Breast Cancer Fear Among Mexican American Women in the United States

SAGE

Silvia Flores-Luevano[1] iD, Navkiran K Shokar[2], Alok Kumar Dwivedi[3], Gurjeet S Shokar[4] and Sandrine N Defeu[5]

[1]Department of Molecular and Translational Medicine, and Department of Family and Community Medicine, Texas Tech University Health Sciences Center El Paso, El Paso, TX, USA. [2]Department of Family and Community Medicine, and Department of Molecular and Translational Medicine, Cancer Prevention and Control, Center of Emphasis for Cancer, Texas Tech University Health Sciences Center El Paso, El Paso, TX, USA. [3]Division of Biostatistics and Epidemiology, Department of Molecular and Translational Medicine, Paul L. Foster School of Medicine, Biostatistics and Epidemiology Consulting Lab (BECL), Texas Tech University Health Sciences Center El Paso (TTUHSC EP), El Paso, TX, USA. [4]Department of Family and Community Medicine, Paul L. Foster School of Medicine, Texas Tech University Health Sciences Center El Paso, El Paso, TX, USA. [5]Paul L. Foster School of Medicine, Texas Tech University Health Sciences Center El Paso, El Paso, TX, USA.

ABSTRACT

INTRODUCTION: Fear has been described as potentially important in affecting breast cancer screening completion. Limited information is available on the prevalence and determinants of fear among Mexican American women. This study describes perceived breast cancer fear and its association with personal characteristics and screening behavior among Mexican American women.

METHODS: This is a secondary analysis of data collected during the implementation of the Breast Cancer Education, Screening and NavigaTion program among eligible uninsured women in two Texas border counties. Participants completed a 26-item survey to assess eligibility, risk status, prior screening, and breast cancer fear. Descriptive statistics and multivariable analyses were used to determine associations between the fear score, personal characteristics, and mammography screening.

RESULTS: In all, 1916 of 2012 eligible women completed the study. The mean age was 57.3 years, 99.2% were Hispanic, and 88% were born in Mexico; 15% had a family history of breast cancer and 14% had never had a mammogram. The mean breast cancer fear score was 25.5 (standard deviation: 10.52; range: 8-40); 54.0 % (95% confidence interval: 52.1%-56.7%) had a high fear level. In multivariable analyses, better health status ($P < .001$), older age ($P = .039$), birth in the United States ($P = .020$), and having a regular doctor ($P = .056$) were associated with lower fear scores. There was no association between breast cancer fear and mammography screening.

CONCLUSION: Breast cancer fear is high and varies by personal characteristics and health status among uninsured Mexican American border-residing women due for screening, but is not associated with screening behavior. Further research is needed to clarify the effect of interventions designed to help reduce breast cancer fear among these women, including educational interventions to reduce breast cancer fear.

KEYWORDS: Breast neoplasms, fear, early detection of cancer, Hispanic Americans

Introduction

Fear was defined by Witte[1] as "a negatively toned emotion accompanied by a high level of physiologic arousal stimulated by a threat that is perceived to be significant and personally relevant." During a person's lifetime, each individual perceives different levels of health threat to falling ill, but the diagnosis of cancer could be considered one of the most frightening diagnoses for anyone. Cancer fear is a negative emotional reaction to the threat of cancer that has implications for both quality and duration of life.[2] Previous reports have shown that around 64% of the adult population report being afraid or worried about getting a cancer diagnosis.[3] The fear of cancer can vary by personal characteristics: higher cancer fear levels have been associated with lower education, poor health, and ethnic minority status[2,4] Breast cancer fear has been reported to be higher in women with hereditary risk factors.[2,5]

In the United States, 1 out of every 8 women will be diagnosed with breast cancer in their lifetime, and approximately 276 480 new cases of breast cancer are expected to be diagnosed in US women in 2020.[6] In 2016, there were an estimated 3 477 866 women living with breast cancer in the United States. Furthermore, breast cancer is the second commonest cause of

overall cancer deaths in women and the leading cancer killer among Hispanic women.[7] There is evidence that breast cancer screening reduces mortality by 15% to 54% through early detection when treatment is more successful.[8] However, a significant number of women are not screening according to national recommendations. Mammography screening rates in the United States vary by race and ethnicity; according to the National Health Interview Survey 2018, the screening rate among Hispanic women aged 45 years or older was 60% compared with 64% among non-Hispanic whites. Hispanic women are also less likely to be diagnosed with local-stage disease (58%) compared with non-Hispanic white women (66%).[7]

