in the United States [1]. The low survival rates Latinas experience [2,3], despite lower incidence of breast cancer, may be partially attributable to high rates of late stage detection [4,5]. A number of interventions have sought to increase early detection through mammography utilization among US-based Latinas [6]. Despite increased efforts, disparities in mammography utilization have remained relatively constant and even slightly increased over time [7,8]. There may thus still be gaps in our understanding of factors impacting Latina's decisions to obtain a mammogram. A substantial body of literature concerning documented barriers and enabling factors to mammography use among Latinas exists [9-15]. These factors likely influence each other, but the majority of this work has not focused on interactive effects. The current study assesses interactive effects of different psychosocial factors for mammography intentions among a rural population of Latinas residing in Eastern Washington State.

Recommendations regarding mammography have been well-studied in Latina populations. Physician recommendations are a major predictor of mammography use among Latinas and other populations [9,10,16-26]. The literature has further demonstrated family and friend recommendations are associated with greater mammography intentions and practices in this population [20,27-30]. Recommendations may be particularly effective for Latinas, given the focus Latin American culture places on interpersonal relationships (e.g., *personalismo, colectivismo)*[31]. Notably, the majority of work has focused on either physician or family recommendations. Little research has simultaneously assessed these factors. Sources of recommendations may differ in their impact on behavioral decisions. For example, family recommendations may be potentially relevant due to particular cultural emphasis on familialism and interests to maintain family harmony and approval. Physician recommendations may relate to cultural values concerning respect for perceived authority figures (*respeto*). Understanding the relative effects of sources is warranted for future intervention planning, as it may elucidate which specific sources need to be targeted. Alternatively, recommendations may have a cumulative effect, in that any source of recommendation may be helpful and numerous sources of recommendation may be associated with greater mammography intentions. In this case, widespread dissemination and recruitment of different segments of women's social networks may be warranted, in order to give women as much support as possible. Thus, examining unique and cumulative effects of recommendations is important for future health interventions.

The impact of may also vary based on perceptions of breast cancer, including perceived seriousness and risk. Perceived seriousness can be defined as an individual's evaluation of the consequences of a disease [32]. Perceived risk of breast cancer can be understood as the likelihood a woman believes she has of obtaining a cancer diagnosis. Both have been associated with increased mammography screening, although elevated levels may serve as deterrents (e.g., fatalism, overestimated risk) [9,33-36]. How women react to recommendations to obtain screening by providers, family, and friends may vary by their perceptions of breast cancer (e.g., seriousness, perceived risk). Health behavior theories often incorporate interactions between perceptions of disease and social factors [9,37,38]. Little research to date has quantified this interplay. Interactive effects are important to consider among Latinos, as there are substantial misconceptions about breast cancer, which may influence the impact of social factors [33,34,39-41]. Empirical assessment of interactions would add to existing literature concerning psychosocial determinants of mammography screening and may elucidate which women may be best targeted by physicians or family members in interventions.

Observational studies are necessary to characterize these

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interactive effects, as they may highlight women who are particularly receptive to recommendations and women for whom alternative health promotion strategies are necessary. For example, women with low levels of perceived seriousness and risk concerning breast cancer may be more receptive and influenced by social factors concerning mammography. Low cost community-based interventions promoting informal conversations and recommendations by members of women's social networks may thus be sufficient to promote mammography use. Conversely, women with high levels of perceived seriousness and risk may already be very motivated to obtain a mammogram, and thus recommendations represent little added benefit.

This study serves as first step to test two research questions, using baseline data from a larger intervention study of U.S.-based Latinas. First, we test simultaneously and cumulatively the associations of different types of recommendations (physician, family) on mammography intentions. This research will help to elucidate which or how many sources may be particularly helpful in future health communication interventions. Second, we examine if associations between specific types of recommendations to obtain a mammogram and mammography intentions vary across different levels of perceptions about breast cancer (seriousness, risk). This exploratory analysis will enable subsequent larger study concerning the interactive effects of different psychosocial determinants on mammography intentions and screening.

