# FACTORS ASSOCIATED WITH MAMMOGRAPHY SCREENING UTILIZATION AMONG LATINAS: A REVISION OF THE BEHAVIORAL MODEL OF HEALTH SERVICES USE

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ABSTRACT

FACTORS ASSOCIATED WITH MAMMOGRAPHY SCREENING UTILIZATION AMONG LATINAS: A REVISION OF THE BEHAVIORAL MODEL OF HEALTH SERVICES USE

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Breast cancer is the most common form of cancer and second leading cause of cancer death among women in the United States. Adherence to mammography screening guidelines is associated with a lower risk of being diagnosed with invasive breast cancer. One reason Latinas are more likely to be diagnosed with breast cancer at advanced stages and have lower survival rates compared to Non-Hispanic white women is because they have lower screening rates. Decreasing these disparities can be accomplished by increasing breast cancer screening and early detection among Latinas. This study used theoretically-driven logistic regression analyses to determine significant predictors of recent mammography screening utilization among Latinas 40 years and older in San Diego County, California. Using Andersen's *Behavioral Model of Health Services Use* as a framework, the *Behavioral Model of Latina Breast Cancer Screening Use* was developed in this study and provided a reasonable framework for explaining and predicting breast cancer screening behavior in this sample of 208 Latinas 40 years and older. Results showed that a lower language-based acculturation, higher health literacy, higher age, a recent physician visit in the last year, and lack of distressful cognitions about developing breast cancer significantly predicted recent mammography screening use within the past two years, after adjusting for other variables. This study demonstrated that access to care matters in the process of obtaining preventive services since no other

factor was consistently more predictive of adherence breast cancer screening guidelines than undergoing an annual examination. In fact, having a recent physician visit in the last year increased the odds of having a recent mammogram by 3 or 4 times in adjusted logistic regression models. Overall, these findings suggest that improving access to care and addressing detracting psychosocial factors is essential for promoting mammography screening utilization among Latinas. Future research is needed to determine if the *Behavioral Model of Latina Breast Cancer Screening Use* framework applies to other Latina health behaviors and to other recent immigrant populations to the United States.

This work is dedicated to my aunt Janet Swajanen and all of the women before her who have lost the fight against breast cancer.

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## Overview

In 2004, cancer was the second leading cause of death in California, accounting for 23 percent of all annual deaths (American Cancer Society [ACS], 2008). Of all cancer types, breast cancer exhibits the highest incidence and the second highest mortality rate in California for all ethnic groups (ACS, 2008; California Cancer Registry [CCR], 2008). Although Latinas are less likely to develop breast cancer than white women, Latinas are more likely to exhibit late stage breast cancers at time of diagnosis and have lower five-, 10- and 15-year survival rates compared to white women in California (CCR, 2008) and nationwide (Zambrana, Breen, Fox, & Gutierrez-Mohammad, 1999).

Regular use of mammography is associated with a decreased risk of developing invasive breast cancer (National Cancer Institute [NCI], 2007b) and reducing breast cancer mortality by about 25% in women aged 40 years and over (Elmore, Armstrong, Lehman, & Fletcher, 2005; Wells & Roetzheim, 2007). However, Latinas have lower rates of mammography use than other ethnicities (Frazier, Jiles, & Mayberry, 1996; Hubbell, Chavez, Mishra, & Valdez, 1996). Thus, much work is needed to promote screening and early detection of breast cancer among Latinas. The purpose of this study was to contribute to this effort by examining factors associated with and that can predict breast cancer screening utilization among Latinas.

Given that the determinants of mammography usage are complex (Fox, Arnsberger, Owens, Nussey, Zhang, Golding, et al., 2004; Mandelblatt, Yabroff, & Kerner, 1999) a multivariate conceptual framework called the *Behavioral Model of Health Services Use* guides this study. The model has existed for 45 years and was developed to explain why individuals use health care, to define and measure equitable

access to healthcare, and to assist in developing policies that promote equitable access to healthcare (Andersen, 1995). The model suggests that health services use is a function of three factors: one's predisposition to use health services (age, education, and acculturation), factors that enable use (health insurance and a recent physician's visit), and one's need for healthcare (perceived health status) (Andersen, 1995). Predisposing, enabling, and need domains of the Behavioral Model were targeted in this study.

In sum, this study aimed to contribute to the current understanding of what predicts breast cancer screening use among Latinas 40 years and older to inform research, health promotion practice, and primary care. The following objectives were proposed to achieve this goal:

*First,* this study used the Behavioral Model to examine what predisposing, enabling, and need factors predict mammography use. In contrast to most of the studies that have examined multiple predictors of Latina breast cancer screening, this study was guided by a well-established theoretical framework. Studies guided by a clear well-established theoretical framework can contribute substantially to the research literature, facilitate inter-study comparisons, and lend credible evidence for the creation of policy. A precursor to this first step was to determine the utility of the Behavioral Model by examining whether the model as outlined in the literature review fit this particular population and outcome variable under investigation.

*Second,* a main argument of this study was that enabling factors matter more than predisposing and need factors in regards to breast cancer screening. In fact, research shows that for the discretionary use of health services-such as mammography utilization-predisposing (age, education, or acculturation) and enabling (health insurance or having a

recent physician's visit) factors may matter more than need (perceived health status) (Andersen, 1968). Although predisposing factors do predict breast cancer screening among Latinas, the presence of enabling factors may counteract this role (Zambrana, et al., 1999). It was necessary to determine the relative importance of such enabling factors (e.g., insurance coverage and regular access to a primary care provider) in facilitating access to mammography screening among this population for future research, policy and community-based practice. Thus, this study sought to contribute to this effort by testing the degree to which predisposing and need factors relate to breast cancer screening, after accounting for enabling factors.

*Lastly,* this study proposed a modification of the Behavioral Model. In fact, the Behavioral Model can be viewed as a "meta-framework", in which context-specific variables are added to allow for greater prediction of the utilization measure in the targeted population (Andersen, 2008). For the current study, the *Behavioral Model of Latina Breast Cancer Screening Use* was created by modifying the Behavioral Model in order to examine the significance of variables context-specific to Latina breast cancer screening behavior (e.g. breast cancer worry, personal/family history of breast cancer, cancer fatalism, religiosity, and health literacy). This study sought to determine if these variables predicted breast cancer screening, after accounting for variables in the original Behavioral Model. Results from this last study component were hypothesized to provide valuable insight for future research, community-based health promotion, and clinical practice. To accomplish these objectives, this study was guided by the following research questions:

1. Does the component structure of the Behavioral Model fit the Latina population for the outcome of breast cancer screening utilization?
2. What predisposing, enabling and need factors are associated with an increased likelihood of breast cancer screening among Latinas?
3. To what extent do predisposing and need factors add to the prediction of breast cancer screening utilization by Latinas, after controlling for enabling factors?
4. To what extent do context-specific variables add to the prediction of breast cancer screening utilization by Latinas?

# INTRODUCTION

Since 1971, when President Nixon signed the National Cancer Act and declared a "War against Cancer", there has been a decline in cancer mortality, although this progress has not been experienced by all Americans (Freeman, 2004). Disparities exist in cancer incidence, mortality, and survival based on ethnicity or socioeconomic status (Blackman & Masi, 2006; Freeman, 2004; IOM, 1999; Sassi, Luft, & Guadagnoli, 2004; Ward et al., 2004). Latinos, African Americans, Asian Americans, and Native Americans experience a greater cancer burden than their white counterparts[1] (NCI, 2005; Freeman, 2004; Ward, et al., 2004). Attention to cancer disparities experienced by Latinas is critical, given that they are members of the fastest growing ethnic and cultural group in the United States (U.S. Census Bureau, 2004). Of the 299.4 million U.S. residents in 2006, 44.3 million were Latino, of which 28.3 million were Mexican origin. In 2006, there were 37.5 million foreign-born persons residing in the United States, of which 20.1 million were from Latin America (U.S. Census Bureau, 2006a). Latinos in the United States are more likely to live in poverty, have less education and lack health insurance than other ethnic groups, which may contribute to disparities in incidence, mortality, and burden of breast cancer affecting Latinas (Abraido-Lanza, Chao, & Gammon, 2004; DeNavas-Walt, Proctor, & Lee, 2005; National Center for Educational Statistics [NCES], 2007).

## Breast Cancer Incidence, Mortality, and Survival

Since 1988, breast cancer mortality rates in California have decreased by 27%, yet cancer is still the second leading cause of death, accounting for 23% of all annual deaths (ACS, 2008). Even though mortality rates have declined over the past two decades, breast

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[1] *Cancer health disparities* are "differences in incidence, prevalence, mortality and burden of cancer and related adverse health conditions that exist among specific population groups in the U.S." (NCI, 2007a)

cancer is still the most common cancer diagnosis and the second leading cause of cancer mortality in California for all ethnic groups (ACS, 2008; CCR, 2008). In 2008, breast cancer will account for 31% of all new cancer cases and 16% of cancer deaths in California (ACS, 2008). One of the strongest predictors of survival is the degree to which the cancer has spread through the body (ACS, 2008). The prospect of surviving five years after diagnosis is better if breast cancer is caught early. From 1988-2004 in California, the five-year relative survival for woman diagnosed with localized breast cancer was 97%, compared to 20% for women diagnosed with late stage breast cancer (ACS, 2008).

Although Latinas are less likely to develop breast cancer than white women, Latinas are more likely to exhibit late stage breast cancers at time of diagnosis (Austin, Ahmad, McNally, & Stewart, 2002), have later initiation of treatment, (Rodriguez, Ward, & Perez-Stable, 2005), and have lower five-, 10- and 15-year survival rates compared to white women (Zambrana, et al., 1999). For example, from 2000-2003, 54% of Latina breast cancer cases were detected at the local stage, compared to 63% of cases of white women (ACS, 2007), even though white women had higher age-adjusted breast cancer incidence (140.6 per 100,000) and mortality (25.8 per 100,000) rates compared to Latinas nationwide (89.1 per 100,000; 16.2 per 100,000 respectively); these disparities in survival may relate to late diagnosis due to a lack of breast cancer screening (ACS, 2007).

## Breast Cancer Screening and Early Detection

Screening is a procedure whereby sections of the population most at risk for a disease are examined for any early indications of disease. Breast cancer screening is a secondary prevention technique, aiming for early disease detection to allow for interventions that prevent disease progression and emergence of symptoms (Marks, 2005;

Rajaram & Rashidi, 1998). Experts agree that screening tests should only be used when the potential benefits clearly outweigh the potential harms (Brawley & Kramer, 2005). Direct causal factors for developing breast cancer remain largely unknown; however, screening can detect cancer at early stages, which greatly increases chances of cure, extends life, reduces the extent of treatment needed, and improves quality of life (ACS, 2003; NCI, 2007b). Thus, breast cancer screening and early detection play an important role in reducing the impact of this cancer (NCI, 2007b).

From 2000-2005, the median age for a diagnosis of breast cancer was 61 years old (NCI, 2007b; 2008a). For this reason, the U.S. Preventive Services Task Force recommends mammography [with or without a clinical breast examination(CBE)] every 1-2 years for women 40 years and older, since it is associated with early detection and improved outcomes (Agency for Healthcare Research and Quality [AHRQ], 2006). Evidence for the utility of manual CBEs and breast self-examinations to screen for breast cancer is inconclusive (AHRQ, 2006; Elmore, et al., 2005; Humphrey, et al., 2002).

Some studies argue that mammography screening tests are less sensitive for younger women aged 40 to 49 years than for women 50 years and older (Buist, Porter, Lehman, Taplin, & White, 2004) and other studies have indicated that the current evidence on the effectiveness of screening mammography does not suggest whether women aged 40-49 should receive mammograms or not (Ringash, 2001). However, the use of regular screening mammography among women 40 to 74 years has been shown in randomized trials to be associated with a reduction in breast cancer mortality (Humphrey, Helfand, Chan, & Woolf, 2002; Tabar, Vitak, Chen, Yen, Duffy, & Smith, 2001; Wells &

Roetzheim, 2007). Other studies have indicated that screening mammography in women aged 40 to 70 years decreases breast cancer mortality (NCI, 2008b).

The precise age to end screening is uncertain, since no trials have enrolled women older than 74 years of age (AHRQ, 2006). A meta-analysis of 13 studies showed that screening mammography significantly reduces breast cancer mortality in women aged 50 to 74 years after seven to nine years of follow-up, regardless of screening interval or number of mammographic views per screen (Kerlikowske, Grady, Rubin, Sandrock, & Ernster, 1995). In another study that reviewed eight randomized controlled trials, screening mammography was found to reduce breast cancer mortality by about 20-35% for women aged 50 to 69 and slightly less for women aged 40-49 years 14 years after the initial screening (Elmore, et al., 2005). A meta-analysis of over 100 randomized controlled trials from 1965 to 2005 showed 7-23% reduction in breast cancer mortality rates with screening mammography for women aged 40-49 (Armstrong, Moye, Williams, Berlin, & Reynolds, 2007). Although these studies have cited the benefits of mammography screening for women aged 40 to 74, it is unclear whether these studies have controlled for age. Given that survival post-diagnosis may be dependent on age of diagnosis, in that younger women may have better survival rates than older women by virtue of their age and better health status, studies are needed to examine the effect that age at diagnosis may or may not have on survival.

Nonetheless, although the benefits of screening mammography for women 40 years and older are clearly evident, mammography usage differs by ethnicity, education, income, acculturation, and geographic region within the United States (Rodriguez, Ward, & Perez-Stable, 2005). Latinas are less likely to utilize mammography than other ethnic

groups in California (California Health Interview Survey [CHIS], 2005) or than African American and white women nationally (CDC, 2007). Thus, the need to promote screening and early detection of breast cancer among Latinas is clear. Latinas are more likely to exhibit late stage[2] breast cancers at time of diagnosis, and have lower rates of survival and mammography usage than other ethnicities. Since breast cancer mortality is largely due to late diagnosis, and late diagnosis is directly related to underutilization of mammography (Borrayo & Jenkins, 2001; Jones, Caplan, & Davis, 2003), this study focused on factors that were proposed to influence breast cancer screening[3] use among Latinas.

## The Behavioral Model of Health Services Use

Theories help provide a framework for understanding the targeted health behaviors and the context in which they occur (NCI, 2005b) and consist of both measurement (e.g., operationalization of constructs) and structural (e.g., interrelationships among constructs) components (Nunnally & Bernstein, 1994). Interventions based on theory are more effective than those not theoretically-based (e.g., Painter, Borba, Hynes, Mays, & Glanz, 2008), and thus theories are important to consider in health promotion research. However, studies targeting health behavioral change are largely atheoretical. In a recent review of 193 health behavior studies published from 2000-2005, Painter and colleagues found that only 37% mentioned theory and of those, most were informed by theory (68.1%) or applied theory (18%) and few either tested (3.6%) or created theory

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[2] Degree of cancer progression (stage I-IV), can range from "in situ" (cells have not spread), "localized" (cells have spread to local tissue or organ(s)), "regional" (cells have spread to the lymph nodes, adjacent tissues, or organs), and "distant" (cells have spread to other regions in the body) (ACS, 2008, p. 7).

[3] Breast cancer screening utilization in this study refers to having a recent mammogram in the previous two years.

(9.4%) (Painter, et al., 2008). Thus, there is a clear need for greater theory integration, development, and testing in health behavior research.

Given that determinants of breast cancer screening use are complex (Fox, et al., 2004; Mandelblatt, Yabroff, & Kerner, 1999; Otero-Sabogal, et al., 2004), this study used a multivariate theoretical framework called the *Behavioral Model of Health Services Use* (Andersen, 1968; 1995; 2008), to help guide hypotheses, measures included, and analyses in this study in order examine breast cancer screening utilization among Latinas. The Behavioral Model has existed for 45 years and was developed to explain why individuals use health care, to define and measure equitable access to healthcare, and to aid in developing policies promoting equitable access to healthcare (Andersen, 2008). The Behavioral Model focuses on the individual unit of analysis and suggests that healthcare use is a function of an individual's predisposition to use services (*predisposing*), factors that enable or impede use (*enabling*), and their need for care (*need*) (Andersen, 1995) (Figure 1).

According to Ricketts and Goldsmith (2005), the Behavioral Model and the Fit Model by Penchanksy, Frenk, and colleagues are the two major theories focusing on access and utilization of health services. Ricketts and Goldsmith (2005) further explained that the Behavioral Model is used more often to guide research and evaluation studies on access to healthcare. While other theories of health behavior, such as the health belief model (NCI, 2005b), may lack components thought to be important in health services utilization research; the Behavioral Model explicitly focuses on factors that predict health services use, which made it an ideal framework for the current study. In a recent

interview with Ronald Andersen, the originator of the model, the utility of such a framework is to:

> "... Inform the research process by guiding the development of testable questions or hypotheses, the collection of relevant data, and the appropriate analytic techniques. Empirical research guided by a conceptual framework has a better change of advancing the field... [and] provides a tool to link disciplinary concepts from the social sciences and earlier applications in health services research to the current research questions being addressed, and also helps to suggest the health policy relevance of the analytic results" (Ashton, 2008, p. 646).

The Behavioral Model has been used as a theoretical and analytic framework in studies for over 30 years focusing on access to and utilization of hospital, dental, and medical care among diverse adults (Aday & Andersen, 1974; Andersen, Bozzette, Shapiro, St Clair, Morton, Crystal, et al., 2000; Andersen & Davidson, 1997; Andersen, Davidson, & Nakazono, 1997; Coulter, Marcus, Freed, Der-Martirosian, Cunningham, Andersen, et al., 2000; Davidson, Rams, & Andersen, 1997; Gallagher, Andersen, Koegel, Gelberg, 1997; Gelberg, Andersen, & Leake, 2000; Miller, Gelberg, Kwan, Stapanian, Fink, Andersen, et al., 2008; Padgett, Struening, & Andrews, 1990; Stein, Andersen & Gelberg, 2007; Swanson, Andersen, & Gelberg, 2003; Wolinsky & Johnson, 1991; Wolinsky, 1978).

The model was also used to examine access to care and utilization barriers experienced by Latinos (Andersen, Giachello & Aday, 1986; Andersen, Lewis, Giachello, Aday, & Chiu, 1981; Estrada, et al., 1990) and Latino cancer screening test utilization (Fernandez & Morales, 2007; Gorin & Heck, 2005). Andersen, et al., (1981)

explored predictors of health care utilization among 5,432 Hispanic households in the southwestern region of the United States and found that barriers to accessing care were a lower income, a lack of health insurance and lower education. Andersen, Giachello, and Aday (1986) used the Behavioral Model to examine access to care among a sample of 4,800 Hispanic families and found that the ability to utilize health care services was impeded by a lower income, a lack of health insurance, and a lack of ties to a primary physician. Estrada, et al., (1990) used data from the Hispanic Health and Nutrition Examination Survey (HHANES) from 1982-1984 to explore health care utilization barriers among Mexican Americans and found that the following barriers prevented individuals from obtaining health care: a younger age, less acculturation, lacking health insurance, having functional limitations, and having a poorer perceived health status. Gorin and Heck, (2005) examined factors that predicted breast cancer screening in the past year for Latinas 40 years and older and found that some predisposing factors (i.e., Dominican versus other Latina subgroups, age, education, smoking status, and a personal history of cancer), enabling factors, (i.e., health insurance and recent physician visit in the past year), and need factors (i.e., using at least one other screening test in the past) were significant. Fernandez and Morales, (2007) examined factors that predicted breast cancer screening in the past two years for Latinas aged 40-64 and found that one predisposing factor (i.e., age), enabling factors (i.e., health insurance and a regular health care provider), and need (i.e., self-rated health status) were significant.

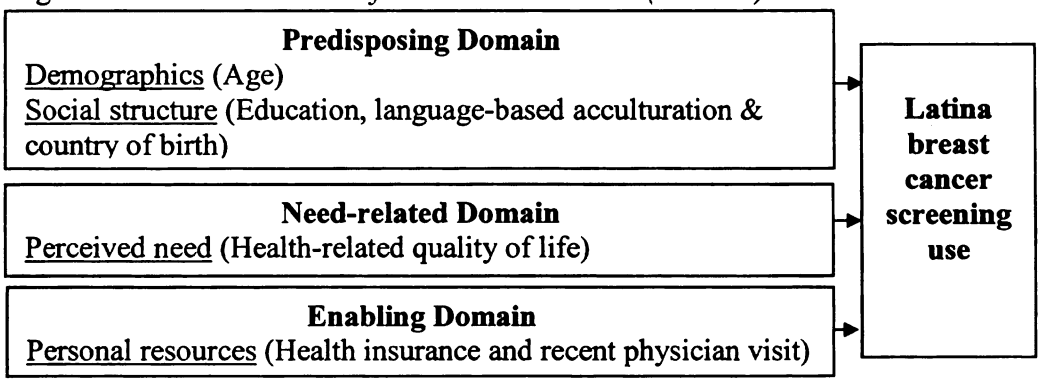
Cultural sub-groups in the United States have different backgrounds, experiences, beliefs, and social norms (Cauce, Coronado, & Watson, 1998; Marin, 1993; Rogler, 1999) that may influence beliefs, attitudes, and knowledge around cancer. For example,

Latinas have been shown to have different health beliefs around breast cancer than mainstream cultural groups (Chavez, Hubbell, McMullin, Martinez, & Mishra, 1995). Given cross-cultural differences in beliefs and behaviors, one cannot assume that health behavior theories work equally across cultural and linguistic groups. There is a need for cultural sensitivity in health promotion research (e.g., Roosa & Gonzales, 1999) and an increased need to empirically test theoretical models to determine how dependable they are across contexts and populations (Lucas, 2003). It was thus important to consider the cultural appropriateness of the Behavioral Model and verify its equivalence in this sample of Latinas 40 years and over (Nunnally & Bernstein, 1994). Demonstration of measurement equivalence can be accomplished by testing whether the theoretical structural model is invariant across cross-cultural or language groups (Vandenberg & Lance, 2000) through confirmatory factor analysis.