Although cancer fear has been shown to affect screening health behaviors, studies have yielded contradictory results; it is not clear whether negative emotions, such as fear, act as a barrier or facilitator of mammography screening.[9] Various studies have indicated that fear, which is often linked to uncertainty, naturally causes a person not to act or induce themselves to make proper decisions and to avoid huge risks as well as potential threats because of fear that the screening process could reveal that they have cancer, and most of them desired not knowing.[5,10-12] Fear has also been associated with other negative effects in women's lives. Cancer worries have been reported to be higher among women at higher risk of breast cancer because of family history,[5] and the level of worry or fear interfered with their daily life functioning especially among women who required follow-up testing after screening.[13] Although information about how breast cancer fear affects racial/ethnic groups is scarce, several researchers have studied fear and anxiety related to breast cancer screening among Hispanic women. They have reported that fear of cancer and their fatalistic cancer perception are a barrier to screening in addition to linguistic barriers and culturally based embarrassment.[14] Similarly, others note that the main reason why many Hispanic women avoid mammography is because of fear, busy schedules, and also feeling uncomfortable during the screening procedure.[15] In contrast, various studies have indicated that fear can motivate routine screening for cancer and that worry about breast cancer risk appears to be associated with mammography use in an inverted u-shaped pattern in which most of the women who reported moderate levels of worry were more likely to use mammography annually than those who were either mildly or severely worried.[16] Another study revealed that self-regulation and cancer worry were both positively associated with mammography screening and clinical breast examination frequency.[12] In addition, some studies have indicated that fear does not affect the frequency of screening for breast cancer. According to Ghahramanian et al,[17] although fear had a stimulating effect on breast cancer screening performance, the association was not significant. They argued that the frequency of breast cancer screening or the behaviors related to the process were affected by family status and lifestyle.[17] The purpose of this study was to expand our knowledge about breast cancer fear among Hispanic women. The main aim was to estimate the prevalence of fear in a predominantly Hispanic underinsured population who were due for screening. We also aimed to determine sociodemographic factors associated with the fear score. In the exploratory analysis, the role of levels of fear as a predictor of future mammographic screening was also examined.

Methods

Sample

A secondary data analysis of baseline data collected during a breast cancer screening intervention called the *B*reast Cancer *E*ducation, *S*creening and Naviga*T*ion (BEST) program was conducted. This funded program provided outreach, education, navigation, and no-cost screening and diagnostic testing to uninsured women. The BEST program was implemented in a 2-county area between June 2014 and May 2017 by 2 program community health workers. Recruitment occurred at 61 participating community sites such as community centers, churches, food pantries, and health fairs. Eligibility criteria for the study included women who were aged 50 to 75 years, uninsured, who had not had a mammogram within the past 2 years, and self-reported a Texas address. The exclusion criterion for this study was a previous diagnosis of breast cancer.

Of the total 2115 women approached, 103 were not eligible for screening because of age (91 were aged <50 years and 12 were aged >75 years); of the remaining 2012 women, 96 did not complete all items in the fear score scale and were excluded. Thus, 1916 participants were included in these analyses. The study was approved by the Institutional Review Board (IRB) of Texas Tech University Health Sciences Center El Paso (IRB Protocol No. E17066).

Measures

Survey items were available in English and Spanish and were collected in-person by a bilingual community health worker during BEST recruitment. Survey items covered age, race and ethnicity, years of education, country of birth, marital status, preferred language, work status, whether they have a regular doctor, personal and family history of cancer, and self-reported health status. The perception of health was assessed with a self-reported response to the question, "Would you say that for someone of your age your health is?" (excellent; very good; good; fair; poor). The self-reported health status items have been validated as a measure of chronic health and have been used as an item in the national Behavioral Risk Factor Surveillance System since 1984.[18,19]

Breast cancer fear was assessed with the validated Champion Breast Cancer Fear Scale. These questions included 8 items covering the emotional responses when women thought of breast cancer, such as "When I think about breast cancer, my heart beats faster," "When I think about breast cancer, I feel

nervous," and "The thought of breast cancer scares me." Response categories were scored on a 5-item Likert-type scale and ranged from strongly agree (5) to strongly disagree (1). Women with a higher score feel more fear about breast cancer. The scale had a good level of internal reliability reported with a Cronbach coefficient α = 0.91.[20] Postintervention follow-up screening was determined by documented completion of screening mammography in the BEST program database.