Methods

Procedures

Study data were collected during April 2007 and September 2008 through the Hispanic Community Network to Reduce Cancer Health Disparities (U01 CA114633). This study took place in the Lower Yakima Valley of Washington State, a primarily agricultural community. The goal of this larger study was to evaluate the effect of a home-based educational intervention on perceptions of breast cancer and subsequent mammography practices. Participants were recruited to participate through two strategies. First, women ("hosts") were recruited at monthly local health fairs and flyers posted at community center venues, local service organizations, and public posting boards. Second, "host" participants were asked to invite family and friends over the age of 18 years to their homes to participate in the intervention. If individuals agreed to participate, they completed an informed consent, a written baseline survey, the intervention, and a written follow-up survey. All activities were led by trained bilingual lay health workers (*promotoras*) in the host participants' homes. Participants were given written surveys in their preferred language (English or Spanish). This project was approved by the Fred Hutchinson Cancer Research Center's Institutional Review Board. Given the current study's two objectives, baseline questionnaire data were used from a subset of participants based on the following eligibility criteria: 1) self-identified as female; 2) self-identified as Latina and 3) within the age of mammography guidelines at the time of data collection (40 years and older).

Measures

Recommendations: To assess recommendations, women were asked, "Has a doctor ever told you that you should receive a mammogram?" and "Have any of your family members ever suggested you get a mammogram?." Women could answer 0= No or 1 = Yes. These items were treated separately to examine the differential effects of physician and family recommendations. They were also summed to create a cumulative score, wherein women could have received no recommendations (0), one type of recommendation (1), or both types of recommendation (2).

Mammography intentions: Women were asked if they were considering having a mammogram within the next few months. Women could answer 0= No or 1 = Yes.

Socio-demographic variables: Standard questions were used to collect data on age, education, income as well as clinical information (e.g., regular source of care, history of mammography use, family history of cancer, insurance status).

Perceived seriousness of breast cancer: Seriousness was measured using three items: "Breast cancer is a serious disease", "There is nothing that can be done to prevent cancer", and "There is nothing that can be done to cure cancer." Women could respond 1 = Not at all to 4 = Very much. Scree plots, parallel analysis, and exploratory factor analysis with varimax rotation suggested a 1-factor solution. All factor loadings were greater than >.60. Cronbach's alpha was 0.70. Summary scores were calculated as sum of the three items, wherein greater scores indicated more perceived seriousness.

Perceived breast cancer risk: To calculate perceived risk, women were asked to give their perceived absolute ("What do you think your chances of getting breast cancer are?") and relative risk of developing breast cancer ("When compared to most women, what do you think the chances are of getting breast cancer someday?"). For both questions, women could respond from 0 = No chance of getting it to 100 = Will definitely get it. Variables were highly correlated (r = 0.86). Average Z-scores were calculated wherein greater Z-scores indicated greater risk perception.

Analysis plan

Bivariate analyses were conducted to identify potential covariates. To answer the first research question, multivariable logistic regression analyses to examine relative and cumulative associations of physician and family recommendations were conducted. The second research question was analyzed using the checklist for evaluating moderation analyses [42]. For analyses focused on moderation, it is not necessary for main effects to be significant [42,43]. Given this, the main effects of recommendations on mammography intentions do not need to be significant in order for moderation to occur. To determine the moderating effects of perceived seriousness and risk, two multivariable logistic regression models were conducted. This model included one type of recommendation, perceived seriousness, perceived risk, and the two possible interaction terms (recommendation x perceived seriousness, recommendation x perceived risk). Support for moderation was determined by significance of interaction terms. Due to the observational nature of our study, there were unequal sizes in groups. Assumptions of homogeneous variance were met across the categorical variables (physician and family recommendation). Unstandardized coefficients were used. For significant interactions, simple slopes were compared in multivariable logistic regression models, as this allowed for estimation concerning the significance of relationships between the predictors (physician and family recommendations) and outcome across levels of the moderator (seriousness, risk). For the purpose of these analyses, women were categorized as low or high in perceived seriousness and risk, based on median values (i.e., low = ≤ median; high = >median). For all analyses, an alpha of .05 was used to determine statistical significance.