This study assessed the validity of the Behavioral Model of Health Services Use in this sample of Latinas 40 years and older by conducting a confirmatory factor analysis (Nunnally & Bernstein, 1994), which addressed the study's first research question: "*Does the component structure of the Behavioral Model fit the Latina population for the outcome of breast cancer screening utilization*?"

Next, this study used the Behavioral Model to answer the second research question: "*What predisposing, enabling and need factors are associated with an increased likelihood of breast cancer screening among Latinas?*" Variables nested in the predisposing, enabling, and need domains, according to the Behavioral Model, are outlined in Figure 1 and discussed below.

Figure 1. *Behavioral Model of Health Services Use (Model 1)*




The remainder of the literature review is written as if the sample data did fit the Behavioral Model as illustrated in Figure 1. However, if the analyses conducted to examine research question 1 suggests an alternative framework, that revised model will be used to examine subsequent research questions.

### *Predisposing Factors*

*Predisposing factors* refer to individual characteristics that affect the likelihood of health care utilization and include demographics, social structure, and health beliefs (Stein, et al., 2007). People with these characteristics are more likely to use health services (Andersen, 1968). *Demographics* include age, sex, marital status, and prior illness, which relate to health care use. Because marital status has been found to not relate to breast cancer screening in Latinas (Gorin & Heck, 2005), it was not included in this study. Instead, *age is targeted as the demographic factor.* The *social structure* domain reflects an individual's status in society and describes one's lifestyle, which relates to health service use (Andersen & Newman, 1973). In the original model, the following were included as measures of social structure: education, race, occupation, family size, ethnicity, religion, and residential mobility (Andersen & Newman, 1973). Recent researchers have revised this conceptualization of social structure and are now including

variables that more accurately fit an immigrant or Latino population as targeted in this study, such as country of birth and language acculturation (Gelberg, Andersen, & Leake, 2000). In this study *education and acculturation were the targeted social structure factors. Health beliefs* are attitudes, values, and knowledge that people have about health and health services that may influence use (Andersen & Newman, 1973). Health beliefs defined as such were not assessed. Below are descriptions of the targeted factors and the rational for their inclusion in this study.

*Age*

Age is a risk factor for breast cancer; from 2000-2005, the median age for a diagnosis of breast cancer was 61 years old (NCI, 2007b; 2008a). For this reason, federal guidelines recommend mammography every one to two years for women 40 and older (AHRQ, 2006) and state law requires insurance companies to cover mammograms every two years for women 40-49 years and annually for women 50 and older (Legislative Council of California, 2000a; 2000b; 2000c). Health care providers – aware of this risk and legislative requirement – are also more likely to recommend mammography screening for women over 40 as part of their standard care of practice. Because of this, as women age, they may be more aware of their risk status and thus more likely to utilize breast cancer screening.

In fact, in studies that have used the Behavioral Model as a framework, Latinas over the age of 50 were significantly more likely to use mammography than Latinas aged 40 to 49 years old, even after adjusting for covariates (Fernandez & Morales, 2007; Gorin & Heck, 2005). Yet, other studies found no association between age and mammography screening in multivariate analyses (Abraido-Lanza, Chao, & Gammon, 2004). Perhaps

these discrepancies are due to study design. Gorin and Heck (2005) used 2000 data from a national sample of more than 2,000 Latinas, and Fernandez and Morales (2007) used 2000, 2002, and 2004 data from a sample of 430 Latinas in Texas; both assessed mammography in the last 2 years and age as a dichotomous variable. Abraido-Lanza, Chao, and Gammon (2004) used 1991 data from a national sample of 535 Latinas and 11,209 white women, assessed mammography in the last year and age as a continuous variable, and did not run separate logistic models for Latinas and white women, which prevented the examination of predictors solely for Latinas. Given these discrepancies in study samples and measures used, the current study hypothesized that age will be positively associated with breast cancer screening and that Latinas over the age of 50 will be more likely to utilize breast cancer screening.

*Education*

Education is a significant factor in breast cancer screening: several studies have shown that Latinas with higher education levels (e.g., more than 6$^{th}$ grade) have greater use of mammography (Calle, Flanders, Thun, & Martin, 1993; Carrasquillo & Pati, 2004; Fox, Arnsberger, Owens, Nussey, Zhang, Golding, et al., 2004; Jones, Caplan, & Davis, 2003; Sambamoorthi & McAlpine, 2003; Qureshi, et al., 2000; Reyes-Ortiz, et al., 2007). In a study that used the Behavioral Model as a framework, Latinas with at least some college were more likely to use mammography than those with less education (Gorin & Heck, 2005). Education is likely to matter since educational level precedes and may predict employment[4] and income level[5] (Muller, 2002). Women who are employed (Heck

[4] In 2006, the unemployment rate for U.S. adults 25 to 64 years old with less than a high school education was 9.6 %, compared with 2.7 % of those with a B.A. degree or higher (U.S. Census Bureau, 2006d).

& Makuc, 2000) and have higher income may be more likely to have access to resources that enable them to use services more readily. Latinas with at least high school education were hypothesized to be more likely to utilize breast cancer screening.

*Acculturation*

Acculturation is the cultural change process that results from continuous first-hand contact between two cultural groups (Berry, 1988), where individuals (whose primary learning has been in one culture) adopt language, attitudes, values, and behaviors from another culture (Suarez, 1994; Wells, 1989). Acculturation among Latinos is usually measured by the propensity to think, read, and speak in English (Marin, Sabogal, Marin, Otero-Sabogal, & Perez-Stable, 1987; Norris, Ford & Bova, 1996). It is also measured by country of birth or length of stay in the United States (Abraido-Lanza, Chao & Florez, 2005; Abraido-Lanza, Chao, & Gates, 2005). This study assessed acculturation by language-based acculturation and country of birth.

*Language-based Acculturation*

Language is a reliable measure of the change process that occurs as immigrants are exposed to U.S. culture. Language-based acculturation is the preferred language for thinking, reading, and speaking at home and in social situations (Norris, Ford & Bova, 1996). About 27% of Latino adults in the U.S. have limited English proficiency (LEP), defined as "living in a household where a language other than English is spoke most often and not being comfortable conversing in English" (Brach & Chevarley, 2008, p. 10); individuals with LEP are considered less acculturated. Previous research suggests that LEP is a barrier to accessing and using health services. Individuals with LEP have

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[5] In 2006, the median annual income for U.S. women 25 years and older with less than a high school education was $13,255, compared with $36,875 for those with a B.A. degree (U.S. Census Bureau, 2006e).

greater difficulties communicating with and understanding providers (Doty, 2003; Salazar, 1996), are less likely to report that their doctor has discussed the importance of cancer screening and early detection (Stein & Fox, 1990), and are less likely to use preventive services, have health insurance, or to have had a recent physician visit (Brach & Chevarley, 2008; Derose & Baker, 2000; Hu & Covell, 1986).

To date, the research on the role of acculturation in predicting cancer screening has produced mixed results. In some studies, higher language acculturation (i.e., English proficiency or propensity to use English over Spanish language) positively predicts Latina mammography screening (Stein & Fox, 1990) usage, even after controlling for other covariates (Gorin & Heck, 2005; O'Malley, Kerner, Johnson, & Mandelblatt, 1999; Ortero-Sabogal, et al., 2003; Suarez & Pulley, 1995). Yet, other studies have shown that after adjusting for socio-demographic factors, the relationship between Latina mammography screening and language acculturation disappears (Fernandez & Morales, 2007; Suarez, 1994). While English proficiency matters, Zambrana, et al., (1999) suggest that factors such as health insurance may matter more in predicting Latina breast cancer screening. For this reason, this study considered the individual role of language-based acculturation and its role in the presence of enabling factors (e.g. health insurance and having a recent physician's visit). This study hypothesized that language-based acculturation will be positively associated with breast cancer screening utilization but this effect may disappear when enabling factors are taken into consideration and incorporated into the model being tested.

*Country of Birth*

Country of origin is related to language-based acculturation and English proficiency for Latinos. Of immigrants from Latin America residing in the U.S. in 2006, 90% spoke a language other than English in the home (U.S. Census Bureau, 2006a). Thus, those who are foreign-born or who have recently arrived to the U.S. can be considered less acculturated. Sometimes being foreign-born increases or decreases the likelihood of breast cancer screening, and sometimes it makes no difference. Studies have shown that foreign-born Latinas were significantly less likely to receive cancer screening compared to U.S.-born Latinas (Goel, et al., 2003; Otero-Sabogal, et al., 2003). Some studies also show that after controlling for demographic factors, foreign-born Latinas were more likely to receive mammograms than U.S.-born white women (Rodriguez, Ward, & Perez-Stable, 2005). Others show that foreign birth did not predict mammography in Latinas (Hubbell, et al., 1997; Valdez, et al., 2001).

These findings might have emerged due to difference socio-demographic profiles between immigrant and U.S.-born populations. Latino immigrants are more likely to have a lower education and income, and lack health insurance and a usual source of care than U.S.-born individuals (Borrayo & Guarnaccia, 2000; Goel, et al., 2003; Thamer, Richard, Casebeer, & Ray, 1997). Latina immigrants are likely to report barriers to accessing health care services (e.g. language barriers or not knowing where to go for care) (Garces, Scarinci, & Harrison, 2006). This study sought to clarify these mixed findings by examining whether country of birth predicts breast cancer screening and if country of birth predicts breast cancer screening in the presence of predisposing and enabling factors, such as education and health insurance. Given the socio-demographic profile

discrepancies between immigrant and U.S.-born populations, this study hypothesized that U.S.-born Latinas will be more likely than foreign-born Latinas to utilize breast cancer screening.

### *Need Factors*

An individual must perceive illness or the possibility of its occurrence in order for utilization to occur (Andersen, 1968; Andersen & Newman, 1973). Thus, *need* was measured by illness level, is indicated by self-perceptions (perceived need) and objective evaluations (evaluated need) (Gelberg, Andersen, & Leake, 2000). *Perceived need* consists of perceived illness (i.e., number of disability days, a self-report of general health status, or perceived symptoms) and *evaluated need* is the objective clinical evaluation of symptoms or diagnoses (Andersen & Newman, 1973). Ideally, physical examinations would be included to confirm a subjective health status; however these are often costly to include in most research designs (Andersen & Newman, 1973). The current study only assessed the perceived need domain due to lack of available data on evaluated need, which includes self-rated health status and the number of recent disability days in the last month (recent physical and mental health, and activity limitation). *The two measures of perceived need are referred to as health-related quality of life.*

### *Health-Related Quality of Life (HRQOL)*

Health-related quality of life (HRQOL) has been defined as perceived physical and mental health over time (Ôunpuu, Chambers, Patterson, Chan, & Yusuf, 2001; Zahran, Kobau, Moriarty, Zack, Holt, & Donehoo, 2005). HRQOL measurement dimensions include perceived general health, recent physical/mental health, and recent activity limitation. The latter two refer to recent disability days (the number of days in the

last month with physical/mental distress or activity limitation due to either type of distress) (Dominick, Ahern, Gold, & Heller, 2002). HRQOL is related to health behaviors. For example, research has shown that the number of unhealthy days (mental or physical) is lower for adults doing the recommended level of physical activity compared to physically inactive adults (Brown, et al., 2003). Research has also shown that a higher HRQOL positively predicts health care utilization (Dominick, et al., 2002). Although few studies have assessed the relationship between HRQOL and mammography, previous research using the Behavioral Model found that higher health status ratings predicted breast cancer screening (Fernandez & Morales, 2007). This study hypothesized that Latinas with higher HRQOL (higher perceived general health, less recent unhealthy days, and less recent activity limitation) will be more likely to utilize breast cancer screening.

*Enabling Factors*

Enabling factors are important because even though individuals may be predisposed to use services, they must have the means to do so. *Enabling factors* are defined as conditions that permit a family to act on a value or satisfy a need regarding health service use and make services available through community or personal resources (Andersen, 1968). First, *community resources* can affect the availability and use of services and consist of ratios of health personnel and facilities to population, price of health services, region of the country, and urban-rural character (Andersen & Newman, 1973). Due to lack of available data, community resources were not assessed in this study. Second, an individual's ability to secure health services is affected by *personal resources*, assessed by the extent of economic resources and sources of medical care (Andersen, 1968). These resources include income, health insurance, type of regular

health care source, and access to regular source of care (Andersen & Newman, 1973) and can be understood in the context of the literature on access to health care. According to a 1993 Institute of Medicine (IOM) report, *access to health care* is a general concept to describe the degree to which individuals are able to obtain health care services when needed, and has been defined as "the timely use of personal health services to achieve best possible health outcomes" (Millman, 1993, p. 4). Access to health care is measured by the presence of resources that facilitate health care use (e.g. insurance coverage, having a recent physician's visit, and adequate economic resources) (AHRQ, 2008; Millman, 1993). Due to lack of available data, income was not assessed in this study. *Thus, enabling resources were measured by health insurance and recent physician's visit.*

*Health Insurance*

In studies that used the Behavioral Model as a framework, health insurance was found to predict Latina breast cancer screening (Fernandez & Morales, 2007; Gorin & Heck, 2005). Health insurance plays a powerful role in the process of using preventive health services, as evident by the fact that state[6] legislation exists to ensure that insurance companies cover certain breast cancer screening and treatment procedures. U.S. health care costs per capita are the highest in the world and given that the breast cancer screening or treatment procedures are covered by insurance, having health insurance can potentially protect individuals from paying associated high medical care costs (Hoffman & Paradise, 2007). Yet, a significant portion of the U.S. population is uninsured; in 2004,

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[6] California law requires insurers to cover the costs of a baseline mammogram for women age 35-39, mammogram screening for women 40-49 years every two years, and annually for those 50+. Since 2000, every health care service plan contract, except one that is specialized, shall also provide coverage for diagnosis of, and treatment for, breast cancer (Legislative Council of California, 2000a; 2000b; 2000c).

45.8 million Americans were without health insurance, equating to 15.7% of the total population (DeNavas-Walt, Proctor, & Lee 2005). Latinos are the least likely to be insured compared to other ethnic groups (DeNavas-Walt, Proctor, & Lee, 2006; Hargraves & Hadley, 2003).

Indeed, research shows that health insurance enables utilization of mammography screening among Latinas (De Alba, et al., 2005; Fernandez & Morales, 2007; Hubbell, et al., 1997; Jones, Caplan, & Davis, 2003; Otero-Sabogal, et al., 2003; Qureshi, et al., 2000; Ramirez, et al., 2000; Zambrana, et al., 1999). In multivariate models, health insurance is the strongest predictor of having a mammogram for Latinas (Abraido-Lanza, Chao, & Gammon, 2004; Carrasquillo & Pati, 2004; Rodriguez, et al., 2005). Having either private or public health insurance as opposed to no insurance predicts Latina mammography usage, even after adjusting for other factors (Gorin & Heck, 2005; Sambamoorthi & McAlpine, 2003). In this study, Latinas with either public or private health insurance were hypothesized to be more likely to utilize breast cancer screening.

*Recent Physician Visit*

In prior research that used the Behavioral Model as a framework, visiting a physician in the past year (Gorin & Heck, 2005) or having a usual source of care (Fernandez & Morales 2007) predicted Latina breast cancer screening, after accounting for other variables. Other studies have shown that visiting a physician in the past year (Frazier, Jiles, & Mayberry, 1996) or a usual source of care (De Alba, et al., 2005; Hiatt, et al., 2001; Valdez, et al., 2001; Selvin & Bratt, 2003; Solis, et al., 1990; Zambrana, et al., 1999) enables use of mammography among Latinas. Physicians are a reputable source of health information that can motivate women to get a mammogram (Metsch, McCoy,

McCoy, Pereyra, Trapido, & Miles, 1998). Using the Foot-in-the-Door theory (Burger, 1999; Pascual, & Gueguen, 2005), once a woman has committed to undergoing an annual exam, she may be more receptive to other recommendations, such as those for mammography. Thus, Latinas who have visited a physician in the past year for a routine physical exam were hypothesized to be more likely to utilize breast cancer screening.

*Discretionary and Non-discretionary Utilization*

Use of health services can be conceptualized as discretionary or non-discretionary behavior (Andersen, 1968). The placement of and specified relationships between the predisposing, enabling, and need factors in the model varies depending on the character of the utilization variable (Andersen & Newman, 1973). The model assumes for non-discretionary use, the choice of using services is based on the extent of that need. For example, if an individual is in need of ambulatory care, the decision to use services is based on the need for care, rather than on predisposing or enabling characteristics. Indeed, research has shown that need-related variables mattered most for recent hospitalization in the previous two weeks (Wolinsky, 1978).

The model assumes that for discretionary use - such as breast cancer screening - the more likely use will be based on predisposing and enabling factors rather than need (Andersen, 1968). Thus, for discretionary use, predisposing and enabling factors matter more than need. This study argued that enabling factors matter more than need *and* predisposing factors for breast cancer screening, which relates to the third research question: *"To what extent do predisposing and need factors add to the prediction of breast cancer screening utilization by Latinas, after controlling for enabling factors?"*

While need-related variables, such as HRQOL, have been linked to health care utilization (Dominick, et al., 2002) and self-rated health status still predicts Latina breast cancer screening after controlling for other variables (Fernandez & Morales, 2007), other studies have shown that self-rated health status does not predict Latina breast cancer screening once all enabling, predisposing, and need factors are taken into account (Carrasquillo & Pati, 2004; Gorin & Heck, 2005). Although predisposing factors (e.g. higher language acculturation) positively influence cancer screening behaviors among Latinas (De Alba, et al., 2004; Stein & Fox, 1990), the presence of enabling factors may counteract this role (Fernandez & Morales, 2007). Zambrana, et al., (1999) suggests that having health insurance or a usual source of care may matter more in predicting Latina mammography usage than English proficiency and country of birth; health insurance and a usual source of health have been shown to be two of the strongest predictors of cancer screening usage in the general population (Carrasquillo & Pati, 2004). Thus, this study hypothesized that after adjusting for enabling factors (e.g. health insurance and a recent physician visit) predisposing and need variables will not be associated with breast cancer screening use.

### *The Behavioral Model of Latina Breast Cancer Screening Use*

Recently, Andersen (2008) suggested that research on access to care and health services utilization should stress the importance of contextual and individual characteristics for defined populations. The Behavioral Model did not include variables context-specific to the population, the disease, or the utilization behavior under investigation. A recent revision called the *Behavioral Model for Vulnerable Populations* was designed to include domains especially relevant to understanding the health-seeking behavior of vulnerable populations, such as the homeless population (e.g., acculturation,

literacy, residential history, criminal behavior and prison history, victimization, mental illness, and substance abuse) (Gelberg, Andersen, & Leake, 2000). Thus, the Behavioral Model can be viewed as a "meta-framework", in which researchers can amend by including context-specific variables that potentially allow for a greater prediction of use.

To answer the fourth research question, *"To what extent do context-specific variables add to the prediction of breast cancer screening utilization by Latinas?"*, this study created the *Behavioral Model of Latina Breast Cancer Screening Use*, in order to target *context-specific*[7] *variables* especially relevant to the Latinas, breast cancer, and breast cancer utilization behavior (Pasick & Burke, 2008), (See Figure 2, where context-specific variables are italicized and bolded).

