Published in final edited form as:

Womens Health Issues. 2017 ; 27(2): 237–244. doi:10.1016/j.whi.2016.10.003.

Predictors of Breast Cancer Worry in a Hispanic and predominantly immigrant mammography screening population

Ayana April-Sanders¹, Sabine Oskar¹, Rachel C. Shelton², Karen Schmitt^{3,4,5}, Elise Desperito⁶, Angeline Protacio¹, and Parisa Tehranifar^{1,3,*}

¹Department of Epidemiology, Mailman School of Public Health, Columbia University

²Department of Sociomedical Sciences, Mailman School of Public Health, Columbia University

³Herbert Irving Comprehensive Cancer Center, Columbia University Medical Center

⁴Division of Academics, School of Nursing, Columbia University

⁵Avon Foundation Breast Imaging Center-New York Presbyterian

⁶Department of Radiology, Columbia University Medical Center-New York Presbyterian

Abstract

Objective—Worry about developing breast cancer (BC worry) has been associated with participation in screening and genetic testing and with follow-up of abnormal screening results. Little is known about the scope and predictors of BC worry in Hispanic and immigrant populations.

Methods—We collected in-person interview data from 250 self-identified Hispanic women recruited from an urban mammography facility (average age 50.4 years; 82% foreign-born). Women reported whether they worried about developing breast cancer rarely/never (low worry), sometimes (moderate worry) or often/all the time (high worry). We examined whether sociocultural and psychological factors (e.g., acculturation, education, perceived risk), and risk factors and objective risk for breast cancer (e.g., family history, Gail model 5-year risk estimates, parity) predicted BC worry using multinomial and binary logistic regression.

Results—In multivariable models, women who perceived higher absolute breast cancer risk (OR=1.66, 95% CI: 1.28, 2.14 for one unit increase in perceived lifetime risk) and comparative breast cancer risk (e.g., OR=2.37, 95% CI: 1.23, 6.06) were more likely to report high BC worry than moderate or low BC worry. There were no associations between BC worry and indicators of objective risk or acculturation.

*CORRESPONDING AUTHOR: pt140@columbia.edu; phone: 212-305-1018.

Compliance with Ethical Standards: The Internal Review Board at [institution name blinded by WHI editors for peer review] approved this study.

Conflicts of Interests: The authors declare that they have no conflict of interest.

Informed consent: All participants provided written informed consent.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Conclusions—In Hispanic women undergoing screening mammography, higher perceptions of breast cancer risk, on both absolute and comparative terms, were independently associated with high BC worry, and were stronger predictors of BC worry than indicators of objective breast cancer risk, including family history, mammographic density and personal breast cancer risk estimates.

Keywords

Breast Cancer; Cancer Worry; Preventive Health Behavior; Race/Ethnicity; Immigrant Status; Health Disparities

---

Introduction

Worry about developing a disease reflects emotions such as fear and concern about the future threat of that disease (Hay, Buckley, & Ostroff, 2005), and can create general or disease-specific distress and anxiety (Deimling, Bowman, Sterns, Wagner, & Kahana, 2006; Deimling, Brown, Albitz, Burant, & Mallick, 2015; Lee-Jones, Humphris, Dixon, & Hatcher, 1997). Depending on the level of worry and other key psychosocial processes (e.g., expected self-efficacy or outcome of the behavior), worry may motivate health preventive and protective behaviors, or conversely, encourage avoidance of such behaviors (Leventhal, Brissette, & Leventhal, 2003; S. M. Miller, Shoda, & Hurley, 1996; Roger & Prentice-Dunn, 1997; Witte, 1998).

Over a quarter of healthy U.S. women express high levels of breast cancer (BC) worry (Lerman, Rimer, Trock, Balshem, & Engstrom, 1990; McCaul, Schroeder, & Reid, 1996; Orom, Kiviniemi, Shavers, Ross, & Underwood, 2013), which exceeds the proportion of women reporting similar levels of worry for more prevalent chronic diseases such as heart disease (Wang et al., 2009). BC worry has been shown to promote participation in BC screening (Hay et al., 2005; Hay, McCaul, & Magnan, 2006; McCaul & Tulloch, 1999) and genetic susceptibility testing (Cameron & Diefenbach, 2001; Durfy, Bowen, McTiernan, Sporleder, & Burke, 1999; Helmes, 2002), as well as contribute to less timely follow-up of abnormal or suspicious screening findings (Yabroff et al., 2004), and less or excessive screening practices in women at high risk for BC (Hay et al., 2005; Lerman et al., 1993; Lerman, Kash, & Stefanek, 1994). Given the potentially modifiable nature of BC worry and its associations with important prevention and early detection outcomes (Bowen, Burke, McTiernan, Yasui, & Andersen, 2004; Magai, Consedine, Conway, Neugut, & Culver, 2004; Magai, Consedine, Neugut, & Hershman, 2007), knowledge of the scope, distribution and predictors of BC worry may inform intervention strategies that promote positive emotional states and health behaviors important to the control of breast cancer and potentially other diseases and health areas.

Since women at increased risk for breast cancer face a greater threat of developing breast cancer, they may experience a higher level of BC worry than average-risk women. However, most women are not aware of their personal risk of BC, lack sufficient information about risk factors for BC, and frequently misperceive their risk of BC (Buxton et al., 2003; Evans, Burnell, Hopwood, & Howell, 1993; Fehniger et al., 2014; Haas et al., 2005). Studies have

produced mixed results, showing a high prevalence of elevated BC worry in high-risk women, mostly defined by a positive family history of BC, as well as similar levels of BC worry levels in women with and without familial risk of BC (Andersen, Smith, Meischke, Bowen, & Urban, 2003; Erblich, Bovbjerg, & Valdimarsdottir, 2000; Hay et al., 2005; Metsala, Pajukari, & Aro, 2012; Price, Butow, Lo, Wilson, & Kathleen Cuningham Consortium for Research into Familial Breast Cancer Psychosocial, 2007). The few studies conducted in racially/ethnic diverse study populations have shown significantly higher BC worry in Hispanic women than in African American and White women (Janz et al., 2011; Orom et al., 2013; Sammarco & Konecny, 2008; Spencer et al., 1999). There is currently very limited information on predictors of BC worry in racial/ethnic minority and immigrant women, a serious shortcoming given the higher likelihood of advanced stage at breast cancer diagnosis, delayed or inadequate treatment, and poorer survival in many minority and foreign-born populations (Bhuyan, Stimpson, Rajaram, & Lin, 2014; Gorin, Heck, Cheng, & Smith, 2006; Hershman et al., 2005; Keegan et al., 2010; Li, Malone, & Daling, 2003; Ooi, Martinez, & Li, 2011; Singh & Siahpush, 2001).