Results

This sample included 97 Latina participants. Cases with missing

data (<1%) were deleted. This is considered a simplistic, adequate method for limited amount of missing data [44]. Table 1 provides basic socio-demographic and clinical information of the sample. Descriptive information concerning study variables of interest is also provided. Bivariate analyses revealed mammography intentions were associated with age, *OR* =0.92, 95%CI [0.86, 0.98], $p = .01$. Age was not associated with recommendations, perceived seriousness or perceived risk (*ps*= 0.39-0.95). Other variables were not associated with mammography intentions. Given this, age was included as a covariate in all subsequent analyses.

Next, bivariate associations between recommendations, perceived seriousness, and risk were examined. Women who received a physician recommendation were more likely to indicate they had received a family recommendation than women who had not received a physician recommendation (52.6% vs. 22.5%; $\chi^2 = 8.88$, $df = 1$, $p = .003$). Neither physician nor family recommendation was associated with perceived seriousness or risk (*p*s = 0.17-0.86). Perceived seriousness and risk were not significantly correlated to one another ($r = -0.03$, $df = 95$, $p = 0.80$).

Types of recommendations and mammography intentions

Two multivariable logistic regression models were conducted, including age as a covariate (Models 1-4; Table 2). Similar patterns were found when including or excluding age as a covariate. Relative to women who did not receive a physician recommendation, women who had received a physician recommendation were almost four times as likely to have mammography intentions, *OR* = 3.96, 95%CI [1.39, 11.28], $p = .01$. Family recommendation was not associated with mammography intentions, *OR* = 2.10, 95%CI [0.66, 6.67], $p = .04$. Finally, a logistic regression model was conducted to compare mammography intentions across women who had received no recommendation, one type (physician or family), and both types of recommendations. Relative to women who had received both types of recommendations, women who had no recommendations were less likely to have mammography intentions, *OR* = 0.19, 95% CI [0.06,0.62], $p<.0001$. There were no significant differences among women who received any recommendation and women who received both physician and family recommendations, *OR* = 3.4, 95%CI [0.61, 18.98], $p = 0.16$.

Variable	M (SE)
Age	50.31 (0.90)
	n (%)
Spanish-speaking	87 (90%)
Education	
≤4th grade	38 (39)
5th-8th grade	41 (42)
≥9-12th grade	18 (19)
Insured	52 (54%)
Previously had a mammogram	80 (83%)
Family history of breast cancer	11 (11%)
Regular source of care	83 (86%)
Received physician recommendation	57 (59%)
Received family recommendation	40 (41%)
Mammography intentions	74 (76%)
Perceived seriousness[1]	
Low	60 (62%)
High	37 (38%)
Perceived risk[2]	
Low	53 (56%)
High	42 (44%)

[1]The range for perceived seriousness was 3-12 (*M* = 8.26, *SD* = 3.15). Median-based categories are depicted to facilitate readability and describe cell sizes for moderation analyses. [2]The range for perceived risk was -1.01-2.62 (*M* = 0.000, *SD* = 0.96). Median categories are depicted to facilitate readability and describe cell sizes for moderation analyses.

Table 1: Socio-demographic and clinical information.

	OR	95%CI
Model 1: Recommendations	3.96	1.39, 11.28
Physician recommendation**	2.1	0.66, 6.67
Family recommendation*		
Model 2: Cumulative recommendations		
Women with no recommendations**	0.19	0.06, 0.62
Women with any recommendation	3.4	0.61, 18.97
Women with both recommendations	Ref	Ref
Model 3: Recommendations, adjusted by age		
Physician recommendation**	4.12	1.40, 12.16
Family recommendation	2.37	0.72, 7.79
Model 4: Cumulative recommendations, adjusted by age		
Women with no recommendations**	0.15	0.42, 0.56
Women with any recommendation	3.57	0.62, 20.59
Women with both recommendations	Ref	Ref
Model 5: Physician recommendations, perceived seriousness, and risk		
Physician recommendation**	227.85	5.63, 9220.95
Perceived seriousness*	1.25	0.99, 1.55
Perceived risk	1.31	0.66, 2.62
Physician recommendation x perceived seriousness*	0.64	0.43, 0.94
Physician recommendation x perceived risk	0.43	0.14, 1.29
Model 6: Family recommendations, perceived seriousness, and risk		
Family recommendation	11.58	0.19, 717.73
Perceived seriousness	1.41	0.74, 2.69
Perceived risk	1.06	0.89, 1.27
Family recommendation x perceived seriousness	0.9	0.59, 1.38
Family recommendation x perceived risk*	0.21	0.06, 0.84
Model 7: Physician recommendations, perceived seriousness, and risk, adjusted by age		
Physician recommendation**	164.05	3.70, 7281.74
Perceived seriousness	1.22	0.97, 1.53
Perceived risk	1.23	0.61, 2.52
Physician recommendation x perceived seriousness*	0.67	0.45, 0.99
Physician recommendation x perceived risk	0.44	0.14, 1.36
Model 8: Family recommendations, perceived seriousness, and risk, adjusted by age		
Family recommendation	18.76	0.23, 1518.60
Perceived seriousness	1.07	0.89, 1.29
Perceived risk	0.22	0.05, 0.91
Family recommendation x perceived seriousness	0.87	0.55, 1.35