Statistical Analysis

Quantitative variables were described using mean and standard deviation (SD). Categorical variables were described using frequencies and proportions. Scoring of the fear variable was done by coding the 8 components that made up the fear score: scared, nervous, upset, depressed, jittery, heartbeat, uneasy, and anxious. Strongly agree = 5, agree = 4, undecided = 3, disagree = 2, and strongly disagree = 1. These components were further summed with a total possible score of 8 to 40. We assessed the reliability of the fear instrument on our data set using a Cronbach α. As the reliability of the fear instrument was very high in our population, we conducted all analyses based on a composite fear score. However, the distributional differences of individual items were also reported using descriptive data analysis. The composite fear score was calculated using 3 categories (strongly agree/agree, strongly disagree/disagree, and undecided). The fear score was also categorized into low, moderate, or high fear categories. Low fear was defined as a total score of 8 to 15; moderate fear, as a score of 16 to 23; and high fear, as a score of 24 to 40.[20] Univariate and multiple linear regression analysis was conducted to examine the relationship between baseline variables and the total fear score as a dependent variable. In the main analysis, a simple ordinary linear regression was used to examine the unadjusted relationship between the baseline cofactors and the total fear score as the dependent variable. A univariate linear regression coefficient (RC) along with the 95% confidence interval (CI) was reported in addition to the *P* value. Statistical significance was considered for *P* values less than 5%. Variables that were significant in the unadjusted analysis at a level of significance of 20% were included in the multivariable analysis. In addition, any clinical significant variables regardless of the significance level were also included in the final multivariable model.

To explore the relationship between fear and screening completion, we performed logistic regression analyses. In these analyses, we used the categorical fear levels of low, moderate, or high as the independent predictor for follow-up screening (with low level of fear as a reference category), and follow-up screening was considered a dichotomized variable with mammography screening completed as the dependent variable. Results are summarized by odds ratio, 95% CI, and *P* value.

Prior to developing regression models, assumptions were assessed, including multicollinearity using variance inflation criteria (VIF). A variable with VIF >5 indicates a potential presence of collinearity of that variable with other variables in the model. We have used multiple model fit criteria such as negative log likelihood, Akaike information criteria (AIC), and Bayesian information criteria (BIC) to evaluate the goodness of fit of the developed multivariable linear model. A higher value of these indices indicates an improvement in the model fit; SPSS version 25.0 was used for all analyses.

Results

Table 1 shows the demographic characteristics of the participants in this study. A total of 1916 women were included in the analysis. The mean age of participants was 57.3 years (SD: 5.42), with an average of 23 years of living in the United States. Overall, 99.2% (n = 1901) of the women were Hispanic and 93.3% (n = 1788) stated a Spanish language preference; 87.9% (n = 1684) of the respondents were born in Mexico. Almost half (53.5%, n = 1026) were either married or living with a partner. The majority were not working (63.3%, n = 1213) and had less than high school education (83.9%, n = 1607). Regarding their health, the majority (94.8%, n = 1816) reported not having a regular doctor, whereas 1113 (58.1%) self-reported their health as poor or fair. Table 1 also shows that 15.5% (n = 297) had a family history of breast cancer, and among 40% (n = 119) of these, the diagnosis was made before the age of 40 years. About half of them (52%, n = 994) reported completing a mammogram more than 3 years previously, and 14.2% (n = 272) had never had a mammogram.

The mean fear score was 25.54 (SD: 10.52); the lowest fear score recorded was 8 and the highest was 40. The prevalence of a high fear level was 54% (n = 1042) (95% CI: 52.1%-56.7) and a moderate fear level was 35.7% (n = 684) (95% CI: 33.5%-37.9%). Overall, about half of the women agreed or strongly agreed with each fear statement. The most prevalent item was being scared (60.1%, n = 1152), followed by feeling nervous (58.1%, n = 1113), uneasy (54%, n = 1034), anxious (53.3%, n = 1021), and depressed (52.8%, n = 1012) when they think of breast cancer. More than a third (39%, n = 749) reported not being scared when they thought about breast cancer. The Cronbach α reliability coefficient of the Fear Scale in this population was 0.978 (Table 2).