To address these limitations, we investigated BC worry in relation to a broad range of factors with conceptual and/or empirical links with cancer worry, including social (e.g., educational attainment, ethnicity), cultural (e.g., language use, migration), cognitive (perceived risk), reproductive (e.g., parity), lifestyle (e.g., alcohol intake), and biological (e.g., mammographic density) factors (Consedine, Magai, Krivoshekova, Ryzewicz, & Neugut, 2004; Consedine, Magai, & Neugut, 2004; Hay et al., 2005; Hay et al., 2006; Magai et al., 2004; McGregor et al., 2004; Orom et al., 2013). We collected detailed data on these factors from a predominantly foreign-born sample of Hispanic women, recruited from an urban screening mammography facility.

Materials and Methods

Study Population

We used data from the Image Study, an ongoing study of mammographic density and breast cancer risk in a sample of 400 women, aged 40–64 years, who were recruited during screening mammography appointments in Northern Manhattan in New York City in 2012–2014 (Tehrani et al., 2015). Sixty-seven percent (n=268) of Image Study participants identified as Hispanic and were included in this analysis. Using an English or Spanish-translated questionnaire, we collected in-person interview data, including detailed data on sociodemographic factors and breast cancer risk factors, and collected data on mammographic density from mammograms obtained on the same day as the interview. We excluded 2 participants with a prior diagnosis of breast cancer, and 16 additional participants with missing data on BC worry as they were recruited prior to the addition of questions on BC worry to the interview. The final sample consisted of 250 women, and represented 93% of the total number of Hispanic participants.

The Institutional Review Board of [institution name blinded by *WHI* editors for peer review] approved this study.

Measures

Outcome: Breast Cancer Worry—We assessed worry about developing breast cancer using a question from Lerman et al.'s cancer worry scale, one of the most commonly used measure of BC worry (Hopwood, Shenton, Lalloo, Evans, & Howell, 2001; Lerman et al., 1994; Lerman et al., 1991; McCaul, Branstetter, O'Donnell, Jacobson, & Quinlan, 1998; Watson et al., 1999). Women responded to the question, "How often do you worry about getting breast cancer?" with response options of rarely or never, sometimes, often or all the time. We coded the responses as low BC worry (worry rarely or never), moderate BC worry (worry sometimes) and high BC worry (worry often or all the time).

Main Predictors: Migration and Acculturation—Participants were classified as U.S.-born and foreign-born based on their country of birth; foreign-born participants (including those born in Puerto Rico) also reported their age at migration to the U.S. Participants reported if they spoke mostly one language or spoke two or more languages in the contexts of home, work and with friends, and further specified the language(s) used. We combined the responses to create the following categories: Monolingual English speaker (English in all contexts), monolingual Spanish speaker (Spanish in all contexts), and bilingual speakers (two or more languages equally in a least one context).

Educational Attainment and Health Literacy—Participants reported their highest educational attainment, which was divided into having a high school or less education or less and more than a high school education. We measured health literacy using a previously validated scale of three questions, developed by Chew et al. (e.g., "How often do you have problems learning about your medical condition because of difficulty understanding written information?"). Consistent with prior research, we categorized the summed responses across the three questions into two categories of adequate and inadequate (including marginal) health literacy (Baker, Williams, Parker, Gazmararian, & Nurss, 1999; Chew, Bradley, & Boyko, 2004).

Breast Cancer Risk Factors and Risk Estimates—We collected detailed data on breast cancer risk factors including age at menarche (in years), parity (nulliparous, 1–2, 3 births), age at first birth, current menopausal status (pre-/peri-menopausal, post-menopausal), receipt of mammogram in the past two years (yes or no), first-degree family history of breast cancer (yes or no), current alcoholic beverage consumption (never or former drinker, <3, 3 – <7, and 7 servings per week), and mammographic breast density categories of Breast Imaging-Reporting and Data System (BI-RADS) (low density refers to the two lower density categories of entirely fatty or scattered fibroglandular density and high density refers to the two higher density categories of heterogeneously or extremely dense breasts). We calculated 5-year breast cancer risk estimates from the Gail model, also known as the Breast Cancer Risk Assessment Tool, using data on current age, age at menarche, age at first birth, race/ethnicity, family history of breast cancer in female first-degree relatives, and personal history of breast biopsy and benign breast disease.

Perceived Breast Cancer Risk—Consistent with prior research (Katapodi, Lee, Facione, & Dodd, 2004), we assessed perceptions of absolute risk of breast cancer (i.e.,

one's belief about their likelihood of developing breast cancer) and comparative risk of breast cancer (i.e., one's belief about their likelihood of developing breast cancer compared to their peers). We used the responses to the question, "How likely do you think it is that you will develop breast cancer in the future? Would you say your chance of getting breast cancer is very low, somewhat low, moderate, somewhat high, or very high?" as a five-point scale with higher values indicating greater perceived absolute risk. We assessed perceived comparative breast cancer risk using the question, "Compared to the average woman your age, would you say that you are more likely to get breast cancer, less likely, or about as likely?"

Cancer Information Seeking—Participants reported whether or not they had used the following source(s) to obtain cancer information: Health care providers (professionals in various health care settings, pamphlets, and cancer organizations), family and friends, media (magazines, newspapers, radio, television) and the internet.

Statistical Analysis

We examined the distribution of the potential predictors across the three levels of BC worry (low, moderate, high) and used multinomial regression to examine univariable associations. As there were no significant differences between moderate and low BC worry, we combined these two levels and compared women with high BC worry to those with low/moderate BC worry in multivariable analyses using binary logistic regression. We added all variables with unadjusted associations with BC worry at $p < 0.10$ in the multivariable models. All statistical tests were 2-tailed and performed using SAS version 9.3 (SAS Institute Inc., Cary, NC).

Results

Participants were on average 50.4 years old (standard deviation (SD) 5.8 years), and 82% were foreign-born, with a large majority born in the Dominican Republic (71%). Twenty-nine percent, 34% and 37% of participants respectively reported high, moderate and low BC worry (Table 1). Women reporting high BC worry had a higher absolute perceived risk than those with moderate and low BC worry (mean of 2.9, 2.0 and 1.8, respectively). We observed similar patterns for perceived comparative risk, with women perceiving a higher risk of developing breast cancer relative to an average woman reporting high BC worry (21%) than low and moderate BC worry (11%). Women reporting low BC worry were slightly more likely to be monolingual Spanish speakers (50%) than women reporting moderate and high BC worry (37% and 41% respectively). We did not observe any other significant differences in BC worry by sociodemographic and breast cancer risk factors.