First, having a history of cancer has been found to be positively related to Latina breast cancer screening and was thus included as a predisposing variable (Gorin & Heck, 2005). Second, although literacy was included as a predisposing factor in a recent revision of the Behavioral Model, health literacy has not previously been tested as a predisposing factor in the Behavioral Model. Since adequate health literacy is positively associated with mammography use in Latinas (Guerra, Krumholz, & Shea, 2005), health literacy was included as a predisposing variable. Third, although religiosity was intended to be a social structure predisposing variable in the original model, spirituality has been recently included as a health belief predisposing variable in a modified version of the Behavioral Model (Miller, et al., 2008). Since religiosity positively influences breast cancer screening among Latinas (Otero-Sabogal, et al., 2003) it was included as a predisposing health belief variable because of the components of religiosity assessed in

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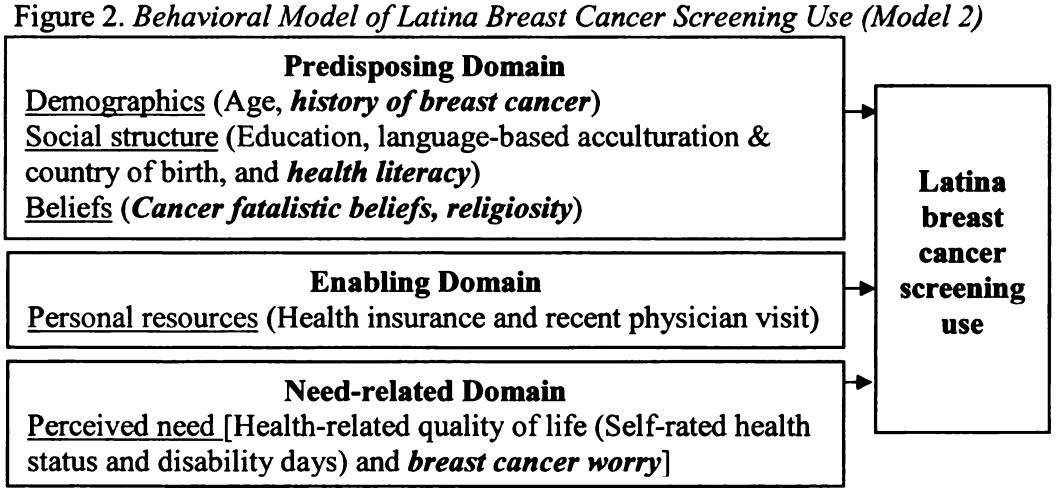
[7] *Context-specific variables* are specifically related to the population, the disease, or the utilization behavior under investigation.

this study, (i.e., beliefs, behavior, and prayer). Fatalistic beliefs deter breast cancer screening use (Barroso, McMillan, Casey, Gibson, Kaminski, & Meyer, 2000) and were also included as a belief variable. Lastly, breast cancer worry was included as a perceived need factor since it relates to perceiving the possibility for breast cancer to occur and has been linked with breast cancer screening (Andersen, Smith, Meischke, Bowen, & Urban, 2003). In conclusion, *additional proposed predisposing variables for this study included: history of breast cancer, health literacy, cancer fatalistic beliefs and religiosity. This study also measured perceived need by breast cancer worry.*

Figure 2. *Behavioral Model of Latina Breast Cancer Screening Use (Model 2)*




*History of Breast Cancer*

Having a personal history of cancer was found to significantly increase breast cancer screening in Latinas in a study that used the Behavioral Model as a framework (Gorin & Heck, 2005). This study focused on personal and familial histories of breast cancer as factors that may predispose Latinas to utilize mammography services. Women with a personal history of cancer (Kim, et al., 2008) or women with a family history of breast cancer who have an increased risk of developing the disease (Watson, Henderson, Brett, Bankhead, & Austoker, 2005; Zakowski, Valdimarsdottir, Bovbjerg, Borgen,

Holland, Kash, et al., 1997), may perceive themselves at risk for cancer (Kim, et al., 2008). Perceiving oneself at risk for breast cancer is associated with higher screening rates (McCaul, Branstetter, Schroeder, & Glasgow, 1996).

In fact, Latinas with a personal or family history of cancer show greater usage of mammography compared to those without a history (Aparicio-Ting & Ramirez, 2003; Cohen, 2006; McCaul, et al., 1996; McCaul & Tulloch, 1999). Some studies have found no differences in screening or perceived risk between women with and without a family history of breast cancer (Audrain, Lerman, Rimer, Cella, Steffens, & Gomez-Caminero, 1995; West, Greene, Kratt, Pulley, Weiss, Siegfried, et al., 2003), which may be due to confounding factors, such as education. Audrain, et al., (1995) found that women with a family history who were significantly less aware of their risk status for developing cancer were less educated than women with a family history who were aware of their risk status. This study hypothesized that having either a personal or family history of breast cancer will positively predict breast cancer screening use.

*Health Literacy*

Health literacy has been defined as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (Selden, Zorn, Ratzan, & Parker, 2000, p. v). Functional health literacy can be measured by frequency of assistance used in reading hospital materials, confidence in filling out medical forms, and understanding written health information (Chew, Bradley & Boyko, 2004). Studies show that low health literacy levels relate to a lack of knowledge about the importance of and reason for screening mammography, which may relate to underutilization of mammography (Davis,

Arnold, & Berkel, 1996). Of the few studies conducted, having adequate health literacy was associated with mammography screening in Latinas (Guerra, Krumholz, & Shea, 2005) and cervical cancer screening in multiethnic women (Garbers & Chiasson, 2004; Lindau, Tomori, Lyons, Langseth, Bennett, & Garcia, 2002). Latinas with higher health literacy levels were hypothesized be more likely to utilize breast cancer screening.

*Cancer Fatalistic Beliefs*

Cancer fatalism is the belief that death is inevitable when cancer is present (Powe, 2001) and is measured by having a belief of fear, predetermination, pessimism, and inevitability of death (Powe, 1995a). Fatalistic beliefs promote an external locus of control, causing individuals to believe that they have no control over their health, which can deters mammography utilization (Barroso, et al., 2000; Borrayo & Guarnaccia, 2000; Niederdeppe & Levy, 2007). Latinas have a tendency to have fatalistic beliefs and misconceptions about cancer, such as divine predetermination as a cause for cancer (Borrayo & Jenkins, 2001; Chavez, et al., 1997; Florez, et al., 2008; Hubbell, et al., 1996; Salazar, 1996; Schettino, Hernandez-Valero, Moguel, Hajek, & Jones, 2006; Suarez, Nichols, Pulley, Brady, & McAlister, 1993). Few studies have assessed whether these beliefs relate to cancer screening among Latinas (Abraido-Lanza, et al, 2007), yet cancer fatalistic beliefs have been found to impede Latina's use of cancer screening exams (Austin, et al., 2002; Chavez, et al., 1997; Hubbell, et al., 1997; Perez-Stable, Sabogal, Otero-Sabogal, Hiatt, & McPhee, 1992; Otero-Sabogal, et al., 2003). Latinas with less fatalistic beliefs were hypothesized to be more likely to utilize breast cancer screening.

*Religiosity*

Religiosity involves beliefs, practices, and personal devotion and is measured by organizational, (e.g., religious services attendance), nonorganizational (e.g., prayer or religious study), and intrinsic (e.g., experiencing the presence of the Divine) religiosity (Storch, et al., 2004). Religiosity is a key facet of Latino culture that promotes positive health behaviors (Magaña & Clark, 1995) and church attendance among Latinas is positively related with a healthier dietary and physical activity (Arredondo, et al., 2005).

Different facets of religiosity relate to health in different ways (Powell, Shahabi, & Thoresen, 2003; van Olphen, Schulz, Israel, Chatters, Klem, Parker, et al., 2003). Religious attendance is associated with health behaviors, good mental health, increased social relationships, marital stability, and use of preventive health services (Felix Aaron, Levine, & Burstin, 2003; Hill, Burdette, Ellison, & Musick, 2006; Levin, Markides, & Ray, 1996; Strawbridge, Shema, Cohen, & Kaplan, 2001). Prayer is associated with less depressive symptoms, perhaps by encouraging emotions such as hope and forgiveness (van Olphen, al., 2003) and prayer can help one cope with stress, pain, or illness (Abraido-Lanza, Vasquez, Echeverria, 2004; Park, & Gaffey, 2007; Tarakeshwar, Vanderwerker, Paulk, Pearce, Kasl, & Prigerson, 2006). Spirituality or faith is also linked with health (Figueroa, Davis, Baker, & Bunch, 2006) and may promote positive behaviors (van Olphen, al., 2003).

Of studies conducted on religious beliefs and breast cancer screening, most has focused on African American women (Gullate, 2006; Kinney, Emery, Dudley, & Croyle, 2002; Mitchell, Lannin, Mathews, & Swanson, 2002; Underwood & Powell, 2006). A few studies have shown that church attendance is associated with breast and cervical

cancer screening among diverse women (Benjamins, 2006) and breast cancer screening among Latinas (Otero-Sabogal, et al., 2003). This study hypothesized that religiosity –as measured by intrinsic, organizational, and nonorganizational religiosity- will positively predict Latina breast cancer screening.

*Breast Cancer Worry*

Worry can be characterized by emotions such as fear and is sometimes considered the cognitive aspect of the anxiety and may function as an adaptive coping mechanism in attempting to psychologically prepare for an external threat (Hay, Buckley, & Ostroff, 2005; Kubzansky, Kawachi, Spiro, Weiss, Vokonas, & Sparrow, 1997). Pathological aspects of worry, (e.g., excessive worry-related thoughts), are characteristic of generalized anxiety disorder (Starcevic, Berle, Milicevic, Hannan, Lamplugh, & Eslick, 2007). *Breast cancer worry* has been defined as an emotional reaction to the threat of cancer and consists of both cognitive and affective elements (Hay, Buckley, & Ostroff, 2005). Measurement targets cognitive elements of worry, (e.g., how often one thinks about their risk of developing breast cancer) (Andersen, et al., 2003). Worrying could stem from a fear of developing cancer. Women consider cancer to be the most feared disease compared to men (Murray & McMillan, 1993) and fear is a barriers to cancer screening in Latinas (Austin, et al., 2002; Garbers, Jessop, Foti, Uribelarrea, & Chiasson, 2003).

No consensus exists on whether worry promotes or inhibits screening (Hay, Buckley, Ostroff, 2005). Moderate levels of worry have been shown to relate to higher mammography rates (Andersen, et al., 2003; Diefenbach, Miller & Daly, 1999; McCaul, Branstetter, O'Donnell, Jacobson & Quinlan, 1998; McCaul, Branstetter, Schroeder &

Glasgow, 1996; McCaul, Schroeder & Reid, 1996) and extremely high levels of worry and distress are associated with a decreased likelihood of mammography (Andersen, et al., 2003; Schwartz, Taylor & Willard, 2003). Other studies found that higher levels of cancer worry relates to over-performance of breast self-exams (Cohen, 2006). Due to the lack of research on Latinas, it was unclear whether higher levels of worry promote or inhibit screening. Given the state of the literature, this study explored the hypothesis that Latinas with extremely high amounts of breast cancer worry and distress will be less likely to utilize breast cancer screening.

## Conclusion

Because of the link between early breast cancer detection through screening and a decreased risk of breast cancer mortality (AHRQ, 2006), it is important to determine what promotes mammography usage. This study aimed to contribute to the current understanding of what predicts breast cancer screening use among Latinas 40 years and older to inform research, health promotion practice, and primary care. Given that the determinants of breast cancer screening use are complex, studies examining such determinants should be guided by a multivariate theoretical framework in order to contribute to the research literature, facilitate inter-study comparisons, and lend credible evidence for the creation of policy. Of the prior studies that have examined multiple predictors of Latina breast cancer screening utilization, only a few were overtly theoretically guided; theories included the *Transtheoretical Model* (Otero-Sabogal, et al., 2003) and the *Behavioral Model of Health Services Use* (Fernandez & Morales, 2007; Gorin & Heck, 2004). This study was theoretically guided by the *Behavioral Model of Health Services Use* to determine what predisposing (age, education, or acculturation),

enabling (health insurance or having a recent physician's visit), and need (perceived health status) factors relate to breast cancer screening use among Latinas.

For the discretionary use of health services, the Behavioral Model suggests that enabling (health insurance or having a recent physician's visit) and predisposing (age, education, or acculturation) factors may matter more than need (perceived health status) (Andersen, 1968). This study sought to contribute to the research literature on the Behavioral Model by arguing that for the discretionary utilization of breast cancer screening, enabling factors matter more than need *and* predisposing factors. The rationale behind this argument was that although predisposing factors -such as age, education, and acculturation- have been shown to be important predictors relating to breast cancer screening in Latinas, once enabling factors-such as health insurance- are taken into account, predisposing factors may be rendered insignificant. Therefore, this study argued that enabling factors matter most when considering breast cancer screening behavior and sought to determine if predisposing and need factors predict breast cancer screening, after accounting for enabling factors.

Lastly, this study proposed a modification of the Behavioral Model, called the *Behavioral Model of Latina Breast Cancer Screening Use,* since adding context-specific variables to the Behavioral Model can allow for a greater prediction of the utilization measure in the targeted population (Andersen, 2008). In contrast to most of the studies that have examined multiple predictors of Latina breast cancer screening in the past, this study proposed to target socio-demographic (e.g., predisposing), health status (e.g., need), and access to care (e.g., enabling) predictors, in addition to variables context-specific to

breast cancer screening behavior among Latinas (e.g., breast cancer worry, personal/ family history of breast cancer, cancer fatalism, religiosity, and health literacy).

Indeed, prior studies focusing on Latinas have lacked a full range of predictors relevant to the context of breast cancer screening. A review of studies focusing on Latina breast cancer screening published from 1990 to 2007 revealed that most examined knowledge, socio-demographic, or access to care variables, yet lacked variables context-specific to breast cancer screening, such as breast cancer worry (Abraido-Lanza, Chao, & Gammon, 2004; Aldridge, et al., 2006; Carrasquillo & Pati, 2004; Coughlin, et al., 2003; De Alba, et al, 2005; Hubbell, et al., 1997; Jones, et al., 2003; Qureshi, et al., 2000; Ramirez, et al., 2000; Rodriguez, Ward, & Perez-Stable, 2005; Sambamoorthi & McAlpine, 2003; Selvin & Brett, 2003; Stein & Fox, 1990; Suarez, 1994; Valdez, et al., 2001; Zambrana, et al., 1999). Other studies included socio-demographic and access to care variables in addition to one or two context-specific variables, such as literacy (Guerra, et al., 2005), personal/family history of breast cancer (Aparcio-Tin & Ramirez, 2003; Shah, et al., 2007), or religiosity and fatalism (Otero-Sabogal, et al., 2003). The two studies that used the Behavioral Model as a theoretical framework did not examine the same predictor variables, produced inconsistent results, and lacked many of the context-specific variables proposed to be included in the current study (Fernandez & Morales, 2007; Gorin & Heck, 2004). This study sought to determine if variables context-specific to Latina breast cancer screening behavior would allow for greater prediction of breast cancer screening than variables in the original Behavioral Model alone, which may provide valuable insight for future research.

## Hypotheses

The goal of this study was to contribute to the current understanding of what predicts breast cancer screening use among Latinas 40 years and older. To achieve this goal, the following proposed hypotheses and sub-hypotheses were tested:

1. Latinas with higher rates of predisposing factors will be more likely to utilize breast cancer screening services.
    a. Latinas over the age of 50 years old compared to those aged 40 to 49 years will be more likely to utilize breast cancer screening.
    b. Latinas with at least a high school education will be more likely to utilize breast cancer screening than Latinas with less than a high school education.
    c. Latinas who are more acculturated will be significantly more likely to use breast cancer screening exams than Latinas with lower levels of acculturation.
    d. U.S.-born Latinas will be significantly more likely to utilize breast cancer screening exams than foreign-born Latinas.
2. Latinas with higher rates of enabling factors will be more likely to utilize breast cancer screening services.
    a. Latinas with either public or private health insurance will significantly be more likely to utilize breast cancer screening exams than Latinas without health insurance.
    b. Latinas that have visited a physician in the past year for a routine physical exam will be more likely to have utilized breast cancer screening services compared to those who have visited a physician in more than a year.

3. Latinas with higher rates of need factors will be more likely to utilize breast cancer screening services.
    a. Latinas with higher levels of reported health status will be more likely to utilize breast cancer screening than Latinas with lower levels of reported health status.
    b. Latinas with a lower number of reported unhealthy days due to mental or physical distress will be more likely to utilize breast cancer screening than Latinas with higher levels of reported unhealthy days.
    c. Latinas with fewer reported days of physical activity limitation levels due to either mental or physical distress will be more likely to utilize breast cancer screening than Latinas that report more days of physical activity limitation.
4. After adjusting for enabling factors in the original model, predisposing and need variables will not be significantly associated with breast cancer screening utilization.
5. After adjusting for variables in the Behavioral Model, context specific variables will be significantly associated with breast cancer screening utilization which will improve the predictability of the Behavioral Model.
    a. Latinas with a personal or family history of breast cancer will be more likely to utilize breast cancer screening than those without a history.
    b. Latinas with higher health literacy levels will be more likely to utilize breast cancer screening than Latinas with lower levels of health literacy.
    c. Latinas with lower levels of cancer fatalistic beliefs will be more likely to utilize breast cancer screening services than to Latinas with higher levels of cancer fatalistic beliefs.

d. Latinas with higher levels of intrinsic religiosity will be more likely than Latinas with low levels of intrinsic religiosity to utilize breast cancer screening services.

e. Latinas with higher levels of organizational religiosity will be more likely than Latinas with low levels of organizational religiosity to utilize breast cancer screening services.

f. Latinas with higher levels of nonorganizational religiosity will be more likely than Latinas with low levels of nonorganizational religiosity to utilize breast cancer screening services.

g. Latinas with extremely high amounts of breast cancer worry and distress will be less likely to utilize breast cancer screening services than Latinas with lower amounts of breast cancer worry and distress.

## RESEARCH DESIGN AND METHODS

In order to investigate the proposed hypotheses, this study used secondary data that were previously collected from a cross-sectional survey of 208 Latinas 40 years and older in San Diego County, California that was originally approved by the University of California, San Diego (UCSD) Institutional Review Board (IRB). Data were collected as part of a community-campus partnership between Vista Community Clinic (VCC) and the UCSD Cancer Center, funded through a California Breast Cancer Research Program (CBCRP) community research collaborative (CRC) pilot award. Approval for secondary data analysis was also obtained from the Michigan State University IRB.

### Procedures

#### *Setting*

This study focused on San Diego County, California's most southern county located adjacent to Baja California Norte, Mexico. The County spans 4,200 square miles (http://www.co.san-diego.ca.us/dpw/organization/history1.html). California is home to the largest U.S. Latino population (Guzman, 2001). In 2006, about 8.1 percent (2.9 million) of Californians resided in San Diego County and 30.1% of San Diego residents were Latino, of which most were Mexican-origin (87%) (U.S. Census Bureau, 2006b; 2006c). In 2008, in San Diego, breast cancer was projected to be the leading type of cancer incidence for all women, and in 2004, 63% of Latina breast cancer cases were diagnosed at early stage compared to 71% for white women (ACS, 2008). Thus, San Diego was an ideal setting for recruiting a large sample of Latinas.

*Sample*

Participants included in the study were drawn from a community sample of 503 Latinas. Eligibility criteria for participation were: being an adult woman, who self-identified as Hispanic American and who reported her preferred language as English or Spanish. Given that the outcome of interest is breast cancer screening utilization, only those women 40 years and older ($n$ = 208) were included for analysis. Participants' ages ranged from 40 to 80 years ($M$ = 50.98; $SD$ = 8.1). Among these women, 47.3% ($n$ = 98) had a high school education or greater, 67.6% ($n$ = 140) had health insurance, 76.3% ($n$ = 151) were Mexican-born, 23.7%, ($n$ = 47) were U.S.-born, and 56.3% ($n$ = 117) chose to be interviewed using a Spanish-language survey and 43.8% ($n$ = 91) chose English.

To determine the extent to which this study sample was representative of the County and State, data from Latinas 40 years and older in the study sample were compared to 2007 data from 121,000 Latinas 40 years and older in San Diego County and 1,861,000 Latinas 40 years and older across California (http://www.chis.ucla.edu/); 2006 data from 363 Latinas 40 years and older from California were also used for comparisons[8] (http://apps.nccd.cdc.gov/BRFSS). Overall, it appears that the study sample was representative of Latinas 40 years and older state-wide on some key factors, such as mammography screening, age, education, health status, and of Latinas 40 years and older in San Diego county for age and mammography screening; but the sample was different on health insurance and country of birth compared to the state and county, and education and health status compared to the county. These differences were most likely due to the sampling procedures utilized to collect sample, county and state-level data.

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[8] Chi-square analyses were run using an online chi-square calculator: http://home.ubalt.edu/ntsbarsh/Business-stat/otherapplets/Catego.htm.