Table 3 shows the association between baseline factors and the average fear score. In the univariate regression analysis, the following variables were associated with a lower fear score: higher education (RC = −1.59, *P* = .015), working (RC = −1.26, *P* = .011), birth in the United States (RC = −2.16, *P* = .020), self-reported better health (RC = −1.86, *P* < .001), and having a regular doctor (RC = −2.28, *P* = .035). Although not statistically significant, subjects with a family history of breast cancer also reported a lower fear score (RC = −1.09, *P* = .09).

Baseline factors that showed a value of *P* ≤ .20 or if a plausible association was considered were included in the multivariable analysis; this made no difference to effect sizes associated with cancer fear except for higher education that became nonstatistically significant and older age being associated with a reduced fear score (RC = −0.094, *P* = .039; Table 4).

Table 1. Demographic characteristics (N = 1916).

VARIABLE	N	MEAN (SD), %
Age, y		
	1916	57.30 (5.4)
Years living in the United States		
	1916	23.92 (15.9)
Language preference		
Spanish	1788	93.3
English	128	6.7
Ethnicity		
Hispanic	1901	99.2
Non-Hispanic white	4	0.2
Non-Hispanic black or African American	4	0.2
Asian/Pacific Islander	3	0.2
Other	4	0.2
Education		
<High school	1607	83.9
≥High school	309	16.1
Married/Living with a partner		
No	890	46.5
Yes	1026	53.5
Working status		
None	1213	63.3
Part-time	536	28.0
Full-time	167	8.7
Health status		
Fair/Poor	1113	58.1
Excellent/Very good/Good	803	41.9
Birth country		
USA	210	11.0
Mexico	1684	87.9
Other	22	1.1
Have a regular doctor		
No	1816	94.8
Yes	100	5.2
Previous mammogram screening		
Never had a mammogram	272	14.2
<3 y	650	33.9
>3 y previously	994	51.9

(Continued)

Table 1. (Continued)

VARIABLE	N	MEAN (SD), %
Breast cancer history		
Previous abnormal mammogram		
No	1902	99.7
Yes	5	0.3
Family history of breast cancer		
No	1619	84.5
Yes	297	15.5
Follow-up mammogram completed BEST		
Yes	333	17.4
No	1583	82.6

Abbreviations: BEST, Breast Cancer Education, Screening and Navigation.

We did not find any sign of multicollinearity. The developed model showed improved overall fit compared with the model with individual predictors. A significant value of the omnibus test (log likelihood ratio test) also indicated a significant fit of the developed model compared with the null model (Table 4).

For the exploratory analysis, a total of 1583 (82.6%) participants completed follow-up mammography screening as part of the BEST program. The logistic regression analysis did not show a significant association between levels of fear (low, moderate and high) and the follow-up screening completion (Table 5).

Discussion

The results indicate that despite numerous public health interventions related to cancer prevention and early detection, negative emotions about breast cancer persist in Hispanic women along the border. In this population, more than half of the women indicated that they were fearful of cancer (60%, n = 1152). Furthermore, the mean score for fear of breast cancer (25.5 [SD: 10.5]) was within the higher fear category previously defined by Champion et al[20] and was higher than that reported among non-Hispanic women (21.1 [SD: 8.5])[20] and similar to that reported by women in Turkey (26.36 [SD: 7.29])[21] when using the same fear scale. Participants in Champion's study were mainly African American and Caucasian women, with older average age (66 years vs 57 years) who received health services from a Health Maintenance Organization or were seen at an indigent clinic. The main difference between the women in the Turkish study and our population is the access to health care and socioeconomic status. Participants were younger (47 years vs 57 years in this study) and had a higher socioeconomic status, with 93% reporting their income in the middle or higher level, compared with our population who had >90% working less than full-time and >80% having less than a high school education. Most of the

Table 2. Breast cancer fear scale response distribution.