Differences between moderate and low BC worry for all predictor variables were minimal and statistically nonsignificant, and these two categories were combined in multivariable analysis. Only age at interview and absolute and comparative perceived risks were associated with high BC worry and included together in the final multivariable models (Table 2). Every year increase in age was associated with marginally statistically significant 5% lower odds of reporting high BC worry (95% CI: 0.90–1.00). Women had a greater odds of reporting high BC worry if they reported higher absolute perceived risk (OR=1.66, 95% CI: 1.28–2.14) and comparative perceived risk (OR = 2.73, 95% CI: 1.12–6.06 for

perceiving the same or higher risk vs. lower risk) after mutual adjustment and further adjustment for age.

Discussion

We investigated the frequency of feelings of worry about developing breast cancer in a Hispanic and predominantly immigrant sample of middle-aged women with no history of breast cancer. We considered a wide range of relevant factors (e.g., migration and language acculturation, educational attainment and health literacy, cancer information seeking preferences, breast cancer risk factors and predicted risk estimates) as possible predictors of BC worry, but only observed strong associations with perceptions of BC risk, and a weaker association with age. Of note, women at increased risk for breast cancer did not express higher worry.

In this sample of Hispanic women, 29% reported worrying about developing breast cancer often or all the time, which is slightly higher than the prevalence reported in prior population-based studies (Lerman et al., 1990; McCaul, Schroeder, et al., 1996; Orom et al., 2013). Using the same measure of BC worry used in our study, Orom and colleagues reported more worry in Hispanic women but similar levels of worry in black and white women in a nationally representative sample of over 3,300 women (Orom et al., 2013). Several studies of women with a history of breast cancer have also shown more worry about breast cancer recurrence in Hispanic women compared with women of other racial/ethnic backgrounds (Janz et al., 2011; Sammarco & Konecny, 2008; Spencer et al., 1999). Although the small number of non-Hispanic women in our study population precluded a comprehensive analysis of racial/ethnic differences in BC worry, in exploratory analysis, we found higher frequency of BC worry in Hispanic women than in Non-Hispanic women (29% vs. 11%). Taken together, this evidence suggests that Hispanic women in the general population or among breast cancer survivors may experience high levels of worry about future breast cancer, which may exceed the levels in other racial/ethnic groups.

We found that women who report higher perceptions of BC risk also report higher BC worry. Specifically, we assessed BC risk perceptions in both absolute terms (assessment of personal future risk) and comparative terms (assessment of personal future risk relative to someone possessing similar relevant characteristics such as age), and observed that higher perceptions on both measures independently predicted more frequent worry in multivariable analysis. These findings are broadly consistent with prior research (Gibbons & Groarke, 2015; Katapodi et al., 2004; Lipkus, Klein, Skinner, & Rimer, 2005; Lipkus et al., 2000; Orom et al., 2013; Zajac, Klein, & McCaul, 2006), and suggest that absolute and comparative appraisal of one's future breast cancer risk, while moderately correlated (Spearman rank correlation coefficient=0.49 in our study), have similar but independent influences on BC worry level. Disease-related worry and risk perceptions capture subjective expectations of future disease risk, but relate to different aspects of this vulnerability, with worry reflecting an emotional reaction to disease risk and perceived risk entailing a cognitive assessment of this risk (Hay et al., 2006; Lipkus, Iden, Terrenoire, & Feaganes, 1999; McCaul, Branstetter, Schroeder, & Glasgow, 1996; Zajac et al., 2006). Perceived risk has been implicated as a facilitator to BC screening and early detection behaviors, and BC

worry may represent a pathway through which perceived risk influence these behaviors (Katapodi et al., 2004; McCaul, Branstetter, et al., 1996; Sheeran, Harris, & Epton, 2014). Some evidence also suggests that BC worry and perceived risk may combine to influence health related behaviors. For example, very high perceived risk and BC worry can interfere with screening and risk reduction choices in certain populations (e.g., women at high risk for breast cancer) (Vogel et al., 1990).

We did not observe any associations between BC worry and objective indicators of breast cancer risk, operationalized by Gail model risk estimates of 1.67% or higher, as well as high mammographic breast density and history of BC in first degree relatives. The majority of women had low Gail model risk estimates (mean= 0.77 in the overall sample) and only 9% had a family history of BC, which may have limited the statistical power to detect significant associations, but high mammographic density was relatively common with over 32% of women having heterogeneously or extremely dense breasts. The null results may have also resulted from women's limited awareness of these indicators of objective risk. Most women do not know their BC risk estimates despite the online availability of many risk models, including the Gail model, and their use in some clinical settings (Fehniger et al., 2014). Mammographic density, one of the strongest risk factors for breast cancer (McCormack & dos Santos Silva, 2006), has only recently entered the public lexicon as a growing number of states, including New York State, have issued legal mandates for the release of this information to women determined by radiologists as having dense breasts (O'Neill et al., 2014; Rhodes, Radecki Breitkopf, Ziegenfuss, Jenkins, & Vachon, 2015). Nonetheless, we considered these indicators of objective risk as both the Gail model estimates and mammographic density map to many established risk factors for breast cancer (e.g., family history, age at first live birth), and thus, women with knowledge of these breast cancer risk factors may have some awareness of their personal risk. The knowledge of family history as a significant risk factor for breast cancer is more widely known, but similar to Gail model risk estimates and mammographic density, family history of BC did not distinguish among women of low, moderate and high levels of BC worry in our study. These results are consistent with some studies (Brain, Norman, Gray, & Mansel, 1999; Zhang et al., 2012), but not other studies that have reported higher BC worry in high-risk women (Andersen et al., 2003; Cohen, 2006; Kash, Holland, Halper, & Miller, 1992; Lerman & Schwartz, 1993). In both high- and average-risk women, low levels of BC worry have been associated with less screening and other health protective behaviors (Leventhal et al., 2003; Witte, 1998). However, there is evidence that high levels of BC worry may hinder appropriate screening in high-risk women, and that a moderate level of worry may better promote screening behavior in this population (Kash et al., 1992; Lerman et al., 1993; Zhang et al., 2012).