Latinas in the sample were significantly more likely to have a high school education or higher (47.3%, $n$ = 98) than those in San Diego (39.8%, $n$ = 40,000) [$\chi^2$ (1, 101,207) = 5.17, p = .023]. Latinas in the sample were significantly less likely to have health insurance (67.6%, $n$ =140) than those in San Diego (77.5%, $n$ = 93,000) [$\chi^2$ (1, 120,207) = 11.53, p = .001] and those in California (79.1%, $n$ = 1,471,000) [$\chi^2$ (1, 1,860,207) = 16.41, p = .000]. When comparing only U.S. or Mexican born groups, Latinas in the sample were significantly more likely to be Mexican born (76.3%, $n$ = 151) than those in San Diego (62.5%, $n$ = 70,000) [$\chi^2$ (1, 112,198) = 15.98, p = .000] and those in California (53.8%, $n$ = 836,000) [$\chi^2$ (1, 1,555,198) = 39.72, p = .000]. Finally, Latinas in the sample were less likely to report their health as excellent (8.3%, $n$ = 17) compared to those in San Diego (16.8%, n = 20,000) [$\chi^2$ (4, 120,205) = 16.18, p=.003]. There were no significant differences between sample, county, and State data for age and mammography screening utilization rates (Table B, Appendix D).

Although participants for this study were drawn from a convenient sample, these data suggest that the sample was representative of Latinas 40 years and older in San Diego County in terms of their mammography screening utilization and age; and the sample was representative of Latinas 40 years and older across the state in terms of their mammography screening utilization, age, educational attainment, and health status.

*Data Collection*

Data were collected from October, 2007 through February, 2008 by seven bi-lingual interviewers representing Vista Community Clinic and UCSD Cancer Center staff, (four Latinas, one African American woman, and two white women). Interviewers were IRB- and HIPAA-certified through UCSD's IRB and trained in survey data

collection methods by the research team (e.g., consistent data collection protocols, eligibility screening, informed consent, confidentiality, checking surveys for complete data, and how to handle standardized scales when reading surveys to participants).

*Recruitment*

Interviewers recruited and consented eligible women to participate in the study through face-to-face meetings at community-based sites, and by snowballing and word-of-mouth strategies. Interviewers were instructed to keep a record of the recruitment method used, number of eligible women, refusal rates, reasons for refusals, and potential contacts. Interviewers logged a total of 10 women who refused to participate in the face-to-face interviews, with lack of time being the most frequent reason for refusal. To invite participants, interviewers explained that the study would involve completing surveys frequently used in health and research settings to learn if the surveys worked equally well for Hispanic women. Participants were given the option of having the surveys and consent forms read to them in English or Spanish or they could fill out the forms themselves. All participants consented to participate in the study and were given a $20.00 incentive for their time. Interviews took around one hour to complete. For those who were unable to read, it took interviewers two hours to read the survey to the participant. Interviews took place at a convenient location, (e.g., homes, place of work, place of worship, community center, or at the community clinic). Most (63.5%, $n = 132$) were recruited by VCC staff and 36.5% ($n = 76$) were recruited by UCSD (Appendix A).

*Sample Size*

The power calculations for this study planned a sample size that would allow for at least 80 percent complete data for each scale, while still being able to demonstrate

statistical significance at a $p < .05$ level (Comrey, & Lee, 1992; Gorsuch, 1983; Nunnally & Bernstein, 1994). While programs can calculate sample size and power estimates for linear regression, ANOVA and related statistical tests (Cohen, 1988; Faul, Erdfelder, Lang, & Buchner, 2007; Lenth, 2006), it was difficult to determine sample size estimates for multivariate logistic regression. Using a widely accepted participant to variable ratio of 10:1, a total sample of 208 still allowed for incomplete response rate of 20% and enough power to detect a moderate effect.

*Survey Instrument*

Survey administration procedures were piloted in Spanish and English with community members and clinic staff. Participant fatigue and literacy level of scales caused the research team to shorten the length of the survey considerably, from 24 to 18 pages. To help minimize response bias, three versions of the surveys were developed, which only differed in order of scale placement. Measures that only had English versions were made into content equivalent Spanish versions by the research team, including: History of Breast Cancer items, Health Literacy, and the Cancer Worry Scale. These were first translated from English to Spanish by a professional translator and then back-translated by one of the researchers, who created a list of discrepancies between the two versions. Two additional researchers reconciled the problems to ensure proper meaning was not lost. The process was finalized once four bilingual researchers reviewed the final translations alongside the original versions and verified their equivalence (Appendix C).

Given that some of the scales were either modified or translated from existing measures, or have not been validated with samples of Latinas, factor analysis was performed to determine the internal consistency and underlying structure of all scales and

to determine if the Spanish and English versions had equivalent psychometric properties (Afifi, Clark, & May, 2004; Nunnally & Bernstein, 1994; Vandenberg & Lance, 2000). Item means and standard deviations, item-total correlations, and patterns of missing or omitted responses were considered. Internal consistency for total and subscale scores of all instruments was computed (using Cronbach's alpha "α") (Nunnally & Bernstein, 1994). Reliabilities were computed for the total sample and separately in English and Spanish for: language-based acculturation (BASH), religiosity (DUREL), cancer fatalistic beliefs (PFI), and breast cancer worry (CWS). Scores are presented as unstandardized values for ease of interpretation (Appendix D).

*Breast Cancer Screening*

Breast cancer screening was assessed in a manner to allow for comparison to national trends, and thus items were derived from the 2007 CDC Behavioral Risk Factor Surveillance System (BRFSS) Questionnaire, available for public use in English and Spanish (CDC, 2006). Participants were asked: "A mammogram is an x-ray of each breast to look for breast cancer. Have you ever had a mammogram?" If "yes", they were asked: "How long has it been since you had your last mammogram?" Participants could then select from the following: within the past year, within the past 2 years (1 year but less than 2 years ago), within the past 5 years (2 years but less than 5 years ago), 5 or more years ago, don't know, and never. A dichotomous outcome variable was created to compare those compliant with federal screening guidelines[9] (most recent mammogram within the past two years) to those non-compliant with federal guidelines (never screened or most recent mammogram more than two years ago) (Table 1 and Appendix D).

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[9]The U.S. Preventive Services Task Force recommends screening mammography every 1-2 years for women 40+ (AHRQ, 2006).

*Predisposing Variables*

*Age* was assessed by asking "What is your date of birth?", an item derived from the 2007 CDC BRFSS Questionnaire (CDC, 2006). By subtracting the participant's date of birth from the survey date, the exact age was calculated as a continuous variable in years through syntax in SPSS. Age categories (40-49 and 50+) were created to compare mammography utilization across two age groups (Appendix D).

*Education* was assessed by asking, "What is the highest level of school you completed?", an item derived from the 2007 CDC BRFSS Questionnaire (CDC, 2006). Participants could respond to this question by selecting different categories, such as "elementary school or primary school." Participant responses were broken down into one binary variable (less than high school versus high school degree or more) (Appendix D).

*Country of Birth* was the first proxy for acculturation. Participants were asked the open-ended question: "In what country were you born?" Responses were transformed into a dichotomous categorical variable (i.e., United States and Mexico) (Appendix D).

*Language-based Acculturation* was the second proxy for acculturation and was assessed by an established language acculturation scale. The Brief Acculturation Measure for Hispanics (BASH) is a 4 item scale that treats language use and preference as indicator for level of acculturation (Norris, Ford & Bova, 1996). The BASH is a modified version of the 12 item Short Acculturation Scale for Hispanics (SASH) (Marin, et al., 1987), which consists of 3 factors: language use, ethnic social relations, and media. The 5 item language subscale was shown to be reliable ($\alpha = .90$) and similar to the 12-item total scale (Marin, et al., 1987), which suggested that it could be used as a shorter measure of acculturation. The BASH used in this study includes 4 of these 5 items; excluding "What

was the language(s) you used as a child?" The 4-item BASH has adequate reliability (α = .80-.92) (Norris, Ford & Bova, 1996). Reponses are rated on a 5-point scale ranging from "only Spanish" to "only English" and a mean score can be created from the 4 items.

Psychometric analyses were conducted to explore the internal consistency and underlying structure of the BASH scale and to determine if the Spanish and English versions had equivalent psychometric properties. Specifying 1 factor and performing an orthogonal varimax rotation using the principle components as the method of factor extraction yielded a 1 factor solution as expected for both language versions. Factor 1 loaded highly on all 4 items. The 4-item BASH had an alpha of .96 for the total sample (English α = .95, Spanish α= .84). A single mean score was created (ranging from 1-5) with higher scores indicating greater language-based acculturation (Appendix D).

*Enabling Variables*

*Health Insurance* was assessed by asking: "Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMO's, or government plans such as Medicare/Medi-Cal?" If "yes", they were asked what type of by selecting from the following: Medi-Cal/Medicaid, Medicare, HMO, PPO, Employer-provided, and other; items were derived from the 2007 CDC BRFSS Questionnaire (CDC, 2006). A categorical variable was created for insurance type [private (HMO, PPO, military); public (Medicaid and Medicare); and none]. A dichotomous variable was created to compare those with any insurance to none; two dummy variables were created to compare private, public, and no insurance groups (Appendix D).

*Recent Physician Visit* was assessed by asking: "About how long has it been since you last visited a doctor for a routine checkup? A routine checkup is a general physical

exam, not an exam for a specific injury, illness, or condition.", an item derived from the 2007 CDC BRFSS Questionnaire (CDC, 2006). Participants could select: within the past year, within the past 2 years (1 year but less than 2 years ago), within the past 5 years (2 years but less than 5 years ago), 5 or more years ago, don't know, and never. A dichotomous variable was created (visit in the past year versus otherwise) (Appendix D).

*Need-related Variables*

*Health-related Quality of Life (HRQOL)* has been defined as perceived physical and mental health over time and is measured by the CDC HRQOL-4, known as the "Healthy Days Measures." The CDC HRQOL-4 assesses: self-rated health, number of recent days with physical or mental health was impaired, and number of days of activity limitation due to poor health (Zahran, et al., 2005) and is available in English and Spanish (http://www.cdc.gov/hrqol). The CDC HRQOL-4 has demonstrated reliability and validity for population use (Andersen, et al., 2003). First, participants are asked "Would you say that in general your health is" and can choose from a range of "excellent" to "poor." Second, participants are asked: "Now thinking about your physical health, which includes physical fitness and injury, for how many days during the past 30 days was your physical health not good?" "Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?" Lastly, participants are asked: "During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?"

Self-rated general health status (item 1) ranges from 1-5 where greater scores reflected a worse self-rated health status. Second, the summary index of overall unhealthy

days ranges from 0-30 and was created by combining responses to items 2 and 3, with a logical maximum of 30 days. Third, item 4 ranges from 0-30 and is the number of days of activity limitation due to unhealthy days in the last 30 days. Item 4 was only valid if items 2 or 3 > 0; higher scores for the latter 2 indicated more unhealthy days and more activity limitation days due to unhealthy days (Appendix D).

*Context-Specific Variables*

*History of Breast Cancer* was assessed by two items created by modifying an item from the 2007 CDC BRFSS questionnaire (e.g., "Have you ever been told by a doctor, nurse, or other health professional that you had prostate cancer?" (CDC, 2006). Participants were asked: "Has a family member ever had breast cancer?"; if "yes" they were asked to specific which family member by selecting from the following categories: mother, grandmother, sister, aunt, cousin, or other. Participants were then asked: "Have you ever had breast cancer?" A single dichotomous variable was created (women with a positive personal or family history of breast cancer versus otherwise) (Appendix D).

*Health Literacy (HL)* can be measured by frequency of assistance used in reading hospital materials, confidence in filling out medical forms, and understanding written health information and was assessed by 2 items: "How confident are you filling out medical forms by yourself?" and "How often do you have someone help you read hospital materials?" (Chew, Bradley & Boyko, 2004). The HL was translated into Spanish for this study. The two items were significantly correlated in the total sample ($r$ = .24) and in English ($r$ = .35) ($p \leq .01$); and were not correlated in Spanish. The two HL items were thus kept separate. Item 1 was reverse-scored and both items ranged from 1-5; higher scores indicated higher HL (more confidence and less help needed) (Appendix D).

*Religiosity* was assessed by the Duke University Religion Index (DUREL), a 5-item scale that assesses organizational, nonorganizational, and intrinsic religiousness (Storch, et al., 2004). Organizational religiosity refers to the frequency of attending formal religious services, nonorganizational refers to the amount of time spent in private religious activities such as prayer, and intrinsic refers to the degree to which one integrates religiosity into their life (Storch, et al., 2004). The DUREL was translated into Spanish for this study. Responses to organizational and nonorganizational items are rated on a 6-point scale ranging from "never" to "several times a week" or "several times a day." Reponses to the 3 intrinsic items are rated on a 5-point scale ranging from "definitely not true" to "definitely true." Items are reverse scored and a total score and an intrinsic mean score can be created (Sherman, Plante, Simonton, Adams, Harbison, & Burris, 2000). The 5-item DUREL ($\alpha = .91$) (Sherman, et al., 2000; Storch, et al., 2004) and the intrinsic subscale ($\alpha = .94$) (Sherman, et al., 2000) showed high internal consistency in previous studies.

Psychometric analyses were conducted to explore the internal consistency and underlying structure of the DUREL and to determine if the language versions were equivalent in this study. First, a 1 factor model was specified and an orthogonal varimax rotation using the principle components method of extraction did not yield a 1 factor solution across the two versions. Items 3-5 loaded highly on the 1 factor, where items 1 and 2 did not. Using the same methods, a 3 factor model was specified and as expected, items 3-5 (intrinsic) loaded highly on factor 1, item 1 (organizational) loaded highly on factor 2, and item 2 (non-organizational) loaded highly on factor 3 for both versions. All 5 DUREL items were reverse coded. An intrinsic mean score was created from items 3-5,

with higher scores reflecting greater intrinsic religiousness; this 3-item scale had an alpha of .75 for the total sample (English $\alpha$ = .80, Spanish $\alpha$ = .74). For items 1 and 2, higher scores reflected greater organizational and nonorganizational religiosity (Appendix D).

*Cancer Fatalism* is defined as the belief that death is inevitable when cancer is present and is measured in this study by the Powe Fatalism Inventory (PFI) (Powe, 1995a) and the Spanish Powe Fatalism Inventory (SPFI) (Lopez-McKee, et al., 2003), which measure four aspects of cancer fatalism: inevitability of death, fears, pessimism, and predetermination. The SPFI was translated from the English PFI; both have similar reliabilities (SPFI $\alpha$ = .81, PFI $\alpha$ = .80) (Lopez-McKee, et al., 2003). The SPFI/PFI consist of 15 items with a "yes/no" response format. Sample items from each domain include: "I think if someone has cancer and gets treatment for it, they will probably still die from the cancer" (inevitability of death items 7, 11, 12, and 15), "I think getting checked for cancer makes people scared that they may really have cancer" (fear items 8 and 10), "I think if someone is meant to get cancer, they will get it no matter what they do" (predetermination items 1, 3-5, 9, 13, and 14), and "I think if someone gets cancer, their time to die is soon" (pessimism items 2 and 6). Items are intended to be summed into a total score, with higher values indicating stronger fatalistic beliefs (Powe, 1995b).

Although the 15-item PFI has been presented as a one factor scale (Powe, 1995b), since there are 4 subscales, psychometric analyses were conducted to explore the internal consistency and underlying structure of the PFI/SPFI scale and to determine if the two versions had equivalent psychometric properties. First, a 4 factor model was specified representing the 4 theoretical factors of the PFI/SPFI (inevitability of death, predetermination, pessimism, and fear). The orthogonal varimax rotation using the

principle components extraction method showed that items 2, 3, 6, 7, 13 and 14 did not load as expected, these items produced inconsistent factor loadings across the PFI and SPFI, and no clear or consistent factor representing pessimism was found. Thus, these six items were omitted. The 9 remaining items representing a reduced version of the predetermination, inevitability of death, and fear scales were used for a second factor analysis and all items loaded as expected on 3 factors consistently across the SPFI/PFI.

In this study the modified version of the SPFI /PFI consisted of the inevitability of death (items 11, 12, and 15), predetermination (items 1, 4, 5 and 9), and fear (items 8 and 10) scales. Mean scores were created and range from 0-1, higher scores indicate more cancer fatalistic beliefs. No total score was created. The 3-item inevitability of death scale had an alpha of .78 (SPFI $\alpha$ = .82, PFI $\alpha$ = .74), the 4-item predetermination scale had an alpha of .72 for the total sample (SPFI $\alpha$ = .69, PFI $\alpha$ = .76), and the 2 fear items had a significant correlation of $r$ = .32 (SPFI $r$ = .34, PFI $r$ = .32) ($p \leq .01$) (Appendix D).

*Breast Cancer Worry* is defined as an emotional reaction to the threat of cancer and consists of both cognitive and affective elements (Hay, Buckley, & Ostroff, 2005). The 5-item Cancer Worry Scale (CWS) was used to assess cognitive elements of recent worry about developing breast cancer (Andersen, et al., 2003). Items 1-4 are rated on a 4-point scale (e.g., "During the past month, how often have you worried about your own chances of developing breast cancer?") and a sum score is created representing recent worry about developing breast cancer (Gramling, et al., 2007). Item 5, rated on a 4-point scale, asked women to describe feelings of distress about their risk of developing breast cancer. The CWS was translated into Spanish in this study.

Psychometric analyses were conducted to explore the internal consistency and underlying structure of the CWS and to determine if the two language versions were equivalent. A 2 factor model was specified representing breast cancer worry and distress and the orthogonal varimax rotation using the principle components extraction method showed that factor loading were as expected for the Spanish CWS, where items 1-4 (worry) loaded on factor 1 and item 5 (distress) loaded on factor 2. Since item 4 did not load as expected in the English CWS, it was dropped from the analysis. Using the remaining 4 items a second factor analysis was conducted and all items loaded as expected on the 2 factors across both language versions. In this study the modified version of the CWS consisted of breast cancer worry (items 1, 2, and 3) and breast cancer distress (item 5). A mean score was created for the breast cancer worry 3-item scale (ranging from 1-4) and higher scores reflected more recent worry; this scale had an alpha of .86 for the total sample (English $\alpha = .86$, Spanish $\alpha = .87$). Item 5 ranged from 1-4; higher scores reflect more recent distress about developing breast cancer (Appendix D).

## Data Analysis

### *Data Entry*

Survey data were entered into a database in SPSS version 14.0 in English by six research assistants trained in data entry by the research team. Data were entered and checked by two independent data enterers and a third person double-checked discrepancies between the first and second data entry, and resolved entry errors. Data enterers were given a master survey with numeric codes to enter for each item. Data enterers also computed the percentage of missing data per scale for each participant (e.g., two items answered equates to 50% missing data for a scale of four total items).

*Data Analysis Strategy*

A series of chi-square tests, t-tests, and logistic regression analyses were used to conduct analyses for this study and test the proposed hypotheses. Table 1 includes an illustration of variable coding for analysis. Prior to hypothesis testing, a confirmatory factor analysis was conducted to determine how well the three-factor Behavioral Model fit this particular sample and regression diagnostics techniques were used to detect the presence of collinearity among the IVs and to determine if there were any outliers in the dataset (Kleinbaum, et al., 2007).

Logistic regression was used as the primary method of analysis given the dichotomous nature of the outcome, consisting of: compliant with breast cancer screening recommendations (e.g., screening received in the last 2 years) versus non-complaint (never screened or last screened 2 or more years ago). Overall fit of the logistic regression models was assessed by the Hosmer and Lemeshow Goodness of Fit (GOF) Test and the model chi-square ($\chi^2$). In SPSS, if the p-value was > .10 for the GOF Test, then the model was a good fit to the data (Lemeshow & Hosmer, 1982). If the p-value was < .05 for the model chi-square, then the model predicted the DV better than a model containing only the intercept (Cohen, et al., 2003; Menard, 2002). The Likelihood Ratio $\chi^2$ Test was used to compare the significance difference between reduced and full models (i.e., hypothesis 4 and 5). If the p-value for this $\chi^2$ Test was < .05, then the added set IVs were significantly related to the DV, after adjusting for IVs in the reduced model. To convey the magnitude and direction of the significance of each IV, odds ratios, 95% CIs, and p-values were reported for all logistic regression analyses (Kleinbaum, et al., 2007).