*$p<.05$, **$p<.01$, ***$p<.001$

Table 2: Regression Models Concerning Recommendations, Perceived Seriousness, and Risk.

Moderation model

Multivariable logistic regression models were conducted to assess moderating effects of perceived seriousness and risk on relationships between physician and family recommendations and mammography intentions (Models 5-8; Table 2). Patterns were comparable across models including and excluding age. Two interaction terms were

significant: physician recommendation x perceived seriousness, *OR* = 0.67, 95%CI [0.45, 0.99], p = .05, and family recommendation x perceived risk, *OR* = 0.22, 95%CI [0.05, 0.91], p = 0.04.

Associations between physician and family recommendations to mammography intentions were conducted across different levels of perceived seriousness and risk, respectively. Among women who had low perceived seriousness, women who received a physician recommendation had greater odds of mammography intentions than women who did not, *OR* = 10.85, 95%CI [1.25, 93.94], p = .03. This relationship was not significant among women with high perceived seriousness, *OR* = 0.95, 95%CI [0.87, 1.03], p = .95. Similarly, among women who had low perceived risk, women who received a family recommendation was associated with greater odds of mammography intentions than women who did not, *OR* = 10.08, 95%CI [2.32, 43.77], p = .002. This association was not significant among women with high perceived risk, *OR* = 1.07, 95%CI [0.16, 6.84], p = .95.

Discussion

The current study sought to address two existing gaps in the literature. First, the differential and cumulative effects of recommendations on mammography intentions among a sample of Latinas were examined. Such assessment is warranted, given the increasing evidence that recommendations are important enabling factors but are generally examined independently [10,16-19,21,28-30]. This work illuminates how providers might be particularly effective in promoting mammography use among Latinas. Second, this work suggests the impact of recommendations on mammography intentions varies by breast cancer perceptions. Specifically, physician recommendation was associated with mammography intentions among women who had low levels of perceived seriousness. Family recommendations were associated with mammography intentions among women with low perceived risk. Such preliminary findings suggest the need for different social resources for educational outreach to improve screening practices among Latinas, dependent on women's existing breast cancer perceptions.

Social interactions appear to be powerful factors for enabling mammography intentions and use [9,10,20-28]. Notably, many studies have not compared the relative versus cumulative effects of recommendations to obtain mammography by different members within the social network. Such work is necessary, as multiple individuals may be offering recommendations to women simultaneously. Data are needed to understand which, if not all, social resources are effective for disseminating information to promote mammography screening. This study suggests it may not be an accumulation of recommendations that lead to greater mammography intentions, but, instead, physician recommendations in particular are associated with intentions. To date, the other study which simultaneously quantified the effect of different recommendation found family recommendations, and not physician recommendations, to be associated with mammography intentions [27]. A major potential reason for differences may be that the effect of recommendations may vary across demographic and psychological characteristics. Molina et al. [27] examined relationships of recommendations and mammography intentions among a sample of Chilean women who had participated in an intervention but had subsequently not obtained a mammogram. The sample in this study was composed of US-based Latinas and drew from baseline survey responses prior to the larger study's intervention. Other studies are needed to simultaneously examine recommendations from multiple sources within one's social network to better understand the nuances of recommendations to mammography intentions and use.