Our study addressed a gap in the literature on BC worry in Hispanic women without a breast cancer diagnosis who undergo mammography screening. We used a single item from a validated and widely used measure that captures the frequency of worry feelings specific to future BC risk (Berrenberg, 1991; Lerman et al., 1990; L. Y. Miller & Hailey, 1994). We lacked data on other accompanying emotions, such as psychological distress or general anxiety, which while represent psychological states that are distinct from cancer worry, may have potentially influenced the investigated associations with BC worry (Hay et al., 2005; Zajac et al., 2006). The cross-sectional design of our study poses some limitations in

interpreting our findings. Importantly, the data were collected at the time of mammography screening, when women may experience elevated psychological distress as compared with the weeks to months following mammography with normal results (Brett, Bankhead, Henderson, Watson, & Austoker, 2005). Different results may be obtained if data were collected at a non-screening time or collected from women who do not participate in mammography screening. However, the prevalence of high BC worry and the main results in our study were mostly consistent with other studies that relied on similar measures of BC worry and involved populations recruited in settings other than a mammography screening facility (Gibbons & Groarke, 2015; Katapodi et al., 2004; Lerman et al., 1990; Lipkus et al., 2005; Lipkus et al., 2000; McCaul, Schroeder, et al., 1996; Orom et al., 2013). The predominantly immigrant and Caribbean Hispanic composition of our study sample provides new information on the distribution and determinants of BC worry in this understudied population, but may be of limited generalizability to other populations. Mammographic screening rates vary across Hispanic subgroups with self-reports of recent screening higher in Dominican and Puerto Rican (> 70%) women than in Mexican American women (~50%) (Lawsin, Erwin, Bursac, & Jandorf, 2011; Shelton, Jandorf, Thelemaque, King, & Erwin, 2012); ~75% of the participants in our study were born in or had parents who were born in the Dominican Republic and/or Puerto Rico. Thus, while our study results may be applicable to the majority of Dominican and Puerto Rican women in the screening age range, they may not adequately reflect the experiences of other Hispanic groups. We accounted for differences in linguistic acculturation and migration, but we were limited in our ability to capture a wider spectrum of acculturation processes relevant to our research questions including the extent of social ties and affiliations with different ethnic groups (A.F. Abraido-Lanza, Armbrister, Florez, & Aguirre, 2006).

Implications for Practice and/or Policy

Understanding psychological factors relevant to women's participation in breast cancer screening is essential to ensuring that clinical and public health policies and interventions improve breast cancer morbidity and mortality. Additional and simultaneous attention must also be devoted to investigating these associations in diverse populations to address disparities in breast cancer early detection and mortality. We extend the limited prior research on the distribution and predictors of BC worry in Hispanic and immigrant women and report perceived risk as the only strong predictor of BC worry in this population. Understanding the associations between perceived risk and BC worry has important conceptual and practical implications, given the central role of perceived risk in many theories and in interventions aimed at improving appropriate BC screening practices (Ferrer & Klein, 2015). Of note, as observed in our study, both comparative and absolute perceptions of risk may independently impact cancer worry and related behaviors and both should be considered in intervention strategies (Zajac et al., 2006). Many web-based risk prediction models, such as the Breast Cancer Risk Assessment Tool that uses Gail risk model (<http://www.cancer.gov/bcrisktool>) and the Breast Cancer Surveillance Consortium Risk Calculator (<https://tools.bcscc.org/BC5yearRisk/calculator.htm>) provide estimates of future breast cancer risk for the woman with the specified risk factors as well as for a woman of the same age and race/ethnicity from the general population. Inclusion of social comparison information in health communication materials has shown to influence absolute

risk perceptions, cancer worry, and subsequent screening and health protective behaviors, but these associations may differ by gender and cancer type and require additional research for more tailored interventions (Dillard, McCaul, Kelso, & Klein, 2006; Lipkus et al., 2005; Zajac et al., 2006).

We examined the independent associations of perceived BC risk and objective BC risk with BC worry. There is also a need to better understand whether and how discordance, or conversely concordance, in objective and perceived risk may relate to BC worry and cancer prevention and screening behaviors. Awareness of personal risk and accurate risk perceptions are important for engagement in appropriate surveillance as BC screening guidelines increasingly recommend that the benefits and harms of screening be weighed against women's personal risk as well as their values and preferences. Many women inaccurately perceive their risk of BC and these inaccurate perceptions of BC may be associated with inappropriately high or low levels of breast cancer worry (Andersen et al., 2003; Fehniger et al., 2014; Graves et al., 2008; Haas et al., 2005). In our study, knowledge of personal objective risk was low among high-risk women, with only 36% of women identified as above-average or high-risk by Gail model risk estimates correctly perceiving their risk to be higher than that of an average woman. Limitations of Gail model in Hispanic women have been described elsewhere, and include an underestimation of breast cancer cases, and the use of risk estimates for risk factors drawn from non-Hispanic white women (Banegas et al., 2012). Improvements in the performance of risk assessment models in Hispanic women are necessary for accurate risk-based and tailored screening and prevention in this population.

We observed minimal differences in BC worry by nativity status, age at immigration to the U.S. and language acculturation. A large population-based study of recently diagnosed BC patients found less acculturated Hispanic women to express higher levels of worry about BC recurrence than more acculturated Hispanic women as well as white and African American women (Janz et al., 2011). This study population, recruited primarily from the Los Angeles area (Hispanic women were predominantly of Mexican and Central American origin), may have differed in relevant cultural and migration experiences from our study population of predominantly Caribbean Hispanic women of Dominican descent [42]. Other relevant factors in Hispanic and immigrant women may include cultural norms about expressing health concerns and fears, which may affect self-report of cancer worry, as well as inadequate healthcare access and insurance coverage and fatalist beliefs about breast cancer survival, which may contribute to higher perceived impact or severity of breast cancer, (A. F. Abraido-Lanza, Martins, Shelton, & Florez, 2015; Giuliano et al., 2000; Janz et al., 2011; Otero-Sabogal, Stewart, Sabogal, Brown, & Perez-Stable, 2003; Spencer et al., 1999). However, as most studies, including ours, have lacked the necessary data to consider these factors, these explanations remain largely speculative and require empirical investigations. We further recommend that qualitative research studies supplement quantitative findings and provide more in-depth information to guide cancer control and prevention interventions targeted to Hispanic and immigrant women.

Acknowledgments

We thank the study participants for contributing data and the following individuals for data collection: [individuals' names blinded by *WHI* editors for peer review]

This work was supported by grants from the National Cancer Institute (grant numbers K07 CA151777) and Susan G. Komen Foundation (grant number KG110331).