Table 1. *Variable Coding for Data Analysis*

| Variables | Coding |
|---|---|
| Age | Continuous, in years |
| Age (2 categories) | 1: 50 years and older 0: 40 to 49 years old |
| History of Breast Cancer | 1: Personal/family history of breast cancer<br>0: otherwise |
| Education | 1: ≥ high school degree 0: < high school |
| Language-based Acculturation | Continuous mean score, (range:1-5) |
| Country of Birth (COB) | 1: U.S.-born 0: Mexican-born |
| Health Literacy1 (Confidence) | Continuous score, (range: 1-5) |
| Health Literacy 2 (Needs help reading) | Continuous score, (range: 1-5) |
| Cancer Fatalism 1 (Predetermination) | Continuous mean score, (range: 0-1) |
| Cancer Fatalism 2 (Inevitable death) | Continuous mean score, (range: 0-1) |
| Cancer Fatalism 3 (Fear) | Continuous mean score, (range: 0-1) |
| Intrinsic Religiosity | Continuous mean score, (range: 1-5) |
| Organizational Religiosity | Continuous score, (range: 1-6) |
| Nonorganizational Religiosity | Continuous score, (range: 1-6) |
| Health Insurance | 1:yes 0: otherwise |
| Health Insurance Type<br>(3 categories; 2 dummy variables) | Ins1=0 and Ins2=0: No insurance<br>Ins1=1 and Ins2=0: Private insurance<br>Ins1=0 and Ins2=1: Public insurance |
| Recent Physician Visit | 1: < 1 year 0: otherwise |
| Breast Cancer Worry | Continuous mean score, (range:1-4) |
| Distress about Breast Cancer | Continuous score (range: 1-4) |
| Health Status (HRQOL1) | Continuous score (range: 1-5) |
| Unhealthy days (HRQOL2) | Continuous, in days (range: 0-30) |
| Activity limitation (HRQOL3) | Continuous, in days (range: 0-30) |
| Activity limitation transformed (HRQOL3T) | Continuous, (range: 1-1.60) |
| Recent Mammogram (< 2 years ago) | 1: < 2 years 0: otherwise |

# RESULTS

## *Logistic Regression Diagnostics*

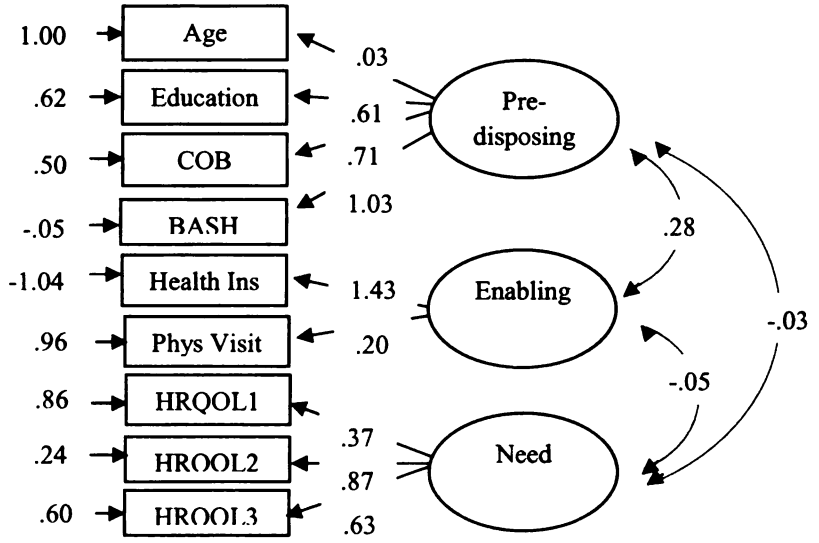
Three separate linear regressions were conducted to obtain tolerance statistics for all IVs: all 12 IVS from the Behavioral Model, all 11 context-specific IVS, and all 23 IVS; each set was regressed on an arbitrary continuous DV. No presence of collinearity existed in the dataset. Potential outliers were examined by plotting the standardized residuals and leverage values of all 12 IVS from the Behavioral Model and all 11 context-specific IVS against the predicted probabilities of the DV (mammogram < 2 years). Four cases were identified as outliers by plotting the standardized residuals against the predicted probabilities of the DV. All four cases had never had a mammogram or had their last mammogram more than 2 years ago. Since 76.2% ($n$ = 154) of the sample reported having a mammogram in the past 2 years and only 23.8% ($n$ = 48) reported never having a mammogram or having their last mammogram more than 2 years ago, these cases were kept in the sample. Although removing these four cases did change the results slightly (see Tables 3 - 11), these cases were kept in the sample for analysis because their removal would have decreased the variability of the non-compliant group.

## *Testing the CFA Model*

To answer the first research question, "*Does the component structure of the Behavioral Model fit the Latina population for the outcome of breast cancer screening utilization?*" a confirmatory factor analysis (CFA) taking a cluster analytic approach to the measurement model was conducted to determine how well the three-factor Behavioral Model fit this particular sample. The model includes three latent factors and 9 observed variables (Figure 3). The LISREL (Joreskog & Sorbom, 2007) structural equation modeling program was used to conduct the CFA.

Multiple goodness of fit indices were used to assess how well the model accounted for the data, including the $\chi^2$/df ratio, the non-normed fit index (NNFI), the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean squared residual (SRMR) (Anderson & Gerbing, 1988; Kline, 1998). The CFA showed that the model fit the data [$\chi^2 = 81.23$ (df = 24, $p < .01$): $\chi^2$/ df ratio = 3.50; CFI = 0.87, NNFI = 0.81; RMSEA = 0.11; and SRMR = 0.10]. The overall model was a good fit, except for age (age had a standardized factor loading of .03 on the latent predisposing factor), and thus an alternative model was analyzed.

Figure 3. *Measurement Model of the Behavioral Model of Health Services Use*[10]




As a first step towards identifying an alternative model, an exploratory factor analysis (EFA) was conducted in SPSS to determine how the variables loaded on an unspecified number of factors (Afifi, Clark, & May, 2004; Nunnally & Bernstein, 1994).

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[10] Note: Since the latent factors are correlated in this measurement model, the factor loadings of the indicators on the latent factors are not correlations, but regression coefficients, and are thus able to range beyond one. The standardized factor loadings for acculturation (BASH) and health insurance (ins) were greater than one, which does not present a problem (Joreskog, 1999). In Figure 3, only the factor loadings for education, acculturation (BASH), country of birth (COB), health status (HRQOL1), unhealthy days (HRQOL2), and activity limitation (HRQOL3) were statistically significant at the .05 level.

The orthogonal varimax rotation using the principle components extraction yielded a three factor solution, explaining 64.5% of the variance. Using .4 as cut-off criteria (e.g., Malcarne, et al., 2005), language-based acculturation, country of birth, and education loaded highly on factor 1, health status, unhealthy days, and activity limitation loaded highly on factor 2, and a recent physician's visit and age loaded highly on factor 3. Health insurance loaded both on factor 1 and 3 (Table 2).

*Table 2.* Behavioral Model Factor Loadings

| | Predisposing | Need | Enabling |
|---|---|---|---|
| Language-based acculturation | .91 | | |
| Country of birth | .80 | | |
| Education | .77 | | |
| Health Status | | .83 | |
| Unhealthy Days | | .79 | |
| Activity Limitation | | .59 | |
| Age | | | .62 |
| Physician Visit | | | .80 |
| Health Insurance | | | .49 |

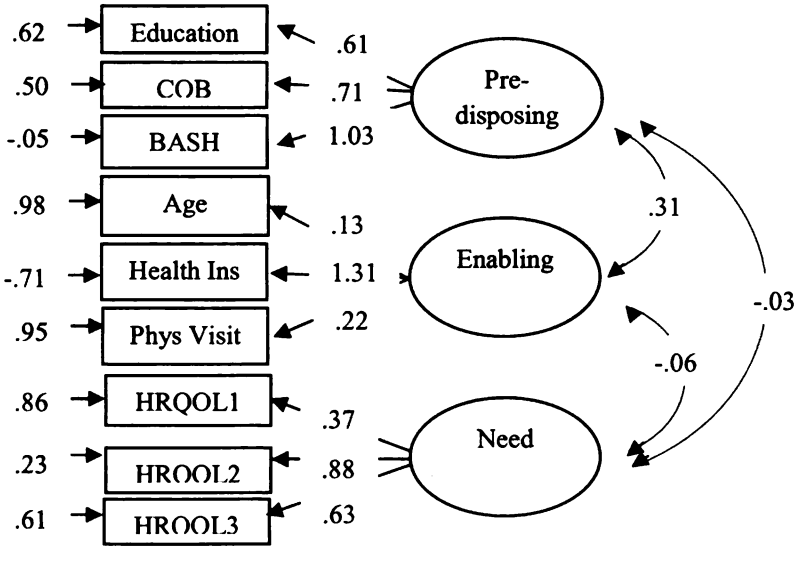
Although age has been previously conceived of as part of the predisposing domain, age facilitates or enables use of screening because mammography screening is an age-dependent preventive service. An increased age is a risk factor for developing breast cancer (NCI, 2007b; 2008a), and California state law requires insurance companies to cover mammograms every two years for women 40-49 years and annually for women 50 and older (Legislative Council of California, 2000a; 2000b; 2000c). Thus, older women are enabled to have a greater frequency of screening than younger women.

Health insurance, as with a recent physician visit, acts to "enable" or "facilitate" access to preventive care, such as mammography screening (Andersen, 1995). Both have been considered enabling factors in the Behavioral Model since its inception (Andersen & Newman, 1973), both have been found be two of the strongest predictors of general

cancer screening utilization (Carrasquillo & Pati, 2004)., and are both considered key resources facilitate health care use (AHRQ, 2008; Millman, 1993). Thus, health insurance was still considered an enabling variable in the second CFA.

A second CFA model, with age as an enabling variable, was tested to empirically validate this EFA structure (Figure 4). The CFA showed that the model fit the data ($\chi^2$ = 79.74 (df = 24, $p < .01$): $\chi^2$/ df ratio = 3.32; CFI = 0.88, NNFI = .83; RMSEA = 0.11; and SRMR = 0.099). This suggested that the slightly modified 9-variable 3-factor structure of the Behavioral Model shown in Figure 4 was supported in the current sample. Thus, exploratory and confirmatory analyses suggested that for this sample of Latinas, a modified Behavioral Model – where age is treated as an indicator of the enabling domain rather than the predisposing domain – was a better fit for the data. Subsequent logistic regression analyses for the hypothesis testing were conducted based on the new measurement model, with age as an enabling, rather than a predisposing variable.

Figure 4. *Modified Measurement Model*[11]




[11] In Figure 4, factor loadings for education, acculturation (BASH), country of birth (COB), insurance, physician visit, health status (HRQOL1), unhealthy days (HRQOL2), and activity limitation (HRQOL3) were statistically significant at the .05 level.

*Univariate and Descriptive Analyses*

Means, standard deviations, skewness, and kurtosis of continuous IVs were examined in order to ensure that each was normally distributed within acceptable limits. The IV 'activity limitation' (hrqol3) that fell outside of acceptable ranges for kurtosis (± 2) was transformed (Tabachnick & Fidell, 2001) and all reported analyses were computed using the transformed IV, [new hrqol3 = log10 (hrqol3 + 10)]. Analyses were also run using an untransformed IV and did not change the results. An overall correlation matrix is located in Table R in Appendix D. Descriptive statistics of all IVs and DVs are reported in Tables A-D in Appendix D and are described below.

*Predisposing Variables.* Over half (52.7%, $n$ = 109) reported not graduating high school and 47.3% ($n$ = 98) reported having at least a high school education. Almost three-fourths [73.7% ($n$ = 151)] of participants reported being Mexican-born and 23.7% ($n$ = 47) reported U.S.-born. Language-based acculturation ranged from 1 to 5, with higher scores indicating a greater English language acculturation. The average score for the entire sample was $M$ = 2.35 ($SD$ = 1.34, $n$ = 200); those interviewed in English had a significantly higher average scores ($M$ = 3.53, $SD$ = 1.14, $n$ = 87) compared to those interviewed in Spanish ($M$ = 1.44, $SD$ = 0.61, $n$ = 113) [T = 16.675 (df = 198, p = .000)].

*Enabling Variables.* Participants' ages ranged from 40 to 80 ($M$ = 50.8; $SD$ = 8.1); 49.5% ($n$ = 103) were 40 to 49 years old and 50.5% ($n$ = 105) were 50 years or older. Several participants (67.6 %, $n$ = 140) indicated that they had health insurance, and for those who specified type, 77.6% ($n$ = 104) reported private (HMO, PPO, or military) and 22.4% ($n$ = 30) reported public (Medicare or Medicaid). Many (67.1%, $n$ = 139) reported visiting their physician in the last year for a routine checkup.

*Need-related Variables.* When asked about their general health status, 27.3% ($n$ = 56) rated their health as excellent or very good. Participants reported an average of 9.57 unhealthy days ($SD$ = 11.00, $n$ = 201) in the past 30 where their physical health and/or mental health was perceived as not good. Of those that reported at least one unhealthy day in the last 30 days, participants reported an average of 5.37 days ($SD$ = 9.23, $n$ = 147) of activity limitation in the last 30 days where poor physical or mental health keep them from doing their usual activities, such as self-care, work, or recreation.

*Context-specific Variables.* Few [2.9% ($n$ = 6)] reported having a personal history of breast cancer and 26.4% ($n$ = 55) reported that a family member had breast cancer; 28.4% ($n$ = 59) reported having a family or personal history of breast cancer. The two health literacy items ranged from 1 to 5, with higher scores indicating higher health literacy. Participants rated themselves as having an average confidence level for filling out medical forms by themselves ($M$ = 3.96, $SD$ = 1.05, $n$ = 208); and reported asking someone (like a family member, friend, hospital/clinic worker, or caregiver) occasionally to help them read hospital materials ($M$ = 3.75, $SD$ = 1.37, $n$ = 207).

The three cancer fatalistic belief subscales ranged from 0 to 1, with higher scores indicating a higher endorsement of cancer fatalistic beliefs. Participants reported a less than average level of beliefs about one's predetermination to get cancer ($M$ = 0.36, $SD$ = 0.36, $n$ = 198), were slightly more likely to endorse the belief about being fearful of getting cancer ($M$ = 0.65, $SD$ = 0.31, $n$ = 206), and less likely to believe that death is inevitability once cancer is present ($M$ = 0.17, $SD$ = 0.31, $n$ = 204). Intrinsic religiosity ranged from 1 to 5 and organizational/non-organizational religiosity ranged from 1-6, with higher scores indicating higher endorsement of religious beliefs, practices, or

behavior. Participants were most likely to endorse intrinsic beliefs, such as having their religious beliefs lie behind their whole approach to life ($M = 4.44$, $SD = 0.80$, $n = 204$) reported attending church or other religious meetings more than a few times per year ($M = 3.24$, $SD = 1.27$, $n = 194$), and reported spending a few times per week in private religious activities, such as prayer ($M = 3.12$, $SD = 1.39$, $n = 162$).

Breast cancer worry and distress ranged from 1 to 4, with higher scores indicating a greater prevalence of recent worry and distress about developing breast cancer (e.g., frequency of thinking and worrying about one's chance of getting breast cancer). Participants reported sometimes worrying about breast cancer ($M = 1.59$, $SD = 0.71$, $n = 206$) and were occasionally distressed about developing breast cancer in the past month ($M = 1.68$, $SD = 0.67$, $n = 205$) (Tables A-D, Appendix D).

## Results of Hypothesis Testing

### *Testing the Behavioral Model of Health Services Use*

To address the question, *"What predisposing, enabling and need factors are associated with an increased likelihood of breast cancer screening among Latinas?"*, several hypothesized relationships between predisposing, enabling, and need-related factors and screening were explored through bivariate and multivariate analyses.

#### *Bivariate Analyses*

Bivariate chi-square ($\chi^2$) and t-tests analyses were conducted to determine whether individual variables in each of the three domains were significantly related to having a mammogram in the past two years (sub-hypotheses 1a-1d, 2a-2b, and 3a-3c).

*Predisposing Variables.* Results from the bivariate analyses did not provide support for the hypothesized relationships between predisposing factors and

mammography screening. Hypotheses 1b-1d were not supported: mammography screening rates did not differ by education [$\chi^2$ (1, 201) = 2.412 (p = .120)], language-based acculturation level (T = -0.102, df = 193, p = .919), or country of birth [$\chi^2$ (1, 193) = 0.047 (p = .828)] (Table 3).

*Enabling Variables*. Significant bivariate relationships existed between breast cancer screening and all enabling factors. Although screening rates did not differ when comparing those 50 and older to those 40-49 years old [$\chi^2$ (1, 202) = 2.733 (p = .098)], hypothesis 1a was partially supported since those who reported a mammogram in the last two years were significantly older ($M$ = 51.99 years) than those who did not have their mammogram in the last two years ($M$ = 47.86 years) (T = 2.846, df = 200, p = .005).

Hypotheses 2a and 2b were supported: Latinas with either public or private health insurance were significantly more likely to have received a mammogram in the last two years (83.8%, $n$ = 114), compared to Latinas without health insurance (60.0%, $n$ = 39) [$\chi^2$(1, 201) = 13.732 (p = .000)]. Latinas that had visited a physician in the past year for a routine physical exam were significantly more likely to have received a mammogram in the last two years (85.8%, $n$ = 115) compared to Latinas who did not visit a physician in the last year (56.7%, $n$ = 38) [$\chi^2$ (1, 201) = 20.814 (p = .000)] (Table 3).

*Need-related Variables*. Results from bivariate analyses did not provide support for the hypothesized relationships between need-related factors and breast cancer screening. Hypotheses 3a, 3b, and 3c were not supported: screening rates among Latinas 40 years and older did not differ significantly by health status (T = -1.823, df = 197, p = .070), recent unhealthy days (T = -1.805, df = 193, p = .073), or recent physical activity limitation (T = 0.143, df = 141, p = .806) (Table 3).

*Table 3.* Bivariate Relationships of Behavioral Model Variables with Mammography Screening Utilization

| *Chi-Square Analyses* | Mammography (< 2 years) % (n) Yes | No | Sig. |
|---|---|---|---|
| Education | | | |
| Less than high school | 71.7 (76) | 28.3 (30) | $\chi^2$ (1, 201) = 2.412 |
| High school or greater | 81.1 (77) | 18.9 (18) | (p = .120) |
| Country of birth | | | |
| United States | 74.5 (35) | 25.5 (12) | $\chi^2$ (1, 193) = .047 |
| Mexico | 76.0 (111) | 24.0 (35) | (p = .828) |
| Age | | | |
| 40-49 yrs | 71.3 (72) | 28.7 (29) | $\chi^2$ (1, 202) = 2.733 |
| 50 + | 81.2 (82) | 18.8 (19) | (p = .098)^ |
| Physician visit < 1 yr | | | |
| Yes | 85.8 (115) | 14.2 (19) | $\chi^2$ (1, 201) = 20.814 |
| No | 56.7 (38) | 43.3 (29) | (p = .000)* |
| Health insurance | | | |
| Yes | 83.8 (114) | 16.2 (22) | $\chi^2$ (1, 201) = 13.732 |
| No | 60.0 (39) | 40.0 (26) | (p = .000)* |
| Health Insurance Groups | | | |
| Private | 84.0 (84) | 16.0 (16) | $\chi^2$ (2, 195) = 13.476 |
| Public | 83.3 (25) | 16.7 (5) | (p = .001)* |
| None | 60.0 (39) | 40.0 (26) | |

| *Mean Comparisons* | Mammography (< 2 yrs) M (SD) Yes | No | Sig. |
|---|---|---|---|
| Language-based acculturation [a] | 2.35 (1.34) (n = 151) | 2.43 (1.49) (n = 44) | t = -0.102 (df = 193, p = .919) |
| Age (years) | 51.99 (9.25) (n = 154) | 47.86 (6.96) (n = 48) | t = 2.846 (df = 200, p = .005)* |
| Health status [b] | 2.99 (1.04) (n = 152) | 3.30 (0.97) (n = 47) | t = -1.823 (df = 197, p = .070)^ |
| Unhealthy days [b] | 8.99 (10.66) (n = 148) | 12.32 (12.11) (n = 47) | t = -1.805 (df = 193, p = .073)^ |

*Table 3.* Cont'd

| | | | |
|---|---|---|---|
| Activity limitation [b] | 5.55 (9.43) (n = 108) | 5.29 (9.13) (n = 35) | t = 0.143 (df = 141, p = .806) |
| Activity limitation transformed [b,c] | 1.14 (0.20) (n = 108) | 1.13 (0.20) (n = 35) | t = 0.109 (df = 141, p = .914) |

Note: Chi-Square tests and independent samples t-tests (equal variances assumed) were used to compare variables across mammography adherence groups. Incomplete data are due to participant non-response.

^ Approaching significance at the .05 level (.05 > p < .10); * P ≤ .01; ** P ≤ .05

[a] Possible range 1- 5; higher scores denote higher acculturation to English language.

[b] Health status ranges from 1-5; unhealthy days and activity limitation range from 0-30; higher scores denote worse health status; [c] Activity limitation transformed.

[d] Analyses were conducted with removing the 4 outlier cases and the only change was that dichotomous age became significant (women 50 + were more likely to have a mammogram in the last 2 years (83.7 %, n=82) than women 40-49 (72.0 %, n=72) [$\chi^2$ (1, 198) = 3.902 p = .048)].

In sum, bivariate analyses revealed that only enabling variables were related to mammography screening (Table 3). Although predisposing and need-related factors were not associated with screening, hypotheses 1, 2, and 3 postulated significant predictive relationships between the three domains and screening. These relationships were examined in three multivariate logistic regression models. Results from these analyses are presented below.

*Multivariate Analyses*

To answer hypotheses about the significance of predisposing, enabling, and need domains in predicting breast cancer screening among Latinas, three logistic regression models were examined to determine the predictive significance of each domain.

HYPOTHESIS 1: Latinas with higher rates of predisposing factors will be more likely to utilize breast cancer screening services.