FEAR ITEMS, N = 1916	NO. (%) SA/A	NO. (%) SD/D	NO. (%) UNDECIDED
The thought of breast cancer scares me.	1152 (60.1)	749 (39.1)	15 (0.8)
When I think about breast cancer, I feel nervous.	1113 (58.1)	791 (41.3)	12 (0.6)
When I think about breast cancer, I get upset.	903 (47.1)	987 (51.5)	26 (1.4)
When I think about breast cancer, I get depressed	1012 (52.8)	879 (45.9)	25 (1.3)
When I think about breast cancer, I get jittery	972 (50.7)	921 (48.0)	24 (1.3)
When I think about breast cancer, my heart beats faster.	987 (51.5)	902 (47.1)	27 (1.4)
When I think about breast cancer, I feel uneasy.	1034 (54)	856 (44.7)	25 (1.3)
When I think about breast cancer, I feel anxious.	1021 (53.3)	873 (45.6)	22 (1.1)
Overall mean score (SD)	25.54 (10.52)		
High fear score, n (%), 95% CI	1042 (54.0), 52.1%-56.7%		
Moderate fear score, n (%), 95% CI	684 (35.7), 33.5%-37.9%		
Low fear score, n (%), 95% CI	190 (9.9), 8.6%-11.3%		
Cronbach α	0.978		

Abbreviations: A, agree; CI, confidence interval; D, disagree; SA, strongly agree; SD, strongly disagree.

Turkish participants had health insurance (75%) compared with 100% with no insurance, and nearly 95% reported no regular doctor in this sample. In a meta-analysis that included 10 studies and 3342 women, the mean score for breast cancer fear or worry was also in the lower third of the score range, although it was measured using a different tool.[9]

Little is known about the distribution of fear as a single component across demographic characteristics. In our population, higher cancer fear scores were associated with lower educational attainment, unemployment, younger age, and poor self-reported health. These findings are consistent with the relationship between lower educational attainment and higher cancer fear reported for prostate cancer[22] and any cancer in general.[4] In our study of the participants aged 50 years, only 31 (17.6%) reported never having a previous mammogram, and of these, 8 reported their doctor had recommended a mammogram but did not seek a mammogram until this program reached them, so only 2.5% (n = 23) had never previously been advised to get a mammogram because of their age. Similar findings about the association of age and health status were reported in a population from Spain that included adults over the age of 50 years. In that study, higher scores of cancer worry were associated with younger age and worse self-perceived health.[2] In a different study that included UK women and men, the prevalence of "cancer as greatest health fear" was 59%. They showed that higher fear of cancer was associated with respondents with lower education and ethnic minority backgrounds. No association was found with age. In addition, respondents with higher general anxiety were more likely to have cancer as the greatest health fear. However, the authors assessed cancer

fear using a different method by selecting 3 questions from a Cancer Attitude Inventory.[4] On the contrary, other authors did not observe any significant association between breast cancer fear scores and self-reported education, marital status, health insurance,[23] or health status.[4]

Nonetheless, most of the findings suggest that probably focusing public health interventions on young women with lower education, higher anxiety levels, and low self-perceived health status might reduce the fear of breast cancer.

The relationship between breast cancer fear and screening completion is complicated and difficult to clarify. On the one hand, a positive association between breast cancer fear and previous mammography completion has been reported[12]; on the other hand, studies report breast cancer fear has a nonsignificant effect on mammogram completion.[17] Also, a previous report showed that both low and high levels of fear may be detrimental to screening, whereas a moderate level of fear may encourage it.[20] In our analyses, we did not observe an association; however, although not significant, there is a suggestion that women with a moderate level of fear may have had a higher screening rate than those with a low level of fear. Comparing the effect of cancer fear on screening behavior is complex because terms are operationalized differently; often synonymous terms such as "cancer fear," "cancer worry," and "cancer anxiety" are used, and results vary depending on the focus of worry. The focus of fear or worries has been "general" as in the fear of being diagnosed with cancer or can be "specific," for example, fear or worry about physical or emotional consequences (eg, pain during mammography, financial problems if diagnosed with cancer). Previous research suggests that general worries about breast cancer have

Table 3. Linear regression of baseline factors and fear score.

	UNIVARIATE RC (95% CI)	*P* VALUE
Education		
<High school	1.0	
≥High school	−1.59 (−2.87 to −0.315)	**.015**
Work status		
No	1.0	
Yes (part-time and full-time)	−1.26 (−2.2 to −0.288)	**.011**
Health status		
Fair/Poor	1.0	
Excellent/Very good/Good	−1.86 (−2.81 to −0.908)	**<.001**
Birth country		
Mexico	1.0	
USA	−2.16 (−3.66 to −0.651)	**.005**
Other	−0.006 (−4.42 to 4.41)	.998
Have a regular doctor		
No	1.0	
Yes	−2.28 (−4.39 to −0.163)	**.035**
Married/Partner		
No	1.0	
Yes	0.842 (−0.103 to 1.78)	.081
Age, y		
	0.059 (−0.146 to 0.028)	.185
Family history		
No	1.0	
Yes	−1.09 (−2.39 to 0.207)	.099
Years living in the United States	0.005 (−0.024 to 0.035)	.728
Hispanic		
No	1.0	
Yes	2.40 (−1.83 to 6.64)	.266

Only 5 participants reported a previous abnormal mammogram and it was removed from the analysis. All bold values are statistically significant *p* values.
Abbreviations: 1.0, reference category; CI, confidence interval; RC, regression coefficient.