References

- Abraido-Lanza AF, Armbrister AN, Florez KR, Aguirre AN. Toward a theory-driven model of acculturation in public health research. *Am J Public Health*. 2006; 96(8):1342–1346. [PubMed: 16809597]
- Abraido-Lanza AF, Martins MC, Shelton RC, Florez KR. Breast Cancer Screening Among Dominican Latinas: A Closer Look at Fatalism and Other Social and Cultural Factors. *Health Educ Behav*. 2015; doi: 10.1177/1090198115580975
- 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(4):314–320. [PubMed: 12692105]
- Baker DW, Williams MV, Parker RM, Gazmararian JA, Nurss J. Development of a brief test to measure functional health literacy. *Patient Education and Counseling*. 1999; 38(1):33–42. [http://dx.doi.org/10.1016/S0738-3991\(98\)00116-5](http://dx.doi.org/10.1016/S0738-3991(98)00116-5). [PubMed: 14528569]
- Banegas MP, Gail MH, LaCroix A, Thompson B, Martinez ME, Wactawski-Wende J, ... Katki HA. Evaluating breast cancer risk projections for Hispanic women. *Breast Cancer Res Treat*. 2012; 132(1):347–353. DOI: 10.1007/s10549-011-1900-9 [PubMed: 22147080]
- Berrenberg JL. The Cancer Attitude Inventory. *Journal of Psychosocial Oncology*. 1991; 9(2):35–44. DOI: 10.1300/J077v09n02_03
- Bhuyan SS, Stimpson JP, Rajaram SS, Lin G. Mortality outcome among medically underserved women screened through a publicly funded breast cancer control program, 1997–2007. *Breast Cancer Res Treat*. 2014; 146(1):221–227. DOI: 10.1007/s10549-014-2992-9 [PubMed: 24903224]
- Bowen DJ, Burke W, McTiernan A, Yasui Y, Andersen MR. Breast cancer risk counseling improves women's functioning. *Patient Educ Couns*. 2004; 53(1):79–86. DOI: 10.1016/S0738-3991(03)00122-8 [PubMed: 15062908]
- Brain K, Norman P, Gray J, Mansel R. Anxiety and adherence to breast self-examination in women with a family history of breast cancer. *Psychosom Med*. 1999; 61(2):181–187. [PubMed: 10204971]
- Brett J, Bankhead C, Henderson B, Watson E, Austoker J. The psychological impact of mammographic screening. A systematic review. *Psychooncology*. 2005; 14(11):917–938. DOI: 10.1002/pon.904 [PubMed: 15786514]
- Buxton JA, Bottorff JL, Balneaves LG, Richardson C, McCullum M, Ratner PA, Hack T. Women's perceptions of breast cancer risk: are they accurate? *Can J Public Health*. 2003; 94(6):422–426. [PubMed: 14700240]
- Cameron LD, Diefenbach MA. Responses to Information about Psychosocial Consequences of Genetic Testing for Breast Cancer Susceptibility: Influences of Cancer Worry and Risk Perceptions. *J Health Psychol*. 2001; 6(1):47–59. DOI: 10.1177/135910530100600104 [PubMed: 22049237]
- Chew LD, Bradley KA, Boyko EJ. Brief questions to identify patients with inadequate health literacy. *Fam Med*. 2004; 36(8):588–594. [PubMed: 15343421]
- Cohen M. Breast cancer early detection, health beliefs, and cancer worries in randomly selected women with and without a family history of breast cancer. *Psychooncology*. 2006; 15(10):873–883. DOI: 10.1002/pon.1018 [PubMed: 16374894]
- Consedine NS, Magai C, Krivoshekova YS, Ryzewicz L, Neugut AI. Fear, anxiety, worry, and breast cancer screening behavior: a critical review. *Cancer Epidemiol Biomarkers Prev*. 2004; 13(4):501–510. [PubMed: 15066912]

- 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(1):64–77. [PubMed: 14672643]
- Deimling GT, Bowman KF, Sterns S, Wagner LJ, Kahana B. Cancer-related health worries and psychological distress among older adult, long-term cancer survivors. *Psychooncology*. 2006; 15(4):306–320. DOI: 10.1002/pon.955 [PubMed: 16041841]
- Deimling GT, Brown SP, Albitz C, Burant CJ, Mallick N. The relative importance of cancer-related and general health worries and distress among older adult, long-term cancer survivors. *Psychooncology*. 2015; doi: 10.1002/pon.4015
- Dillard AJ, McCaul KD, Kelso PD, Klein WMP. Resisting Good News: Reactions to Breast Cancer Risk Communication. *Health Communication*. 2006; 19(2):115–123. DOI: 10.1207/s15327027hc1902_3 [PubMed: 16548702]
- Durfy SJ, Bowen DJ, McTiernan A, Sporleder J, Burke W. Attitudes and interest in genetic testing for breast and ovarian cancer susceptibility in diverse groups of women in western Washington. *Cancer Epidemiol Biomarkers Prev*. 1999; 8(4 Pt 2):369–375. [PubMed: 10207642]
- Erblich J, Bovbjerg DH, Valdimarsdottir HB. Looking forward and back: distress among women at familial risk for breast cancer. *Ann Behav Med*. 2000; 22(1):53–59. [PubMed: 10892528]
- Evans DG, Burnell LD, Hopwood P, Howell A. Perception of risk in women with a family history of breast cancer. *Br J Cancer*. 1993; 67(3):612–614. [PubMed: 8439512]
- Fehniger J, Livaudais-Toman J, Karliner L, Kerlikowske K, Tice JA, Quinn J, ... Kaplan CP. Perceived versus objective breast cancer risk in diverse women. *J Womens Health (Larchmt)*. 2014; 23(5): 420–427. DOI: 10.1089/jwh.2013.4516 [PubMed: 24372085]
- Ferrer R, Klein WM. Risk perceptions and health behavior. *Curr Opin Psychol*. 2015; 5:85–89. DOI: 10.1016/j.copsyc.2015.03.012 [PubMed: 26258160]
- Gibbons A, Groarke A. Can risk and illness perceptions predict breast cancer worry in healthy women? *J Health Psychol*. 2015; doi: 10.1177/1359105315570984
- Giuliano AR, Mokuau N, Hughes C, Tortolero-Luna G, Risendal B, Ho RCS, ... McCaskill-Stevens WJ. Participation of minorities in cancer research: the influence of structural, cultural, and linguistic factors. *Ann Epidemiol*. 2000; 10(8 Suppl):S22–34. [PubMed: 11189089]
- Gorin SS, Heck JE, Cheng B, Smith SJ. Delays in breast cancer diagnosis and treatment by racial/ethnic group. *Arch Intern Med*. 2006; 166(20):2244–2252. DOI: 10.1001/archinte.166.20.2244 [PubMed: 17101943]
- Graves KD, Huerta E, Cullen J, Kaufman E, Sheppard V, Luta G, ... Mandelblatt J. Perceived risk of breast cancer among Latinas attending community clinics: risk comprehension and relationship with mammography adherence. *Cancer Causes Control*. 2008; 19(10):1373–1382. DOI: 10.1007/s10552-008-9209-7 [PubMed: 18704716]
- Haas JS, Kaplan CP, Des Jarlais G, Gildengoin V, Perez-Stable EJ, Kerlikowske K. Perceived risk of breast cancer among women at average and increased risk. *J Womens Health (Larchmt)*. 2005; 14(9):845–851. DOI: 10.1089/jwh.2005.14.845 [PubMed: 16313212]
- Hay JL, Buckley TR, Ostroff JS. The role of cancer worry in cancer screening: A theoretical and empirical review of the literature. *Psycho-Oncology*. 2005; 14(7):517–534. DOI: 10.1002/Pon.864 [PubMed: 15490428]
- 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(6):401–408. DOI: 10.1016/J.Ymed.2006.03.002 [PubMed: 16626796]
- Helmes AW. Application of the protection motivation theory to genetic testing for breast cancer risk. *Prev Med*. 2002; 35(5):453–462. [PubMed: 12431894]
- Hershman D, McBride R, Jacobson JS, Lamerato L, Roberts K, Grann VR, Neugut AI. Racial disparities in treatment and survival among women with early-stage breast cancer. *J Clin Oncol*. 2005; 23(27):6639–6646. DOI: 10.1200/JCO.2005.12.633 [PubMed: 16170171]
- Hopwood P, Shenton A, Lalloo F, Evans DG, Howell A. Risk perception and cancer worry: an exploratory study of the impact of genetic risk counselling in women with a family history of breast cancer. *J Med Genet*. 2001; 38(2):139. [PubMed: 11288719]