Table 4 displays the adjusted odds ratios (OR) and corresponding 95% confidence intervals (CI) for all predisposing variables predicting likelihood of breast cancer screening as a group. The Hosmer and Lemeshow Goodness of Fit (GOF) Test showed that the model was a good fit to the data ($\chi^2$ = 2.317, df = 6, p = .888), indicating that

there was no difference between observed and expected values of the dependent variable (Menard, 2002). The model chi-square was insignificant ($\chi^2 = 6.467$, df = 3, p = .091), indicating that at least one of the logistic regression coefficients equaled zero.

Having a high school degree or greater predicted screening (OR = 2.999), adjusting for other factors ($p \leq .05$): the odds of having a mammogram in the past two years were almost 3 times higher for those with at least a high school degree compared to those with less than a high school education. Language-based acculturation was inversely related to screening (OR = 0.641), adjusting for education and country of birth ($p \leq .05$). In other words, for every one unit decrease in acculturation, the odds of having a mammogram in the past two years increased almost two fold [OR = 1.560 (1 / 0.641)]. Adjusting for other factors, country of birth did not relate to screening.

*Table 4.* Predisposing Factors Predicting Recent Mammography Screening Use

| *Predisposing Factors* | Recent Mammography (< 2 years)[a, c] | | |
|---|---|---|---|
| | OR | 95% C.I. | P-value |
| Education | | | |
| Less than high school [b] | 1.00 | | |
| High school or greater | 2.999 | (1.154, 7.793) | 0.024** |
| Language-based acculturation | 0.641 | (0.414, 0.995) | 0.047** |
| Country of Birth | | | |
| Mexico [b] | 1.00 | | |
| United States | 2.042 | (0.590, 7.060) | 0.259 |

Note: C.I. = confidence interval; Acculturation no longer predicted screening when 4 outlier cases were excluded (OR=.656, CI= (.413 - 1.044), p=.075)

^ Approaching significance at the .05 level (.05 > p < .10); * P ≤ .01; ** P ≤ .05;

[a] $n = 185$; [b] Reference category

[c] Model chi-square: 6.467 (df = 3, p = .091); GOF $\chi^2 = 2.317$, (df = 6, p = .888).

In sum, although the model fit the data at an acceptable level, the model chi-square was not significant, indicating that at least one of the predictors equaled zero.

However, in the adjusted model, language-based acculturation and education significantly predicted recent mammography screening; country of birth was not significant. Thus, hypothesis 1 was supported: Latinas with certain predisposing factors (a greater education and lower language-based acculturation) were more likely to utilize mammography screening services in the past two years.

HYPOTHESIS 2: Latinas with higher rates of enabling factors will be more likely to utilize breast cancer screening services.

Table 5 displays the adjusted ORs and corresponding 95% CIs for all enabling IVs predicting likelihood of breast cancer screening as a group. The model was a good fit to the data ($\chi^2 = 4.568$, df = 8, p = .803), indicating that there was no difference between observed and expected values of the dependent variable (Menard, 2002). The model chi-square showed that this model predicted the likelihood of mammography screening better than a null model ($\chi^2 = 29.355$, df = 4, p = .000), indicating that at least one of the predictors was significantly related to the dependent variable (Menard, 2002).

Age predicted screening (OR = 1.062), adjusting for health insurance and a recent physician visit ($p \leq .05$); for every one unit increase in age, the odds of having a recent mammogram increased 1.06 times. A physician visit in the past year significantly predicted screening (OR = 3.336), adjusting for insurance and age ($p \leq .01$); the odds of having a recent mammogram were 3 times higher for those who went to see a physician for a physical exam in the past year compared to those who had not. Private insurance was significant (OR = 2.391), adjusting for age and a recent physician visit ($p \leq .05$); the odds of a recent mammogram were 2 times higher for those with private insurance compared to those with none. Adjusting for other factors, public insurance was not significant (Table 5).

*Table 5.* Enabling Factors Predicting Recent Mammography Screening Use

| *Enabling Factors* | Recent Mammography (< 2 years) [a, c] | | |
|---|---|---|---|
| | OR | 95% C.I. | P-value |
| Age | 1.062 | (1.006, 1.120) | 0.029** |
| Health insurance | | | |
| None [b] | 1.00 | | |
| Public | 1.746 | (0.538, 5.667) | 0.354 |
| Private | 2.391 | (1.093, 5.228) | 0.029** |
| Physician visit < 1 yr | | | |
| No [b] | 1.00 | | |
| Yes | 3.336 | (1.603, 6.944) | 0.001* |

Note: C.I. = confidence interval; an analysis without 4 outlier cases did not change the results. Insurance remained a significant predictor (OR = 2.180, CI= (1.048-4.538), p= .037) when substituting the three insurance categories with a dichotomous insurance variable (1=yes, 0=no).

* $P \leq .01$; ** $P \leq .05$;

[a] $n = 195$; [b] Reference category

[c] Model chi-square: 29.355 (df = 4, p = .000); GOF $\chi^2 = 4.568$, (df = 8, p = .803).

In sum, the model fit the data at an acceptable level and the model chi-square was significant, indicated that at least one of the predictors was significant. In particular, a greater age, a recent physician visit, and private insurance predicted having a recent mammogram. Hypothesis 2 was supported: Latinas with certain enabling resources were more likely to utilize mammography screening services in the previous two years.

HYPOTHESIS 3: Latinas with higher rates of need factors will be more likely to utilize breast cancer screening services.

Table 6 displays the adjusted ORs and corresponding 95% CIs for all need-related IVs predicting likelihood of breast cancer screening as a group. The model was a good fit to the data ($\chi^2 = 4.155$, df = 8, p = .843), which means that there was no difference between observed and expected values of the dependent variable (Menard, 2002). However, the model chi-square was not significant ($\chi^2 = 3.819$, df = 3, p = .282),

indicating that this partial regression model did not predict likelihood of mammography screening better than a model containing only the intercept term, which means that at least one of the logistic regression coefficients equaled zero (Menard, 2002). Indeed, in the adjusted model, screening rates did not differ by health status, unhealthy days, or by activity limitation. Hypothesis 3 was not supported: There was no difference in likelihood of utilizing breast cancer screening based on the level of need among Latinas.

*Table 6.* Need-related Factors Predicting Recent Mammography Screening Use

| *Need Factors* | Recent Mammography (< 2 years) [a, c] | | |
|---|---|---|---|
| | OR | 95% C.I. | P-value |
| Health status | 0.877 | (0.580, 1.325) | 0.534 |
| Unhealthy days | 0.962 | (0.922, 1.004) | 0.078^ |
| Activity limitation [b] | 4.932 | (0.411, 59.214) | 0.208 |

Note: C.I. = confidence interval; an analysis substituting the transformed activity limitation variable with an untransformed variable did not change results. Removing 4 outlier cases did not change results.
^ Approaching significance at the .05 level (.05 > p < .10); [a] $n = 141$; [b] Activity limitation is transformed
[c] Model chi-square: 3.819 (df = 3, p = .282); GOF $\chi^2 = 4.155$, (df = 8, p = .843)

The three partial logistic regression models showed that all of the enabling variables, and all of the predisposing variables except country of birth, significantly predicted the likelihood of having a mammogram in the previous two years. These variables were included in a full regression model (Table 7). The model was a good fit to the data ($\chi^2 = 6.198$, df = 8, p = .625), indicating that the model explained a significant proportion of variance in the criterion. The model chi-square was significant ($\chi^2 = 35.533$, df = 6, p = .000); indicating at least one of the predictors was significant (Menard, 2002). After adjusting for other factors, having a high school degree (OR = 3.528), a lower language-based acculturation (OR = 0.538), a greater age (OR = 1.067), and a physician visit in the last year (OR = 3.350) significantly predicted screening ($p \leq .05$); private or public insurance were not significant (Table 7).

*Table 7.* Reduced Behavioral Model Predicting Recent Mammography Screening Use

| *Factors* | Recent Mammography (< 2 years)[a] | | |
|---|---|---|---|
| | OR | 95% C.I. | P-value |
| Education | | | |
| Less than high school [b] | 1.00 | | |
| High school or greater | 3.528 | (1.076, 11.564) | 0.037** |
| Language-based Acculturation | 0.538 | (0.386, 0.881) | 0.010** |
| Age | 1.067 | (1.010, 1.126) | 0.021** |
| Health insurance | | | |
| None [b] | 1.00 | | |
| Public | 1.793 | (0.495, 6.493) | 0.374 |
| Private | 2.589 | (0.917, 7.314) | 0.073^ |
| Physician visit < 1 yr | | | |
| No [b] | 1.00 | | |
| Yes | 3.350 | (1.519, 7.386) | 0.003* |

Note: C.I. = confidence interval. Education no longer predicted screening when 4 outlier cases were excluded (OR= 3.544, CI= (.962, 13.060), p= .057). An analysis with dichotomous insurance (yes/no) was not significant. ^ Approaching significance at the .05 level (.05 > p < .10); * P ≤ .01; ** P ≤ .05

[a] $n$ = 194; [b] Reference category

[c] Model chi-square: 35.533 (df = 6, p = .000); GOF $\chi^2$ = 6.198, (df = 8, p = .625)

*Summary*

*Significance of Predisposing Variables.* None of the predisposing variables were associated with screening in bivariate analyses (Table 3). However, results from the adjusted logistic regression analysis revealed that Latinas with a greater education and lower language-based acculturation were more likely to obtain a recent mammogram (Table 4), which partially supports the hypothesis that predisposing variables increases the likelihood of mammography screening. A closer examination of these analyses revealed that language-based acculturation and education went from non-significant in bivariate analyses to significant in the logistic regression model containing three

predisposing variables, which suggests that a suppression[12] situation was present (Collins & Schmidt, 1997; Conger, 1974; Conger & Jackson, 1972; Lynn, 2003; MacKinnon, Krull, & Lockwood, 2000; Rosenberg, 1973; Tzelgov & Henik, 1991). To determine which variable(s) acted as a suppressor, additional analyses were examined with the three predictors (language-based acculturation, education, and country of birth).

T-tests analyses showed that those with high school or greater education had a higher language-based acculturation ($M$ = 3.25, $SD$ = 1.22, $n$ = 95) than those with less than a high school education ($M$ = 1.53, $SD$ = .89, $n$ = 104), [T = 11.467 (df = 197) p = .000]; and U.S.-born Latinas had a higher language-based acculturation ($M$ = 4.15, $SD$ = .95, $n$ = 44) than Mexican-born Latinas ($M$ = 1.80, $SD$ = .94, $n$ = 146) [T = 14.457 (df = 188) p = .000]. A chi-square analyses showed that U.S.-born Latinas were more likely to have a high school education or greater (85.1%, $n$ = 40) compared Mexican-born Latinas (35.3%, n = 53) [$\chi^2$ (1, 197) = 35.574, p = .000]. Thus, a higher education was positively related to higher English-language acculturation and being U.S.-born; and being U.S. born was positively related to a higher English-language acculturation level.

Simple unadjusted logistic regression analyses revealed that education (p = .122), language-based acculturation (p = .918), and country of birth (p = .829) were not significant predictors of recent mammography screening. Then, three regression models were conducted with two predictors entered simultaneously (i.e., country of birth and acculturation, country of birth and education, and education and acculturation). Country

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[12] A *suppressor* is a non-redundant variable that increases the predictive validity of another variable (or set of variables) by its inclusion in the regression equation by removing irrelevant predictive variance in other predictor(s) (Conger & Jackson, 1972). Usually, the variable being suppressed was uncorrelated with the dependent variable in bivariate analyses and became significant in multivariate analyses (Conger, 1974; Tzelgov & Henik, 1991).

of birth (p = .344) and acculturation (p = .392) were not significant when entered simultaneously and country of birth (p = .349) and education (p = .094) were not significant when entered simultaneously. However, when education and acculturation were entered simultaneously, acculturation was non-significant (p = .116) and education became significant (OR = 2.910, p = .026). When all three variables were entered simultaneously (e.g., Table 4) country of birth was not significant (p = .259), yet a higher education (OR = 2.999, p = .024) and lower acculturation (OR = .641, p = .047) significantly predicted screening. No interaction or confounding relationships existed among the three variables (Lynn, 2003; MacKinnon, Krull, & Lockwood, 2000).

Since education became significant only when acculturation was entered simultaneously, this suggested that acculturation suppressed some of the irrelevant variance in the relationship between education and screening (Rosenberg, 1973). Since acculturation only became significant once both education and country of birth were entered into the model, this suggested that country of birth and education together suppressed some of the irrelevant variance in the relationship between acculturation and screening (Rosenberg, 1973). Thus, education was suppressed by acculturation and acculturation was suppressed by education and country of birth. These two variables were not excluded from further analyses because their inclusion improves the predictability of the outcome and provides information about the relationship among the predictors and the outcome that needs to be explored further (Collins & Schmidt, 1997; Conger & Jackson, 1972; Rosenberg, 1973; Tzelgov & Henik, 1991)[13].

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[13] For example, if A suppressed some of the irrelevant variance in the relationship between B and the criterion, and A was correlated with B, this means that the uniqueness of B unrelated to A is associated with the criterion. The unique part of B would need to be explored in future studies (Rosenberg, 1973).

*Significance of Enabling Variables.* As hypothesized, all of the enabling variables were significantly associated with screening in bivariate analyses (Table 3). Latinas with enabling characteristics, (greater age, private insurance, and a physician visit in the past year), were more likely to utilize screening, after adjusting for all other enabling variables. Thus, this dataset supported the hypothesis that enabling variables increased the likelihood of having a recent mammogram in the past two years.

*Significance of Need-related Variables.* Need-related variables were not related to screening in bivariate analyses (Table 3) or in the partial regression model containing all three need-related variables (Table 6). Thus, these data failed to support the hypothesis that the need-related domain increases the likelihood of having a recent mammogram.

Significant variables from the three partial logistic regression models, (i.e., all enabling variables and education and language-based acculturation predisposing variables) were included in a full regression model. Results showed that the model explained a significant portion of the variance in screening and after adjusting for all other factors, having a high school degree, a lower language-based acculturation, a greater age, and a recent physician visit significantly predicted screening; and private or public insurance were not significant (Table 7). This model was further modified by adding contextual variables (Table 11). First, attention is drawn to analyses conducted to determine the incremental significance of predisposing and need-related domains.

*Testing the Incremental Prediction of Predisposing and Need Domains*

To address the third research question, *"To what extent do predisposing and need factors add to the prediction of breast cancer screening utilization by Latinas, after controlling for enabling factors?"*, two hierarchical logistic regression analyses were

conducted to determine the incremental prediction of predisposing and need-related domains. The first model placed all enabling domain variables in Step 1 and included predisposing variables in Step 2 (Table 8). The second model placed enabling variables in Step 1 and included need-related variables in Step 2 (Table 9).

HYPOTHESIS 4: After adjusting for enabling factors in the original model, predisposing and need variables will not be significantly associated with breast cancer screening utilization.

*Predisposing and Enabling Domains*

Table 8 displays the adjusted ORs and corresponding 95% CIs for all predisposing and enabling variables examined in a step-wise fashion to predict likelihood of breast cancer screening; Model 1 contained all enabling variables and Model 2 contained all enabling plus predisposing variables. Model 2 was not a good fit to the data ($\chi^2 = 17.459$, df = 8, p = .026), indicating that there was a difference between observed and expected values of the dependent variable (Menard, 2002). However, the model chi-square was significant, indicating that at least one of the predictors was significantly related to the dependent variable ($\chi^2 = 36.062$, df = 7, p=.000), (Menard, 2002).

A Likelihood Ratio $\chi^2$ Test was used to compare the hierarchical models; results of which indicated that the three predisposing variables significantly added to Model 1 ($\chi^2 = 8.686$, df = 3, $p \leq .05$) (Table 9). Although the likelihood ratio test showed that after accounting for enabling factors, predisposing factors significantly added to the model, the overall model including enabling and predisposing factors did not account for a significant proportion of variance in mammography screening. Thus, hypothesis 4 was supported.

*Table 8.* Predisposing and Enabling Domains Predicting Recent Mammography Screening Use

| *All Behavioral Model Independent Variables* | Model 1 (Enabling Only) Recent Mammography (< 2 years) [a] | | | Model 2 (Enabling + Predisposing) Recent Mammography (< 2 years) [b] | | |
|---|---|---|---|---|---|---|
| | OR | 95% C.I. | P-value | OR | 95% C.I. | P-value |
| *Enabling Factors* | | | | | | |
| Age | 1.052 | (.995, 1.111) | .072^ | 1.059 | (1.00, 1.121) | .048** |
| Health insurance | | | | | | |
| None [c] | 1.00 | | | 1.00 | | |
| Public | 1.448 | (.430, 4.882) | .550 | 1.870 | (.482, 7.249) | .365 |
| Private | 2.029 | (.876, 4.698) | .099^ | 3.172 | (1.043, 9.644) | .042** |
| Physician visit < 1 yr | | | | | | |
| No [c] | 1.00 | | | 1.00 | | |
| Yes | 4.097 | (1.876, 8.948) | .000* | 3.411 | (1.530, 7.736) | .003* |
| *Predisposing Factors* | | | | | | |
| Education | | | | | | |
| Less than high school [c] | -- | -- | -- | 1.00 | | |
| High school or greater | -- | -- | -- | 3.053 | (1.019, 10.048) | .066^ |
| Language-based acculturation | -- | -- | -- | .462 | (.263, .814) | .007* |
| Country of birth | | | | | | |
| Mexico [c] | -- | -- | -- | 1.00 | | |
| United States | -- | -- | -- | 2.712 | (.596, 12.345) | .197 |
| -2 log likelihood | | 167.132 [d] | | | 158.446 [e] | |

Note: C.I. = confidence interval. Analyses substituting insurance dummy variables with a dichotomous variable and substituting continuous age with a dichotomous age only changed the results slightly: Age became non-significant in model 2 (OR=1.538, CI=.699, 3.380, p=.284). Age became significant in Model 1 when 4 outlier cases were excluded (OR= 1.084, CI= 1.016, 1.156, p= .014).

*P ≤ .01; ** P ≤ .05; [a] $n$ = 178; [b] $n$ = 178; [c] Reference category;

[d] Model chi-square: 27.377 (df = 4, p = .000); GOF $\chi^2$ = 6.676, (df = 8, p = .572)

[e] Model chi-square: 36.062 (df = 7, p = .000); GOF $\chi^2$ = 17.459, (df = 8, p = .026). A Likelihood Ratio $\chi^2$ Test indicated that the three additional predisposing variables significantly added to the model 1 containing enabling factors [$\chi^2_3$= 8.686 > critical value ($\chi^2_{3\ (\alpha = .05)}$ = 7.815), p ≤ .05].

### *Need-related and Enabling Domains*

Table 9 displays the adjusted ORs and corresponding 95% CIs for need and enabling domains examined in a step-wise fashion to predict likelihood of screening;

Model 1 contained the enabling domain and Model 2 contained the enabling plus need-related variables. Model 2 was a good fit to the data ($\chi^2 = 7.253$, df = 8, p = .510), indicating there was no difference between observed and expected values of the outcome. The model chi-square was significant ($\chi^2 = 19.695$, df = 7, p = .006), showing that at least one of the predictors was significant (Menard, 2002). Yet, a Likelihood Ratio $\chi^2$ Test showed that the need domain did not add to the model containing enabling factors ($\chi^2 = 2.641$, df = 3, p > .05); thus, need did not matter after accounting for enabling factors.

*Table 9.* Need-related and Enabling Domains Predicting Recent Mammography Screening Use

| *All Behavioral Model Independent Variables* | Model 1 (Enabling Only) Recent Mammography (< 2 years)[a] | | | Model 2 (Enabling + Need) Recent Mammography (< 2 years)[b] | | |
|---|---|---|---|---|---|---|
| | OR | 95% C.I. | P-value | OR | 95% C.I. | P-value |
| *Enabling Factors* | | | | | | |
| Age | 1.036 | (.980, 1.096) | .215 | 1.044 | (.983, 1.108) | .162 |
| Health insurance | | | | | | |
| None [c] | 1.00 | | | 1.00 | | |
| Public | 2.063 | (.533, 7.993) | .294 | 2.264 | (.547, 9.379) | .260 |
| Private | 2.161 | (.871, 5.362) | .096^ | 1.770 | (.667, 4.698) | .252 |
| Physician visit < 1 yr | | | | | | |
| No [c] | 1.00 | | | 1.00 | | |
| Yes | 3.361 | (1.436, 7.866) | .005* | 3.369 | (1.409, 8.056) | .006* |
| *Need Factors* | | | | | | |
| Health status | -- | -- | -- | .927 | (.572, 1.501) | .758 |
| Unhealthy days | -- | -- | -- | .965 | (.920, 1.011) | .136 |
| Activity limitation | -- | -- | -- | 1.737 | (.108, 28.032) | .697 |
| -2 log likelihood | | 135.323 [d] | | | 132.682 [e] | |

Note: Substituting the transformed activity limitation variable with an untransformed variable, insurance with a dichotomous variable and substituting the age with a dichotomous age did not change results. Age was significant in Model 2 when 4 outliers were excluded. (OR= 1.075, CI= 1.001, 1.156, p= .048).* P ≤ .01; ** P ≤ .05; [a] $n = 135$; [b] $n = 135$; [c] Reference category; [d] Model chi-square: 17.055 (df = 4, p = .002); GOF $\chi^2 = 11.718$, (df = 8, p = .164); [e] Model chi-square: 19.695 (df = 7, p = .006); GOF $\chi^2 = 7.253$, (df = 8, p = .510). A Likelihood Ratio $\chi^2$ Test indicated that the three need-related variables did not significantly add to model 1 containing enabling factors [$\chi^2_3 = 2.641$ < critical value ($\chi^2_{3\ (\alpha = .05)} = 7.815$), p ≤ .05).