Table 4. Multivariable linear regression of baseline factors and fear score.

	MULTIVARIABLE RC (95% CI)	*P* VALUE
Education		
<High school	1.0	
≥High school	−0.898 (−2.21 to 0.423)	.183
Work status		
No	1.0	
Yes (part-time and full-time)	−1.27 (−2.27 to −0.274)	**.013**
Health status		
Fair/Poor	1.0	
Excellent/Very good/Good	−1.83 (−2.79 to −0.876)	**<.001**
Birth country		
Mexico	1.0	
USA	−1.82 (−3.36 to −0.284)	**.020**
Other	0.246 (−4.15 to 4.64)	.913
Have a regular doctor		
No	1.0	
Yes	−2.06 (−4.17 to −0.053)	**.056**
Married/Partner		
No	1.0	
Yes	0.566 (−0.392 to 1.52)	.247
Age, y		
	−0.094 (−0.184 to −0.005)	**.039**
Family history		
No	1.0	
Yes	−0.780 (−2.08 to 0.521)	.240
Model fit criteria		
Log likelihood	−7207.21	
Akaike information criterion	14 436.54	
Bayesian information criterion	14 497.68	
Likelihood ratio χ² (omnibus test)	<0.001	

All bold values are statistically significant *p* values.
Abbreviations: 1.0, reference category; CI, confidence interval; RC, regression coefficient.

been associated with improved screening, but fear of specific consequences may discourage screening.[12] In this Hispanic population, general fear for breast cancer was not related to future screening; this is similar to the findings of a recent study among British women where general cancer worry was not associated with screening, but specific fears about physical or emotional consequences were associated.[3]

Our study confirms that screening behavior was not associated with a high level of fear in this study sample, although in this population the level of fear was not associated with

Table 5. Logistic regression of future mammogram completed (dependent) and fear score levels (independent) (N = 1916).

VARIABLE	ODDS RATIO	95% CONFIDENCE INTERVAL	*P* VALUE
Low fear (reference)	1.0		
Moderate fear	1.45	(0.971-2.16)	.069
High fear	1.29	(0.883-1.89)	.188

follow-up mammography completion. It is plausible that the differences in the breast cancer fear score may be attributed to different personality types and consideration of different individual sentiments regarding perceptions of breast cancer. There are potentially many background variables that may affect the fear score, some of which may not be related to or affect breast cancer screening. Such factors may include general anxiety,[4] cultural stigma,[24] faith or religious beliefs,[25] past encounters with breast cancer with relatives or close friends, or individual perception.[26] Barriers to access due to financial challenges, lack of insurance, and immigration status might be associated with whether or not a women engages in breast screening behavior[27] as well as social cognitive factors and theoretical concepts from the Health Belief Model, such as perceived threat or harm, benefits, self-efficacy, barriers, and fatalism.[20] Champion proposed an integrated model in which the perception of higher threat and fatalism would increase fear, whereas a higher perception of benefits and self-efficacy would decrease fear with more possibilities to participate in screening when women experience a moderate level of fear.[20]

The Attitude-Social influence-self-Efficacy (ASE) model is a social psychology model that suggests that the intention to perform a certain behavior predicts this behavior, and "intention" is determined by 3 important psychosocial factors: attitude, social influence, and self-efficacy. This behavioral intent–oriented model has been reported to determine health preventive behaviors such as intention of smoking cessation[28] and intention of cervical cancer screening.[29] The attitude reflects previous knowledge of the advantages and disadvantages of a particular behavior. Also, attitudes toward "health" and "illness" are shaped by cultural beliefs: a fear of "finding something wrong" has been reported as a main obstacle to screening among Hispanic women[14] as has the fear associated with the screening procedure.[12] Albert Bandura[30] defined self-efficacy as one's ability to succeed in specific situations or accomplish a task. Higher levels of self-efficacy defined as an individual's confidence to overcome barriers have been associated with previous breast cancer screening among Hispanic women.[31] Theoretically, lower levels of self-efficacy have been associated with greater breast cancer fear. In this study, no association was found between total fear and mammography completion, although it is possible that other social and psychological factors included in the ASE model are predictors of compliance with screening.