- Janz NK, Hawley ST, Mujahid MS, Griggs JJ, Alderman A, Hamilton AS, ... Katz SJ. Correlates of worry about recurrence in a multiethnic population-based sample of women with breast cancer. *Cancer*. 2011; 117(9):1827–1836. DOI: 10.1002/cncr.25740 [PubMed: 21445916]
- Kash KM, Holland JC, Halper MS, Miller DG. Psychological distress and surveillance behaviors of women with a family history of breast cancer. *J Natl Cancer Inst*. 1992; 84(1):24–30. [PubMed: 1738170]
- Katapodi MC, Lee KA, Facione NC, Dodd MJ. Predictors of perceived breast cancer risk and the relation between perceived risk and breast cancer screening: a meta-analytic review. *Prev Med*. 2004; 38(4):388–402. DOI: 10.1016/j.ypmed.2003.11.012 [PubMed: 15020172]
- Keegan TH, John EM, Fish KM, Alfaro-Velcamp T, Clarke CA, Gomez SL. Breast cancer incidence patterns among California Hispanic women: differences by nativity and residence in an enclave. *Cancer Epidemiol Biomarkers Prev*. 2010; 19(5):1208–1218. DOI: 10.1158/1055-9965.EPI-10-0021 [PubMed: 20447917]
- Lawsin C, Erwin D, Bursac Z, Jandorf L. Heterogeneity in breast and cervical cancer screening practices among female Hispanic immigrants in the United States. *J Immigr Minor Health*. 2011; 13(5):834–841. DOI: 10.1007/s10903-010-9378-9 [PubMed: 20734140]
- Lee-Jones C, Humphris G, Dixon R, Hatcher MB. Fear of cancer recurrence--a literature review and proposed cognitive formulation to explain exacerbation of recurrence fears. *Psychooncology*. 1997; 6(2):95–105. DOI: 10.1002/(SICI)1099-1611(199706)6:2<95::AID-PON250>3.0.CO;2-B [PubMed: 9205967]
- Lerman C, Daly M, Sands C, Balschem A, Lustbader E, Heggan T, ... Engstrom P. Mammography adherence and psychological distress among women at risk for breast cancer. *J Natl Cancer Inst*. 1993; 85(13):1074–1080. [PubMed: 8515494]
- Lerman C, Kash K, Stefanek M. Younger women at increased risk for breast cancer: perceived risk, psychological well-being, and surveillance behavior. *J Natl Cancer Inst Monogr*. 1994; (16):171–176. [PubMed: 7999461]
- Lerman C, Rimer B, Trock B, Balschem A, Engstrom PF. Factors associated with repeat adherence to breast cancer screening. *Prev Med*. 1990; 19(3):279–290. [PubMed: 2377590]
- Lerman C, Schwartz M. Adherence and psychological adjustment among women at high risk for breast cancer. *Breast Cancer Res Treat*. 1993; 28(2):145–155. [PubMed: 8173067]
- Lerman C, Trock B, Rimer BK, Jepson C, Brody D, Boyce A. Psychological side effects of breast cancer screening. *Health Psychol*. 1991; 10(4):259–267. [PubMed: 1915212]
- Leventhal, H., Brissette, I., Leventhal, EA. The common-sense model of self-regulation of health and illness. In: Cameron, LD., Leventhal, H., editors. *The self-regulation of health and illness behaviour*. London: Routledge; 2003.
- Li CI, Malone KE, Daling JR. Differences in breast cancer stage, treatment, and survival by race and ethnicity. *Arch Intern Med*. 2003; 163(1):49–56. [PubMed: 12523916]
- Lipkus IM, Iden D, Terrenoire J, Feaganes JR. Relationships among breast cancer concern, risk perceptions, and interest in genetic testing for breast cancer susceptibility among African-American women with and without a family history of breast cancer. *Cancer Epidemiol Biomarkers Prev*. 1999; 8(6):533–539. [PubMed: 10385144]
- Lipkus IM, Klein WMP, Skinner CS, Rimer BK. Breast cancer risk perceptions and breast cancer worry: what predicts what? *Journal of Risk Research*. 2005; 8(5):439–452. DOI: 10.1080/1366987042000311018
- Lipkus IM, Kuchibhatla M, McBride CM, Bosworth HB, Pollak KI, Siegler IC, Rimer BK. Relationships among breast cancer perceived absolute risk, comparative risk, and worries. *Cancer Epidemiol Biomarkers Prev*. 2000; 9(9):973–975. [PubMed: 11008917]
- Magai C, Consedine N, Conway F, Neugut A, Culver C. Diversity matters: Unique populations of women and breast cancer screening. *Cancer*. 2004; 100(11):2300–2307. DOI: 10.1002/cncr.20278 [PubMed: 15160332]
- Magai C, Consedine N, Neugut AI, Hershman DL. Common psychosocial factors underlying breast cancer screening and breast cancer treatment adherence: a conceptual review and synthesis. *J Womens Health (Larchmt)*. 2007; 16(1):11–23. DOI: 10.1089/jwh.2006.0024 [PubMed: 17324093]