*Summary*

In sum, the Likelihood Ratio $\chi^2$ Test showed that after adjusting for enabling factors, predisposing variables as a group were significantly related to breast cancer screening. However, the model was not a good fit to the data, meaning that the overall model including enabling and predisposing factors failed to account for a significant proportion of variance in the dependent variable (Table 8). After adjusting for enabling variables, the need-related variables were not related to screening (Table 9). These results demonstrated that predisposing and need domains did not matter in the prediction of recent mammography screening among Latinas 40 years and older, after accounting for enabling variables, which supports this study's hypotheses.

*Testing the Incremental Prediction of the Proposed Context-Specific Variables*

To address the question, *"To what extent do context-specific variables add to the prediction of breast cancer screening utilization by Latinas?"*, several hypotheses about the relationship between contextual predisposing and need-related factors and breast cancer screening were explored through bivariate and multivariate analyses .

*Bivariate Analyses*

Bivariate chi-square ($\chi^2$) and t-tests analyses were conducted to determine whether the individual context-specific variables were significantly related to having a mammogram in the past two years (sub-hypotheses 5a-5g).

Breast cancer screening rates did not differ by a history of breast cancer in a chi-square analysis [$\chi^2 (1, 202) = .424$, ($p = .515$)]. Hypothesis 5a was not supported, suggesting that a personal or family history of breast cancer was not related to breast cancer screening in this sample of Latinas.

Latinas who reported having a mammogram in the past two years (M = 4.03, SD = 1.00, n = 154) had a greater confidence in filling out medical forms compared to those who reported having a mammogram more than 2 years ago (M = 3.63, SD = 1.16, n = 48) (T = 2.360, df = 200, p = .019). Hypothesis 5b was partially supported: screening rates differed by level of confidence in filling out medical forms. Assistance needed in reading hospital materials was not associated with screening (T = .224, df =199, p = .824).

Overall, hypotheses 5c -1f were not supported, suggesting that cancer fatalistic beliefs were not related breast cancer screening in this sample of Latinas 40 years and older. Screening rates did not differ by beliefs about a predetermination of getting cancer (T = .330, df = 190, p = .742), an inevitability of death once cancer is present (T = .777, df = 190, p = .438), or a fear of getting cancer (T = -0.289, df =198, p = .773) (Table 10).

Hypotheses 5d-5f were not supported, suggesting that religiosity was not related breast cancer screening in this sample of Latinas 40 years and older. Mammography screening rates did not differ when comparing different levels of intrinsic religiosity (T = 0.411, df = 196, p = .517), organizational religiosity (T = 0.649, df = 187, p = .517), or non-organizational religiosity (T = -0.513, df = 156, p = .609) (Table 10).

Overall, hypothesis 5g was partially supported. While breast cancer worry was not related to screening, (T = 0.407, df = 197, p = .684), Latinas who had a mammogram in the two years had a lower level of recent distress about developing breast cancer ($M$ = 1.50, $SD$ =.62, $n$ = 153) when compared to those who had a mammogram more than two years ago ($M$ = 1.85, $SD$ = .93, $n$ = 47) (T = -2.961, df = 198, p = .003) (Table 10).

*Table 10.* Bivariate Associations between Context-specific Variables with Recent Mammography Screening Use

| *Chi-Square Analyses* | Mammography (< 2 years) % (n) Yes | No | Sig. |
|---|---|---|---|
| History of breast cancer | | | |
| Yes | 79.3 (46) | 20.7 (12) | $\chi^2$ (1, 202) = .424 |
| No | 75.0 (108) | 25.0 (36) | (p = .515) |
| *Mean Comparisons* | Mammography (< 2 yrs) M (SD) Yes | No | Sig. |
| Cancer fatalistic beliefs: predetermination [a] | 0.46 (0.37) (*n* = 146) | 0.44 (0.34) (*n* = 46) | t = 0.330 (df = 190, p = .742) |
| Cancer fatalistic beliefs: inevitability of death [a] | 0.17 (0.31) (*n* = 150) | 0.13 (0.28) (*n* = 48) | t = 0.777 (df = 196, p = .438) |
| Cancer fatalistic beliefs: fear [a] | 0.65 (0.39) (*n* = 152) | 0.67 (0.40) (*n* = 48) | t = -0.289 (df = 198, p = .773) |
| Intrinsic religiosity [b] | 4.45 (0.80) (*n* = 151) | 4.40 (0.81) (*n* = 47) | t = 0.411 (df = 196, p = .681) |
| Organizational religiosity [c] | 3.26 (1.21) (*n* = 145) | 3.11 (1.43) (*n* = 44) | t = 0.649 (df = 187, p = .517) |
| Non-organizational religiosity [c] | 3.08 (1.37) (*n* = 121) | 3.22 (1.44) (*n* = 37) | t = -0.513 (df = 156, p = .609) |
| Health literacy: confidence in filling out medical forms [d] | 4.03 (1.00) (*n* = 154) | 3.63 (1.16) (*n* = 48) | t = 2.360 (df = 200, p = .019)** |
| Health literacy: assistance needed in reading hospital materials [d] | 3.75 (1.32) (*n* = 154) | 3.70 (1.52) (*n* = 47) | t = 0.224 (df = 199, p = .823) |
| Breast cancer worry [e] | 1.68 (0.66) (*n* = 152) | 1.64 (0.71) (*n* = 47) | t = 0.407 (df = 197, p = .684) |
| Breast cancer distress [e] | 1.50 (0.62) (*n* = 153) | 1.85 (0.93) (*n* = 47) | t = -2.961 (df = 198, p = .003)* |

Note: Chi-Square tests and independent samples t-tests (equal variances assumed) were used to compare variables across mammography adherence groups. An analysis without 4 outliers did not change the results. ^ Approaching significance at the .05 level (.05 > p < .10); * P ≤ .01; ** P ≤ .05; [a] Range from 0-1; higher scores denote higher levels of fatalistic beliefs. [b] Ranges from 1-5 and [c] Ranges from 1- 6; higher scores denote greater religiosity. [d] Ranges from 1-5, higher scores denote more confidence in filling out forms and less assistance needed. [e] Range from 1-4; higher scores denote higher levels of worry and distress.

*Multivariate Analyses*

Contextual factors associated with screening in bivariate analyses included health literacy (confidence in filling out medical forms) and breast cancer distress. To determine the incremental prediction of these variables, a hierarchical logistic regression analysis was performed with Step 1 including Behavioral Model variables (i.e., education, language-based acculturation, age, health insurance, and recent physician visit) and Step 2 included confidence in filling out medical forms and breast cancer distress.

HYPOTHESIS 5: After adjusting for variables in the Behavioral Model, context specific variables will be significantly associated with breast cancer screening utilization which will improve the predictability of the Behavioral Model.

Table 11 displays the adjusted ORs and corresponding 95% CIs for the two models. Model 1 contained selective Behavioral Model variables and Model 2 contained the selective Behavioral Model variables plus the two context-specific variables. Model 2 was a good fit to the data ($\chi^2 = 6.392$, df = 8, p =.603), meaning there was no difference between observed and expected values of the outcome variable. The model chi-square was significant ($\chi^2 = 47.657$, df = 8, p = .000), indicating that at least one of the predictors was significant (Menard, 2002). A Likelihood Ratio $\chi^2$ Test indicated that the two contextual variables significantly added to Model 1 ($\chi^2 = 12.571$, df = 2, $p \leq .05$). After controlling for the reduced Behavioral Model variables, a lower breast cancer distress (OR = .582) and a greater confidence in filling out medical forms (OR = 1.701) predicted recent mammography screening ($p \leq .05$). Thus, the addition of the two context-specific variables improved the prediction of the reduced Behavioral Model, (containing all enabling and predisposing variables except for country of birth), together these constitute the final *Behavioral Model of Latina Breast Cancer Screening Use.*

*Table 11.* Reduced Behavioral Model and Selective Context-specific Variables Predicting Recent Mammography Screening Use

| *Factors* | Model 1 Mammography (< 2 years)[a] | | | Model 2 Mammography (< 2 years)[b] | | |
|---|---|---|---|---|---|---|
| | OR | 95% C.I. | P-value | OR | 95% C.I. | P-value |
| Education | | | | | | |
| Less than high school[c] | 1.00 | | | 1.00 | | |
| High school or greater | 3.523 | (1.076, 11.532) | .037** | 2.937 | (.854, 10.103) | .087^ |
| Language-based Acc. | .584 | (.386, .882) | .011** | .509 | (.331, .782) | .002* |
| Age | 1.066 | (1.009, 1.126) | .022** | 1.087 | (1.025, 1.152) | .005* |
| Health insurance | | | | | | |
| None[c] | 1.00 | | | 1.00 | | |
| Public | 1.776 | (.490, 6.433) | .382 | 2.038 | (.525, 7.914) | .304 |
| Private | 2.586 | (.916, 7.300) | .073^ | 2.541 | (.865, 7.468) | .090^ |
| Physician visit < 1 yr | | | | | | |
| No[c] | 1.00 | | | 1.00 | | |
| Yes | 3.342 | (1.516, 7.367) | .003* | 4.170 | (1.793, 9.698) | .001* |
| *Contextual Factors* | | | | | | |
| Breast cancer distress | -- | -- | -- | .582 | (.347, .976) | .040** |
| Confidence in filling out medical forms | -- | -- | -- | 1.701 | (1.134, 2.552) | .010* |
| -2 log likelihood | 166.055[d] | | | 153.484[e] | | |

Note: Substituting insurance with a dichotomous variable and the continuous age with a dichotomous variable changed the results slightly. Education (OR=2.430, CI=.837-7.052, p=.103) and age (OR=1.652, CI=.766-3.560, p=.200) became non-significant in Model 1 and age became non-significant in Model 2 (OR=2.073, CI=.919-4.687, p=.079). An analysis without 4 outlier cases did not change the results.

^ Approaching significance at the .05 level (.05 > p < .10); * P ≤ .01; ** P ≤ .05

[a] $n$ = 186; [b] $n$ = 186; [c] Reference category;

[d] Model 1 chi-square: 35.086 (df = 6, p = .000); GOF $\chi^2$ = 7.009, (df = 8, p = .536)

[e] Model 2 chi-square: 47.657 (df=8, p = .000); GOF $\chi^2$ = 6.392, (df=8, p= .603). Model 2 was a better fit. A Likelihood Ratio $\chi^2$ Test indicated that the two context-specific variables significantly added to the reduced model 1 [$\chi^2_2$ = 12.571 > critical value ($\chi^2_{2\ (\alpha = .01)}$ = 9.210), p ≤ .01].

*Behavioral Model of Latina Breast Cancer Screening Use*

A final step in this analysis was to determine how well the structure of the final three-factor 7 observed variable model fit this particular sample by running a confirmatory factor analysis (Figure 5). Since the latent factor labeled "need" only

contained one indicator, breast cancer worry was included as an additional indicator of the "need" latent factor to examine all three latent factors simultaneously in the CFA (Figure 6). Multiple goodness of fit indices showed that overall, the model fit the data well ($\chi^2$=36.51 (df = 17): $\chi^2$/ df ratio = 2.15; CFI= 0.93, NNFI= 0.88; RMSEA= 0.074; and SRMR= 0.062). The confirmatory analyses suggested that for this sample of Latinas, the eight-variable three latent factor modified Behavioral Model depicted in Figure 6 was a good fit to the data; suggesting that the *Behavioral Model of Latina Breast Cancer Screening Use* (Figure 5) was also supported in this sample of Latinas and was a better fit than the original Behavioral Model (see pages 55 and 57).

Figure 5. *Final Behavioral Model of Latina Breast Cancer Screening Use*

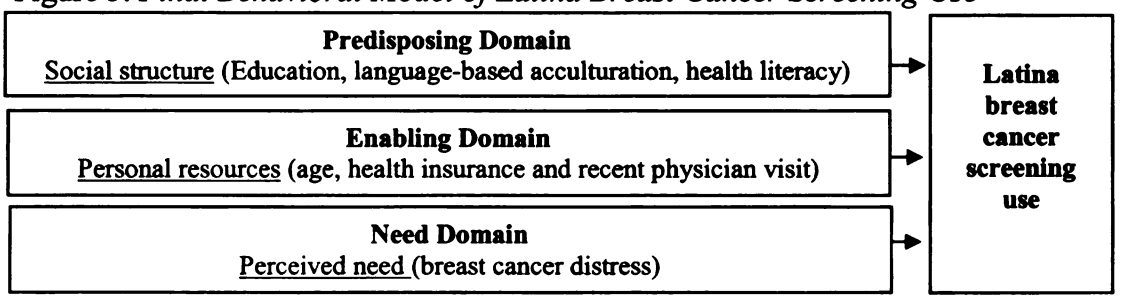
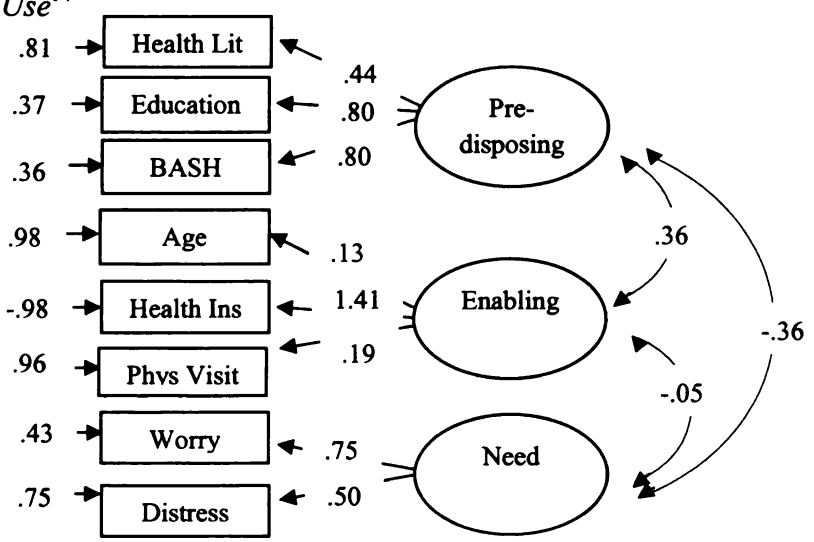



Figure 6. *Measurement Model of the Behavioral Model of Latina Breast Cancer Screening Use*[14]




[14] In Figure 6, factor loadings for health literacy, education, acculturation (BASH), country of birth (COB), insurance, breast cancer worry, and breast cancer distress were statistically significant at the .05 level.

*Summary*

Religiosity (intrinsic, organizational, and non-organizational), history of breast cancer, cancer fatalistic beliefs (fear, predetermination, and inevitability of death), assistance needed in filling out medical forms, and breast cancer worry were not associated with recent mammography screening. The Likelihood Ratio $\chi^2$ Tests showed that a higher confidence in filling out medical forms and a lower breast cancer distress were significantly related to screening, after adjusting for age, education, language-based acculturation, health insurance, and a recent physician visit, which supported the hypothesis that some contextual variables increased the prediction of having a recent mammogram in the past two years. These seven variables together were used to create the *Behavioral Model of Latina Breast Cancer Screening Use*, which accounted for a significant proportion of variance in recent mammography screening utilization among Latinas. Confirmatory analyses suggested that this modified seven-indicator three-factor model was a good fit to the data, which can be appropriately used to predict the likelihood of mammography screening among Latinas 40 years and older.

# DISCUSSION

This study sought to contribute to the current understanding of what influences Latina's use of breast cancer screening by testing a theoretical model, the *Behavioral Model of Health Services Use (Behavioral Model),* which explains why individuals use health care (Andersen, 2008) and includes three domains: predisposing, enabling, and need-related. *Predisposing factors* refer to individual characteristics that increase the likelihood of health care use (Stein, et al., 2007); measured in this study by education, language-based acculturation, and country of birth. *Enabling factors* are conditions that permit access to health care and make services available (Andersen, 1968), measured in this study by age, health insurance, and recent physician's visit. *Need-related factors* are measured by illness level, indicated by self-perceptions and objective evaluations (Gelberg, Andersen, & Leake, 2000), measured in this study by health-related quality of life (health status, unhealthy days, and activity limitation).

Because there is a need for a greater focus on the importance of contextual and individual characteristics for defined populations in studies that examine access to care and health services utilization, a proposed modification of the *Behavioral Model*, called *Behavioral Model of Latina Breast Cancer Screening Use,* was created and tested in this study. The model was modified by including context-specific variables theorized to be especially relevant to the Latinas, breast cancer, and breast cancer utilization behavior (Pasick & Burke, 2008) that could allow for a greater prediction of screening.

## Key Findings

Overall, findings suggest that the *Behavioral Model* was a reasonably good fit for examining breast cancer screening in this sample of Latinas 40 years and older, with the slight modification of treating age as an enabling variable. The suppression effect that

emerged in the partial regression model of predisposing variables of the *Behavioral Model,* illustrated a complex relationship among predictors and the criterion that needs to be explored further (Rosenberg, 1973). Results showed the enabling domain mattered more than the need and predisposing domains for predicting screening (Tables 8-9). Yet, once country of birth was omitted, (Table 7), enabling and predisposing variables together predicted screening, thus supporting the claim that predisposing and enabling factors matter more than need for the discretionary use of health care (Andersen, 1968).

Findings from the logistic regression analysis of the final *Behavioral Model of Latinas Breast Cancer Screening Use* showed that an older age, being unacculturated, a recent physician visit in the past year, a lower recent level of cognitive distress about developing breast cancer, and a higher confidence in filling out medical forms were key to ensuring compliance with current mammography screening guidelines among Latinas. A recent physician visit was the most significant predictor of screening in this study, suggesting that above all, access and entry into the health care system is critical to receipt of mammography screening among Latinas (e.g., Zambrana, et al., 1999).

A discussion of this study's results in regards to the *Behavioral Model* and *Behavioral Model of Latina Breast Cancer Screening Use* are outlined below. Discussion of specific findings related to this study's research questions, implications for future research, and implications for interventions are included.

### *Behavioral Model of Health Services Use*

Exploratory and confirmatory analyses suggested that a modified *Behavioral Model* – where age was treated as an enabling not a predisposing variable – provided a reasonable framework for examining breast cancer screening behavior for Latina women

40 years and older in this sample. These findings suggest that within different disease contexts, various factors may play unique roles in utilization behaviors. Future studies should empirically examine the structure of the *Behavioral Model* within the context of different diseases, health care utilization types, and ethnic populations (Nunnally & Bernstein, 1994; Lucas, 2003; Vandenberg & Lance, 2000). Contrary to previous research, (Andersen, 1995; Gelberg, Andersen, & Leake, 2000) age was treated as an enabling variable in this study. Because an older age is a risk factor for breast cancer incidence (NCI, 2007b; 2008a) and federal screening recommendations and state insurance coverage laws are age-specific, these factors together may cause older women to be enabled to have a greater frequency of mammography screening use than younger women. To confirm this enabling effect of age, future studies are needed to examine age in relation to use of other preventive health services, such as colorectal cancer or cholesterol screening.

The second goal of this study was to determine what predisposing, enabling and need factors were associated with an increased likelihood of breast cancer screening among Latinas. Overall, predisposing and need-related variables were not associated with screening in bivariate analyses; however all the enabling variables had significant bivariate relationships with screening (Table 3). In the adjusted regression model of need-related variables, none of the predictors were significantly related to screening (Table 6), contrary to what was hypothesized. In the adjusted regression model of the enabling variables, age (OR = 1.062), private health insurance (OR = 2.391), and a recent physician visit (OR = 3.336) positively predicted the likelihood of mammography

screening in the last two years, which did support this study's hypotheses. Public health insurance did not predict screening, once adjusting for other enabling variables.