Strengths

This is one of the first studies to systematically describe breast cancer fear in a population of predominantly Hispanic women along the US-Mexico border. Strengths include a large sample size with countywide recruitment from predominantly community sites, which is more representative of the population and increases the external validity of the study. Implementation by bilingual staff and outreach workers who belong to the same community reduced barriers to reporting emotions. Using a validated questionnaire to collect the data makes the data more reliable and increases the internal validity.

Limitations

Limitations of the study include that although it provides much needed information about breast cancer fear, we were not able to include other psycho-cognitive mediators of mental or psychological status that can also influence screening behavior. Future studies should include these measures for a more complete understanding of the role of fear in breast cancer screening behavior.

This sample reflects the demographics and culture of the US-Mexico border region, and so generalizations to the larger population of women in the United States should be done cautiously. Further limitations relate to self-report bias and the inclusion of uninsured women who were due for breast cancer screening.

Implications/Conclusions/Further Research

The study describes that a high rate of breast cancer fear is present among Mexican American women due for breast cancer screening. It shows that greater breast cancer fear is associated with personal characteristics like younger age, being unemployed, and self-reported poor health . There is a suggestion that both too little fear and too much fear may reduce screening behavior, but this needs more study. More longitudinal research using standardized measures needs to be done to better understand both the level and type of fear and how that in turn impact subsequent screening behavior. Interventions designed to help women better manage their fear could be very helpful. Those interventions might include providing education about risk factors that can be changed and promoting early detection with regular mammography screenings.

Author Contributions

SFL: Conceptualization, statistical analysis, main writer; SD: Assisted with manuscript development; AKD: Assisted with manuscript editing, analysis plan and interpretation of statistical analysis; GS: Manuscript editing; NKS: Principal investigator, conceptualization, program implementation and manuscript development.