- McCaul KD, Branstetter AD, O'Donnell SM, Jacobson K, Quinlan KB. A descriptive study of breast cancer worry. *J Behav Med.* 1998; 21(6):565–579. [PubMed: 9891255]
- McCaul KD, Branstetter AD, Schroeder DM, Glasgow RE. What is the relationship between breast cancer risk and mammography screening? A meta-analytic review. *Health Psychol.* 1996; 15(6): 423–429. [PubMed: 8973921]
- McCaul KD, Schroeder DM, Reid PA. Breast cancer worry and screening: some prospective data. *Health Psychol.* 1996; 15(6):430–433. [PubMed: 8973922]
- McCaul KD, Tulloch HE. Cancer screening decisions. *J Natl Cancer Inst Monogr.* 1999; (25):52–58. [PubMed: 10854458]
- McCormack VA, dos Santos Silva I. Breast density and parenchymal patterns as markers of breast cancer risk: a meta-analysis. *Cancer Epidemiol Biomarkers Prev.* 2006; 15(6):1159–1169. DOI: 10.1158/1055-9965.EPI-06-0034 [PubMed: 16775176]
- McGregor BA, Bowen DJ, Ankerst DP, Andersen MR, Yasui Y, McTiernan A. Optimism, perceived risk of breast cancer, and cancer worry among a community-based sample of women. *Health Psychol.* 2004; 23(4):339–344. DOI: 10.1037/0278-6133.23.4.339 [PubMed: 15264969]
- Metsala E, Pajukari A, Aro AR. Breast cancer worry in further examination of mammography screening--a systematic review. *Scand J Caring Sci.* 2012; 26(4):773–786. DOI: 10.1111/j.1471-6712.2011.00961.x [PubMed: 22168467]
- Miller LY, Hailey BJ. Cancer anxiety and breast cancer screening in African-American women: a preliminary study. *Womens Health Issues.* 1994; 4(3):170–174. [PubMed: 7950398]
- Miller SM, Shoda Y, Hurley K. Applying cognitive-social theory to health-protective behavior: breast self-examination in cancer screening. *Psychol Bull.* 1996; 119(1):70–94. [PubMed: 8559860]
- O'Neill SC, Leventhal KG, Scarles M, Evans CN, Makariou E, Pien E, Willey S. Mammographic breast density as a risk factor for breast cancer: awareness in a recently screened clinical sample. *Womens Health Issues.* 2014; 24(3):e321–326. DOI: 10.1016/j.whi.2014.02.005 [PubMed: 24725756]
- Ooi SL, Martinez ME, Li CI. Disparities in breast cancer characteristics and outcomes by race/ethnicity. *Breast Cancer Res Treat.* 2011; 127(3):729–738. DOI: 10.1007/s10549-010-1191-6 [PubMed: 21076864]
- Orom H, Kiviniemi MT, Shavers VL, Ross L, Underwood W 3rd. Perceived risk for breast cancer and its relationship to mammography in Blacks, Hispanics, and Whites. *J Behav Med.* 2013; 36(5): 466–476. DOI: 10.1007/s10865-012-9443-z [PubMed: 22772713]
- Otero-Sabogal R, Stewart S, Sabogal F, Brown BA, Perez-Stable EJ. Access and attitudinal factors related to breast and cervical cancer rescreening: why are Latinas still underscreened? *Health Educ Behav.* 2003; 30(3):337–359. [PubMed: 19731500]
- Price MA, Butow PN, Lo SK, Wilson J. Kathleen Cuninghame Consortium for Research into Familial Breast Cancer Psychosocial G. Predictors of cancer worry in unaffected women from high risk breast cancer families: risk perception is not the primary issue. *J Genet Couns.* 2007; 16(5):635–644. DOI: 10.1007/s10897-007-9105-4 [PubMed: 17828585]
- Rhodes DJ, Radecki Breitkopf C, Ziegenfuss JY, Jenkins SM, Vachon CM. Awareness of breast density and its impact on breast cancer detection and risk. *J Clin Oncol.* 2015; 33(10):1143–1150. DOI: 10.1200/JCO.2014.57.0325 [PubMed: 25732156]
- Roger, RW., Prentice-Dunn, S. Protection motivation theory. In: Gochman, DS., editor. *Handbook of health behavior research.* New York: Plenum Press; 1997.
- Sammarco A, Konecny LM. Quality of life, social support, and uncertainty among Latina breast cancer survivors. *Oncol Nurs Forum.* 2008; 35(5):844–849. DOI: 10.1188/08.ONF.844-849 [PubMed: 18765332]
- Sheeran P, Harris PR, Epton T. Does heightening risk appraisals change people's intentions and behavior? A meta-analysis of experimental studies. *Psychol Bull.* 2014; 140(2):511–543. DOI: 10.1037/a0033065 [PubMed: 23731175]
- Shelton RC, Jandorf L, Thelemaque L, King S, Erwin DO. Sociocultural determinants of breast and cervical cancer screening adherence: an examination of variation among immigrant Latinas by country of origin. *J Health Care Poor Underserved.* 2012; 23(4):1768–1792. DOI: 10.1353/hpu.2012.0191 [PubMed: 23698689]

- Singh GK, Siahpush M. All-cause and cause-specific mortality of immigrants and native born in the United States. *Am J Public Health*. 2001; 91(3):392–399. [PubMed: 11236403]
- Spencer SM, Lehman JM, Wynings C, Arena P, Carver CS, Antoni MH, ... Love N. Concerns about breast cancer and relations to psychosocial well-being in a multiethnic sample of early-stage patients. *Health Psychol*. 1999; 18(2):159–168. [PubMed: 10194051]
- Tehraniifar P, Protacio A, Schmitt KM, Desperito E, Oskar S, Potter AJ, ... Terry MB. The metabolic syndrome and mammographic breast density in a racially diverse and predominantly immigrant sample of women. *Cancer Causes Control*. 2015; doi: 10.1007/s10552-015-0630-4
- Vogel VG, Graves DS, Vernon SW, Lord JA, Winn RJ, Peters GN. Mammographic screening of women with increased risk of breast cancer. *Cancer*. 1990; 66(7):1613–1620. [PubMed: 2208012]
- Wang C, O'Neill SM, Rothrock N, Gramling R, Sen A, Acheson LS. ... Family Healthware Impact Trial, g. Comparison of risk perceptions and beliefs across common chronic diseases. *Prev Med*. 2009; 48(2):197–202. DOI: 10.1016/j.ypmed.2008.11.008 [PubMed: 19073208]
- Watson M, Lloyd S, Davidson J, Meyer L, Eeles R, Ebbs S, Murday V. The impact of genetic counselling on risk perception and mental health in women with a family history of breast cancer. *Br J Cancer*. 1999; 79(5–6):868–874. DOI: 10.1038/sj.bjc.6690139 [PubMed: 10070883]
- Witte, K. Fear as motivator, fear as inhibitor: using the extended parallel process model to explain fear appeal successes and failures. In: Anderson, PA., Guerrero, LK., editors. *Handbook of communication and emotion: research, theory applications, and contexts*. Academy Press; 1998.
- Yabroff KR, Breen N, Vernon SW, Meissner HI, Freedman AN, Ballard-Barbash R. What factors are associated with diagnostic follow-up after abnormal mammograms? Findings from a U.S. National Survey. *Cancer Epidemiol Biomarkers Prev*. 2004; 13(5):723–732. [PubMed: 15159302]
- Zajac LE, Klein WM, McCaul KD. Absolute and comparative risk perceptions as predictors of cancer worry: moderating effects of gender and psychological distress. *J Health Commun*. 2006; 11(Suppl 1):37–49. DOI: 10.1080/10810730600637301 [PubMed: 16641073]
- Zhang LR, Chiarelli AM, Glendon G, Mirea L, Knight JA, Andrulis IL, Ritvo P. Worry is good for breast cancer screening: a study of female relatives from the ontario site of the breast cancer family registry. *J Cancer Epidemiol*. 2012; 2012:545062. doi: 10.1155/2012/545062 [PubMed: 22792104]