This work provides important information concerning the interactive effects of breast cancer perceptions and social factors for Latinas. Previous models have suggested a complex interplay of perceptions and social factors for health behaviors [9,37,38]. Nonetheless the majority of work has been limited to examination of independent effects [10,45-47]. This study hypothesized and found evidence to suggest women's perceptions about breast cancer moderate the association of social interactions. Within this sample of Latinas, it appears that physicians may contribute to the education and promotion of early detection behaviors among women who do not perceive breast cancer to be a serious disease. Such findings are important, given the low levels of breast cancer knowledge Latinas have with regard to breast cancer [33,39,40]. As authority figures in health and disease, doctors may be effective in disseminating information concerning the benefits of mammography and the seriousness of breast cancer for Latinas [48,49]. This exploratory study suggests that physician recommendations may be particularly helpful for women with low levels of perceived seriousness regarding breast cancer. The changes in likelihood of planning to obtain a mammogram among women with higher levels of perceived seriousness may be less due to external social factors and more due to already existing high level of motivation to obtain a mammogram or higher levels of anxiety concerning breast cancer and potential fatalism. Unfortunately, the current study did not differentiate between these alternatives. Future research is also warranted to confirm findings with larger sample sizes and address the interaction between physician recommendation and seriousness of breast cancer, especially with regard to causal relationships and factors underlying interactive effects (e.g., fatalism, anxiety).

This study further found evidence to suggest an interaction between family recommendations and perceived risk on mammography intentions. It is possible that during conversations with family, women with low perceived risk of breast cancer may be exposed to more comprehensive risk assessments with family members who are more aware of their potential risk. For example, salience regarding family history of breast cancer can influence one's perceived risk and mammography intentions [50,51]. This relationship may be particularly strong if these same family members and friends are making recommendations. Notably, Latinas have low awareness of their absolute breast cancer risk, potentially due to a lack of conversation with family members [52]. Family recommendations may be necessary to inform women about the need for to engage in early detection practices [9,52]. Conversely, women with absolute or overestimated perceived risk may already have high levels of anxiety concerning the risk of breast cancer. Family conversations may augment anxiety and negatively influence decisions to seek care. Notably, perceived risk does not predict mammography use among Latinos [53], potentially due to high levels of fatalism exhibited by this population [34,41]. Perceived risk and fatalism/misperceptions about the seriousness of breast cancer may interact with each other to influence the impact of recommendations. Altogether, this study adds to a growing body of work that suggests a need to understand communication about risk among Latino families more closely in order to develop effective interventions to promote early detection practices.

Limitations

This study has several limitations. Given the format of the larger parental study, many participants who completed the questionnaire were recruited using convenience-based group sampling. The hosts of each home health party invited their own guests to the intervention event. Given the small sample size, adjustment for potential clustering

did not occur. Future research incorporating larger, population-based samples is needed to confirm the interactive effects of recommendations and perceptions of breast cancer on mammography intentions. Specifically, larger sample sizes are needed to examine simultaneously the interactive and cumulative effects and features that contribute to those interactions. Further, convenience-based sampling may have led to selection bias, as all participants were aware of disease prevention efforts (e.g., invitation to a breast cancer education study, 83% with lifetime history of mammography use). Confirmation of causal relationships is warranted through future longitudinal research. Finally, while the intent to obtain a mammogram is an important step toward actual screening, it is not always the predictive of the behavior itself. Indeed, there are several theories (e.g., Transtheoretical Model) in the literature that have characterized the stages of adoption associated with mammography behavior and have elucidated the distinction between intentions and actual practice [37]. A major limitation of this work is the focus on intention and the inability to examine the effects of recommendations on mammography practice, due to potential confounding effects from the larger intervention study. Future research should address these relationships in the context of screening practices themselves.

Conclusions

This study offers pilot data for future studies that may advance a more nuanced understanding of psychosocial factors and cancer screening among Latinos. First, this study highlights the need to further examine the relative and cumulative strength of recommendations by physician, family, and friends. Further, to our knowledge, this is the first study to directly assess the moderating effect of psychological processes on the relationship of social resources and intent to obtain a mammogram. This study also provides new data concerning interactive effects that can contribute to more tailored interventions designed to meet the unique needs of individual Latina patients.

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