ORCID iD

Silvia Flores-Luevano https://orcid.org/0000-0003-0629 -2270

REFERENCES

1. Witte K. Putting the fear back into fear appeals: the extended parallel process model. https://msu.edu/~wittek/fearback.htm. Updated 1992. Accessed October 12, 2019.
2. Hidalgo JL, Sotos JR, Herráez MJ, Rosa MC, López JL, Ortiz MP. Factors associated with cancer worry among people aged 50 or older, Spain, 2012-2014. *Prev Chronic Dis*. 2015;12:E226.
3. Quaife SL, Waller J, von Wagner C, Vrinten C. Cancer worries and uptake of breast, cervical, and colorectal cancer screening: a population-based survey in England. *J Med Screen*. 2019;26:3-10.
4. Vrinten C, van Jaarsveld CH, Waller J, von Wagner C, Wardle J. The structure and demographic correlates of cancer fear. *BMC Cancer*. 2014;14:597.
5. Schwartz MD, Taylor KL, Willard KS. Prospective association between distress and mammography utilization among women with a family history of breast cancer. *J Behav Med*. 2003;26:105-117.
6. American Cancer Society. *Cancer Facts & Figures 2020*. Atlanta, GA: American Cancer Society; 2020. https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2020/cancer-facts-and-figures-2020.pdf. Accessed July 13, 2020.
7. American Cancer Society. *Breast Cancer Facts & Figures 2019–2020*. Atlanta, GA: American Cancer Society; 2019. https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/breast-cancer-facts-and-figures/breast-cancer-facts-and-figures-2019-2020.pdf. Accessed November 10, 2019.
8. Smith RA, Andrews KS, Brooks D, et al. Cancer screening in the United States, 2019: a review of current American Cancer Society guidelines and current issues in cancer screening. *CA Cancer J Clin*. 2019;69:184-210.
9. Hay JL, McCaul KD, Magnan RE. Does worry about breast cancer predict screening behaviors? A meta-analysis of the prospective evidence. *Prev Med*. 2006;42:401-408.
10. Greaney ML, De Jesus M, Sprunck-Harrild KM, et al. Designing audience-centered interactive voice response messages to promote cancer screenings among low-income Latinas. *Prev Chronic Dis*. 2014;11:E40.
11. Gregg J, Curry RH. Explanatory models for cancer among African-American women at two Atlanta neighborhood health centers: the implications for a cancer screening program. *Soc Sci Med*. 1994;39:519-526.
12. Consedine NS, Magai C, Neugut AI. The contribution of emotional characteristics to breast cancer screening among women from six ethnic groups. *Prev Med*. 2004;38:64-77.
13. Lee JM, Lowry KP, Cott Chubiz JE, et al. Breast cancer risk, worry, and anxiety: effect on patient perceptions of false-positive screening results. *Breast*. 2020;50:104-112.
14. Austin LT, Ahmad F, McNally MJ, Stewart DE. Breast and cervical cancer screening in Hispanic women: a literature review using the health belief model. *Womens Health Issues*. 2002;12:122-128.
15. Miranda-Diaz C, Betancourt E, Ruiz-Candelaria Y, Hunter-Mellado RF. Barriers for compliance to breast, colorectal, and cervical screening cancer tests among Hispanic patients. *Int J Environ Res Public Health*. 2015;13:21.
16. Andersen MR, Smith R, Meischke H, Bowen D, Urban N. Breast cancer worry and mammography use by women with and without a family history in a population-based sample. *Cancer Epidemiol Biomarkers Prev*. 2003;12:314-320.
17. Ghahramanian A, Rahmani A, Aghazadeh A, Mehr L. Relationships of fear of breast cancer and fatalism with screening behavior in women referred to health centers of Tabriz in Iran. *Asian Pac J Cancer Prev*. 2016;17:4427-4432.
18. Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Questionnaire*. Atlanta, GA: US Department of Health and Human Services, CDC; 2019. https://www.cdc.gov/brfss/questionnaires/index.htm. Accessed June 3, 2020.
19. Dwyer-Lindgren L, Mackenbach JP, van Lenthe FJ, Mokdad A. Self-reported general health, physical distress, mental distress, and activity limitation by US county, 1995-2012. *Popul Health Metrics*. 2017;15:16. https://pophealthmetrics.biomedcentral.com/articles/10.1186/s12963-017-0133-5. Accessed June 3, 2020.
20. Champion VL, Skinner CS, Menon U, et al. A Breast Cancer Fear Scale: psychometric development. *J Health Psychol*. 2004;9:753-762.
21. Secginli S. Mammography self-efficacy scale and breast cancer fear scale: psychometric testing of the Turkish versions. *Cancer Nurs*. 2012;35:365-373.
22. Consedine NS, Adjei BA, Ramirez PM, McKiernan JM. An object lesson: source determines the relations that trait anxiety, prostate cancer worry, and screening fear hold with prostate screening frequency. *Cancer Epidemiol Biomarkers Prev*. 2008;17:1631-1639.
23. Ersin F, Gozukara F, Polat P, Ercetin G, Bozkurt ME. Determining the health beliefs and breast cancer fear levels of women regarding mammography. *Turk J Med Sci*. 2015;45:775-781.
24. Nyblade L, Stockton M, Travasso S, Krishnan S. A qualitative exploration of cervical and breast cancer stigma in Karnataka, India. *BMC Womens Health*. 2017;17:58.
25. Gullatte MM, Phillips JM, Gibson LM. Factors associated with delays in screening of self-detected breast changes in African-American women. *J Natl Black Nurses Assoc*. 2006;17:45-50.
26. Kissal A, Vural B, Ersin F, Solmaz T. The effect of women's breast cancer fear and social support perceptions on the process of participating in screening. *Glob Health Promot*. 2018;25:52-59.
27. Adunlin G, Cyrus JW, Asare M, Sabik LM. Barriers and facilitators to breast and cervical cancer screening among immigrants in the United States. *J Immigr Minor Health*. 2019;21:606-658.
28. De Vries H, Backbier E, Kok G, Dijkstra M. The impact of social influences in the context of attitude, self-efficacy, intention, and previous behavior as predictors of smoking onset. *J Appl Soc Psychol*. 1995;25:237-257.
29. Twinomujuni C, Nuwaha F, Babirye JN. Understanding the low level of cervical cancer screening in Masaka Uganda using the ASE model: a community-based survey. *PLoS ONE*. 2015;10:e0128498.
30. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev*. 1977;84:191-215.
31. Jerome-D'Emilia B, Suplee PD. Mammogram use and self-efficacy in an urban minority population. *Public Health Nurs*. 2015;32:287-297.