Biographies

Ayana April-Sanders, MPH is a doctoral student in epidemiology at Columbia University Mailman School of Public Health. Her research interests include social determinants of cancer and cardiovascular risk and preventive behaviors.

Sabine Oskar, MPH, a doctoral student in epidemiology at Columbia University Mailman School of Public Health, is interested in precision prevention and early detection of breast cancer.

Rachel C. Shelton, ScD, an assistant professor of sociomedical sciences at Columbia University Mailman School of Public Health, is a social and behavioral scientist whose research program includes development, evaluation and dissemination of community-based and health systems interventions for addressing health disparities.

Karen Schmitt, BSN, MA is the director of Cancer Services Program at Herbert Irving Comprehensive Cancer Center, New York Presbyterian-Columbia University. Her work centers on improving the health of women and minorities by eliminating barriers to care and improving access to cancer clinical trials.

Elise Desperito, MD is an assistant professor of clinical radiology at Columbia University Medical Center whose research interests focus on imaging approaches to prevention and early detection of breast cancer.

Angeline Protacio, MPH, a data analyst at Columbia University Mailman School of Public health at the time of this research, collaborated on study design and statistical analysis.

Parisa Tehranifar, DrPH, is an assistant professor of epidemiology at Columbia University Mailman School of Public Health. Her research examines how structural, social and behavioral factors are associated with cancer health disparities, with a focus on breast cancer prevention and screening in racial/ethnic minority and immigrant populations.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 1

Participant characteristics by levels of breast cancer worry (n=250)

	Low BC Worry		Moderate BC Worry		High BC Worry	
	n = 93		n = 84		n = 73	
	<i>n</i>	<i>or SD</i>	<i>n</i>	<i>or SD</i>	<i>n</i>	<i>or SD</i>
Sociodemographic characteristics						
Age at interview	51.9	6.2	49.8	5.1	49.2	5.7
Educational attainment						
High school graduate	49	52.7	38	45.2	43	58.9
>High school graduate	44	47.3	46	54.8	30	41.1
Health literacy						
Adequate	35	37.6	36	42.9	26	35.6
Inadequate	58	62.4	48	57.1	47	64.4
Nativity						
US born	14	15.1	18	21.4	13	17.8
Foreign born	79	85.0	66	78.6	60	82.2
Language acculturation						
English only	6	6.5	6	7.1	4	5.5
Spanish only	47	50.5	31	36.9	30	41.1
Bilingual	40	43.0	47	56.0	39	53.4
Age at migration in foreign-born women (year)	24	12.4	24.2	9.5	23.3	9.2
Breast cancer risk factors						
Age at menarche (year)	12.6	2.0	12.9	2.0	12.8	2.0
Age at first birth in parous women (year)	24.0	5.7	24.6	6.5	24.2	4.8
Parity						
Nulliparous	5	5.4	9	10.7	5	6.9
1–2	45	48.4	49	58.3	37	50.7
3+	43	46.2	26	31.0	31	42.5
Menopausal status						
Pre-/peri-menopausal	37	40.2	49	59.0	38	52.8
Post-menopausal	55	59.8	34	41.0	34	47.2

	Low BC Worry n = 93		Moderate BC Worry n = 84		High BC Worry n = 73	
	n or mean	% or SD	n or mean	% or SD	n or mean	% or SD
Current Alcohol Use						
Never of former drinker	62	67.4	45	54.2	40	55.6
<3 servings a week	19	20.7	26	31.3	18	25.0
>3 but <7 servings a week	5	5.4	6	7.2	8	11.1
>7 servings a week	6	6.5	6	7.2	6	8.33
5 year Gail model risk estimate						
Mammographic density ^b	0.9	0.7	0.72	0.36	0.72	0.32
Low breast density	62	66.7	55	66.3	52	71.2
High breast density	31	33.3	28	33.7	21	28.8
First degree relative with breast cancer	9	9.7	7	8.33	7	9.59
Psychosocial and behavioral factors						
Sought cancer information from ^a :						
Family and friends	11	11.8	19	22.6	18	24.7
Media	12	12.9	20	23.8	14	19.2
Health care provider	59	63.4	49	58.3	43	58.9
Internet	29	31.2	40	47.6	32	43.8
Received mammogram < 2 years ago	72	77.4	71	84.5	61	83.6
Perceived absolute risk	1.8	1.1	2	1.2	2.9	1.3
Perceived comparative risk						
Lower risk	40	44.4	34	42.0	10	13.9
Same risk	40	44.4	38	46.9	47	65.3
More risk	10	11.1	9	11.1	15	20.8

^aCompares women who report vs. women who do not report seeking information from the specified source.

^bBreast Imaging Reporting and Data System (BI-RADS) classification, from the mammogram obtained on the same as the data collection. Low density refers to the two lower density categories of entirely fatty or scattered fibroglandular density and high density refers to the two higher density categories of heterogeneously or extremely dense breasts.

Abbreviations: BC=breast cancer; n=number, SD=standard deviation;

Table 2

Adjusted odds ratios and 95% confidence intervals for predicting high breast cancer worry (n=230)

	High vs. Low/Moderate BC Worry	
	<i>Odds ratio</i>	<i>95% Confidence Intervals</i>
Age at interview	0.95	0.90–1.00
Perceived Absolute Risk	1.66	1.28–2.14
Perceived Comparative Risk		
Lower Risk	1.0	
Same/More Risk	2.73	1.23–6.06