A closer examination of the predisposing variables revealed that language-based acculturation and education went from non-significant in bivariate analyses (Table 3) to significant in the partial logistic regression model [acculturation OR = 1.560 (1/0.641); education OR= 2.999] (Table 4). In fact, further analyses revealed that education was suppressed by language-based acculturation and language-based acculturation was suppressed by education and country of birth. Suppressor variables are more common than researchers tend to believe (Rosenberg, 1973) and should not necessarily be excluded once discovered because they may provide key insight for future research. Suppressors can improve the predictability of the outcome variable (Collins & Schmidt, 1997; Conger & Jackson, 1972; Tzelgov & Henik, 1991) and may contribute to theory development (Collins & Schmidt, 1997). Omitting suppressors could potentially increase the risk of a Type II error of rejecting a true hypothesis as false (Rosenberg, 1973) which could lead to a misinterpretation of results (Collins & Schmidt, 1997). Suppressors can also lend interesting information about the relationship among predictors and the criterion that needs to be explored further (Rosenberg, 1973) in order to confirm that the suppression effect was not due to chance (Collins & Schmidt, 1997).

While this study found that enabling factors mattered more than need and predisposing factors (Tables 8 and 9), once the non-significant country of birth predisposing variable was omitted, (Table 7), the combination of predisposing and enabling variables explained a significant proportion of the variance in breast cancer screening. Findings from this enabling/predisposing model that excluded country of birth

showed that Latinas who had a high school education or greater (OR = 3.528), a lower language-based acculturation [OR = 1.859 (1 / 0.538)], a greater age, (OR = 1.076) and a recent physician visit in the last year (OR = 3.350), were more likely to obtain a recent mammogram in the past two years than Latinas without these characteristics, adjusting for other variables (Table 7); and private and public insurance were not significant. This collection of variables suggest that older Spanish-speaking Latinas who have graduated high school and who have had a recent doctor visit are also likely to have received a mammogram within the last two years, irrespective of insurance coverage.

These results also imply that enabling and certain predisposing variables (i.e., education and language-based acculturation) contribute significantly to the prediction of screening. These results support the original assumptions of the *Behavioral Model,* suggesting that for the discretionary use of health care - such as breast cancer screening - the more likely use will be based on predisposing and enabling factors rather than need (Andersen, 1968). Since research suggests that enabling factors, such as health insurance and a usual source of care matter more for breast cancer screening than predisposing factors such as education and acculturation (Zambrana, et al., 1999), studies are needed to explore these relationships further. Studies are also needed to determine the extent to which predisposing and need-related domains matter in the face of enabling domains for other disease contexts, types of health care use, and ethnic populations.

*Behavioral Model of Latina Breast Cancer Screening Use*

The confirmatory analyses suggested that for this sample of Latinas, the *Behavioral Model of Latina Breast Cancer Screening Use* created in this study provided a reasonable framework for examining breast cancer screening behavior (Figure 6).

Future studies are needed to empirically test this model in order to determine how dependable it is across disease contexts, health care utilization types, and ethnic populations (Lucas, 2003; Nunnally & Bernstein, 1994). Findings from the logistic regression analysis of the *Behavioral Model of Latinas Breast Cancer screening Use* showed that these two context-specific variables significantly added to the prediction of mammography screening use. In fact, a lower language-based acculturation [OR = 1.965 (1 / 0.509)], a greater age (OR = 1.087), a recent physician visit in the past year (OR = 4.170), a greater confidence in filling out medical forms (OR= 1.701), and a lower level of cognitive distress about developing breast cancer (OR = 1.718 (1/ 0.582) were important facilitators to breast cancer screening use. Education and private insurance were marginally insignificant ($p < .10$), adjusting for the preceding variables (Table 11). Given that education and health literacy were related - those with a high school degree or more had a higher confidence in filling out medical forms ($M = 4.39$, $SD = 0.83$, $n = 98$) than those with less than a high school education ($M = 3.58$, $SD = 1.09$, $n = 109$) (T = 5.951 (df = 205, p = .000) - perhaps health literacy took away some of the variance in the relationship between education and screening, suggesting that education should be excluded. However, a post-hoc analysis showed that the two variables that were being suppressed (education and language-based acculturation) added significantly to the *Behavioral Model of Latina Breast Cancer Screening Utilization's* prediction of screening (Table S, Appendix D), thus supporting their inclusion in the final model.

Some of these findings support prior research showing that a higher health literacy (Guerra, Krumholz, & Shea, 2005), visiting a physician in the past year (Frazier, Jiles, & Mayberry, 1996; Gorin & Heck, 2005) and a higher age (Fernandez & Morales,

2007) promote mammography screening use among Latinas and how extremely high levels of worry and distress create a barrier to mammography screening (Andersen, et al., 2003; Schwartz, Taylor, & Willard, 2003). However, other study findings contradicted prior research which has showed that health insurance is the leading predictor of mammography screening among Latinas, (Carrasquillo & Pati, 2004; Rodriguez, et al., 2005), and a higher language-based acculturation (Gorin & Heck, 2005; O'Malley, Kerner, Johnson, & Mandelblatt, 1999) and higher education predict screening after controlling for other factors (Gorin & Heck, 2005; Jones, Caplan, & Davis, 2003).Thus, findings from this San Diego sample did not fully replicate what other researchers have found when examining predictors of breast cancer screening among Latinas.

*Predisposing, Enabling, Need, and Contextual Predictors*

*Enabling Factors*

Although this study failed to replicate previous study findings showing that Latinas over the age of 50 are more likely to use mammography than those aged 40 to 49, (Fernandez & Morales, 2007; Gorin & Heck, 2005), this study did find a positive relationship between age and recent mammography screening, in adjusted and unadjusted analyses. Since this study included age as an enabling variable, studies are needed to determine what component of age enables screening, such as age-specific physician referral systems or personal motivations to obtain a mammogram, stemming from cancer risk awareness or knowledge of age-appropriate cancer screenings exams. Post-hoc analyses revealed there were no age differences between those who have been to see a physician in the past year and those who have not (T = 1.668 (df = 205) p = .097), but those who had insurance were significantly older ($M$ = 52.04, $SD$ = 9.45, $n$ = 140) than

those without insurance ($M$ = 48.89, $SD$ = 6.89, $n$ = 67) (T = 2.433 (df = 208) p = .016). However, since Latinas with health insurance and who were employed[15] were significantly younger ($M$ = 49.81, $SD$ = 6.83, $n$ = 97) than Latinas with health insurance and unemployed ($M$ = 57.30, $SD$ = 12.55, $n$ = 41) (T = - 4.517 (df = 136), p = .000), there is little evidence to suggest that employment status explained the link between a higher age and likelihood of insurance coverage. Thus, studies should examine the relationship between age and health insurance in relation to other enabling resources, such as income.

A recent physician visit remained the most significant predictor of recent mammography screening adjusting for other enabling variables, (OR = 3.336) and adjusting for variables in the *Behavioral Model of Latinas Breast Cancer Screening Use* (OR = 4.170) (Tables 5 and 11). These results substantiate prior research showing that visiting a physician in the past year (Gorin & Heck, 2005) predicted Latina breast cancer screening, adjusting for other variables. This suggests that above all, access and entry into the health care system is critical to receipt of mammography screening among Latinas (e.g., Zambrana, et al., 1999). In order to resolve why a physician visit may matter so much, research is needed to determine if an increased exposure to the health care system, somewhat like a dosage effect, promotes screening among Latinas. Research is also needed to understand the role that physicians as trusted sources of information plays in patients' motivation to obtain mammograms (Metsch, et al., 1998).

This study failed to replicate previous research showing that health insurance was the strongest predictor of having a mammogram for Latinas (Abraido-Lanza, Chao, &

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[15] In this sample, 60.6% ($n$ = 123) were currently employed ($n$ = 110 employed for wages and $n$ = 13 self-employed) and 39.4% ($n$ = 80) were unemployed ($n$ = 5 retired, $n$ = 47 homemaker, $n$ = 6 on social security/SSI, $n$ = 10 unable to work, $n$ = 11 out of work, and $n$ = 1 student).

Gammon, 2004; Carrasquillo & Pati, 2004; Rodriguez, et al., 2005). Although private insurance was related to screening adjusting for enabling variables (Table 5), private and public insurance did not significantly predict screening adjusting for variables in the *Behavioral Model of Latina Breast Cancer Screening Use* (Table 11). Since previous studies show that either private or public insurance predict mammography screening among Latinas (Gorin & Heck, 2005), the role that insurance plays in the process of obtaining a mammogram needs to be explored further.

Perhaps health insurance was not found to be as nearly important as previous studies because of a context-specific phenomenon unique to this study. One plausible explanation is the availability and utilization of federally-qualified community health centers (CHCs) throughout San Diego County that offer bilingual breast cancer screening services for the underinsured and uninsured[16]. In fact, most (63.5%, $n = 132$) of the sample of Latinas 40 years and older were recruited by staff of one such federally-qualified CHC located in northern San Diego County and 36.5% (n = 76) were recruited by UCSD staff. Although CHC staff were instructed not to recruit from the CHC patient population, it is possible that patients were recruited at community-based events in the catchment area of the CHC. Recruitment data from the entire sample of 503 Latinas 18 years and older, showed that CHC staff recruited 42.5% (n = 149) through community-

[16] Across the United States, there are around 1,200 federally-funded community health centers (CHCs), that provide comprehensive health care services, such as mammography screening at free or reduced rates, for around 15 million underserved patients annually; underserved patients include the under-insured and uninsured, and other disadvantaged groups, such as the elderly, homeless, migrant farmworkers, and public housing residents (National Association of Community Health Centers (NACHC), 2008a; 2009). Many CHCs have bilingual staff; in 2007, of the 260 CHCs surveyed, 84% had Spanish-speaking staff and 68% had more than 10% of their patients who were Spanish-speaking (NACHC, 2008c). In California, 110 federally-funded CHCs with 796 health care delivery sites served 2.3 million patients in 2007 (NACHC, 2008b). In 2007, 45% of California CHC patients were uninsured compared to 19% of the state; 76% of patients were at or below 100% of poverty compared to 19% of the state; and 62% of patients were Latino compared to 36% of the state (NACHC, 2008b). In San Diego, there were 92 delivery sites in 2009 (Health Resources and Services Administration, 2009).

based events hosted by the CHC, (e.g., health fair) (Appendix A). Given that CHC staff did not inquire potential participants if they were CHC patients, it is entirely possible that a significant proportion of women recruited by the CHC were indeed clinic patients.

Post-hoc analyses showed that there was no significant difference in likelihood of recent mammography screening [$\chi^2$ (1, 202) = 2.722, p = .099] and a recent physician visit [$\chi^2$ (1, 207) = 2.325, p = .127] based on CHC versus UCSD recruitment. However, those recruited by UCSD were more likely to have insurance (81.6%, $n$ = 62) than those recruited by the CHC (59.5%, $n$ = 78) [$\chi^2$ (1, 207) = 10.670, p = .001]; and of those with health insurance, those recruited by the CHC were more likely to have public as opposed to private (33.8%, $n$ = 25) versus those recruited from UCSD (8.3%, $n$ = 5) [$\chi^2$ (1, 74) = 12.352, p = .000]. Even though CHC-recruited participants were more likely to be uninsured or have public health insurance, they did not differ in their mammography screening rates. This might suggest that communities can link to available local resources and opportunities that override the negative consequences of being uninsured, which may help explain why insurance was not an important predictor of screening relative to other factors in the current study. Research is needed to examine these specific community and healthcare contextual pathways that positively influence screening.

*Predisposing Factors*

Although prior research has found that a having at least a high school degree (Jones, Caplan, & Davis, 2003), or at least a college degree (Gorin & Heck, 2005) predicts breast cancer screening use among Latinas in multivariate analyses; in this study, the relationship between education and screening was concealed until acculturation was accounted for. In fact, language-based acculturation suppressed some of the irrelevant

variance of the relationship between education and screening (Rosenberg, 1973), meaning, the uniqueness of education unrelated to acculturation is what predicted screening. Since some studies show that education does not relate to Latina breast cancer screening use after adjusting for other variables (Fernandez & Morales, 2007), research is needed to confirm the suppression effect was not due to chance (Collins & Schmidt, 1997) and to clarify the causal mechanisms by which education leads to screening.

The original *Behavioral Model* assumed that education leads towards a greater knowledge of health, diseases, and available health care services (Andersen, 1968). Education may relate to employment and higher income (Muller, 2002; U.S. Census Bureau, 2006d), which increase access to resources that enable utilization of preventive health care services (Andersen, 1968; Heck & Makuc, 2000). In fact, Latinas in this sample who were employed were more likely to have insurance (79.5%, $n = 97$) than those not employed (51.3%, $n = 41$) [$\chi^2$ (1, 202) = 17.825, p = .000], however, employment status was not associated with recent mammography screening [$\chi^2$ (1, 198) = 0.827, p = .363]. Future studies should examine how education, employment status and other resources such as income relate to use of mammography screening among Latinas.

In this study, the relationship between language-based acculturation and screening was concealed until education and country of birth were accounted for. In fact, these two variables suppressed some of the irrelevant variance of the relationship between language-based acculturation and screening (Rosenberg, 1973), meaning, the uniqueness of acculturation unrelated to these two variables is what predicted screening. Since acculturation has been defined as the cultural change process of adopting language, attitudes, values, and behaviors from another culture (Suarez, 1994; Wells, 1989), future

studies should explore aspects of the acculturation process other than language that could be relevant to screening, irrespective of education level and country of birth.

Studies show that a limited English proficiency is a barrier to accessing and using health services because of the difficulty of communicating with and understanding providers (Doty, 2003; Salazar, 1996). Spanish-language has been shown to be a barrier to mammography screening among Latinas (Gorin & Heck, 2005; O'Malley, et al., 1999; Ortero-Sabogal, et al., 2003; Suarez & Pulley, 1995); however sometimes it makes no difference, after considering other demographic factors (Fernandez & Morales, 2007; Suarez, 1994). Results from this study contrast the literature that deems Spanish-language usage as a barrier to mammography screening use, which leads one to question the unique characteristics of the Southern California context that allowed predominately Spanish-speaking Latinas in this study to obtain mammography screening, irrespective of their education level and country of birth. Around 30% of San Diego County residents are Latino, (U.S. Census Bureau, 2006b), of which a significant portion is unacculturated (e.g., in 2007 18.6% of Latinos spoke only Spanish at home) (http://www.chis.ucla.edu) and a significant portion of community health centers (CHCs) and private sector health care systems, such as Sharp Healthcare (http://www.sharp.com), throughout the county offer bilingual health care services. Perhaps in this context, English-language proficiency was not found to be as nearly important as in previous studies.

Studies show that foreign-born Latinas are more (Rodriguez, Ward, & Perez-Stable, 2005) or less likely (Goel, et al., 2003; Otero-Sabogal, et al., 2003) to receive mammography screening, and other studies show that Latina foreign birth did not predict mammography screening (Valdez, et al., 2001); and this study sought to clarify these

mixed findings. In fact, study results showed no relationship between nativity and screening, even after controlling for other factors. Even though research shows that Latina immigrants are likely to report barriers to accessing health care services (Garces, Scarinci, & Harrison, 2006), U.S. and Mexican-born Latina participants did not differ in their likelihood of having a recent physician visit [$\chi^2$ (1, 197) = .946, p = .331]. Although U.S.-born Latinas were more likely to be insured and have a higher education than Mexican-born Latinas[17], country of birth did not predict screening in the presence of factors, such as education and insurance (Tables 4 and 8). Studies should assess other aspects of nativity, such as citizenship status or time since immigration, that may create barriers to knowing how and being able to navigate the local health care system.

*Need-related Factors*

Health-related quality of life, (including health status, recent unhealthy days, and recent activity limitation), was not significantly related to screening in this study. Given that prior research has shown that a higher health-related quality of life positively predicts health care utilization (Dominick, et al., 2002) and a higher health status predicted breast cancer screening in Latinas, even after adjusting for other factors (Fernandez & Morales, 2007), research is needed to fully examine the role of mental and physical health status in health behaviors, such as breast cancer screening.

*Context-specific Factors*

Having a personal or family history was not related to screening, which contrasts prior research showing that a personal or family history of cancer increased the likelihood

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[17]U.S.-born Latinas (85.1%, *n* = 40) were more likely than Mexican-born Latinas (35.3%, n = 53) to have a high school education or greater [$\chi^2$ (1, 197) = 35.574, p = .000] and U.S.-born Latinas (85.1%, *n* = 40) were more likely that Mexican-born Latinas (60.7%, *n* = 91) to be insured [$\chi^2$ (1, 197) = 9.595, p = .002].

of breast cancer screening among Latinas (Aparicio-Ting & Ramirez, 2003; Cohen, 2006; Gorin & Heck, 2005). Since a personal/family history of breast cancer has been shown to increase one's perceived risk of developing cancer (Kim, et al., 2008), future studies are needed to examine the relationship among a history of breast cancer, perceived cancer risk and breast cancer screening among Latinas.

Cancer fatalistic beliefs were not related to screening in this study, which contrasts prior research showing that cancer fatalistic beliefs impede Latina's use of breast cancer screening exams (Hubbell, et al., 1997). Fatalistic beliefs are thought to promote an external locus of control, causing individuals to believe that they have no control over their health, which can deter mammography utilization (Barroso, et al., 2000; Borrayo & Guarnaccia, 2000; Niederdeppe & Levy, 2007). Latinas in this study tended to have moderate levels of fatalistic beliefs, which supports prior research (Borrayo & Jenkins, 2001; Chavez, et al., 1997; Florez, et al., 2008; Hubbell, et al., 1996); perhaps these beliefs were not severe enough to impede screening. Research is needed to examine the relationship between health locus of control, severity of fatalistic beliefs, and mammography screening use.

Religiosity were not related to screening, which contrasts prior research showing that church attendance was associated with breast cancer screening among Latinas (Otero-Sabogal, et al., 2003). Given that religiosity is a key facet of Latino culture that can promote positive health behaviors (Magaña & Clark, 1995), studies are needed to further examine the role that different components of religiosity among Latinas play in health behaviors such as mammography screening.

Frequency of assistance used in reading hospital materials was not associated with screening. In bivariate and multivariate analyses, confidence in filling out medical forms was a significant predictor of screening, which supports previous research showing that an adequate level of health literacy was associated with mammography screening in Latinas (Guerra, Krumholz, & Shea, 2005). Since a low health literacy level relates to a lack of knowledge about the importance of and reason for screening mammography, which may relate to underutilization of mammography (Davis, Arnold, & Berkel, 1996), research is needed to examine the interplay of health literacy and other predisposing and enabling variables, such as education and income, in predicting use of screening among Latinas. Studies are also needed to understand additional components of health literacy, such as knowledge of navigating the health care system and informed decision making (Selden, Zorn, Ratzan, & Parker, 2000), and how these relate to patient's perceptions of provider cultural competency, patient satisfaction with patient-provider communication (DeVoe, Wallace, & Fryer, 2009; Lloyd, Ammary, Epstein, Johnson, & Rhee, 2006), and use of mammography screening services.

Breast cancer worry was not associated with screening in this sample. However, in bivariate and multivariate analyses, lower levels of breast cancer distress were associated with an increased likelihood of screening, which supported findings in previous studies where extremely high levels of worry and distress decreased the likelihood of mammography among Latinas (Andersen, et al., 2003; Schwartz, Taylor & Willard, 2003). Worry is sometimes considered the cognitive aspect of the anxiety and may function as an adaptive coping mechanism in attempting to psychologically prepare for an external threat (Hay, Buckley, & Ostroff, 2005; Kubzansky, et al., 1997). Future

studies are needed to examine how aspects of extreme levels worry, distress, and cognitive aspects of anxiety impede health behaviors among Latinas and how these thoughts may be overcome.

### *Implications for Interventions*

The results of this study yield several implications that may inform future research and the development of breast cancer screening promotion interventions for Latinas 40 years and older. Breast cancer screening utilization in this sample differed by level of education, age, acculturation, health literacy, cognitive distress about developing breast cancer, and whether women have visited a physician recently. Thus, interventions need to be tailored to the context of women's lives and may vary depending on the predisposing, enabling, and need-related characteristics of the target population.

Research shows that interventions that were culturally-tailored, incorporated the health belief model, or included physician recommendations significantly increased breast cancer screening adherence in diverse samples (Sohl & Moyer, 2007). Indeed, results from this study imply that individual behavioral change interventions to increase breast cancer screening adherence among Latinas should be culturally and linguistically tailored based on the level of health literacy, language of choice, and extent of cognitive distress about developing breast cancer experienced. System-level change interventions should focus on incorporating concepts of increasing access to care, such as age-based targeting of patients or promoting mammography referrals by general practice physicians (Legler, Meissner, Coyne, Breen, Chollette, & Rimer, 2002; Sohl & Moyers, 2007). Since no other factor was consistently more predictive of adherence to breast cancer screening guidelines, the encouragement to have an annual physical examination appears to be the single most important message health educators need to convey.

## Study Limitations

This study has several limitations. One limitation is that the secondary data for this study were derived from a cross-sectional self-report survey, which although can be considered a snapshot of participants' reality, limited the ability to develop causal inferences about the relationships among variables examined in this study. Inherent in the cross-sectional design was the focus on retrospective accounts of the amount of time since their last mammogram. This limitation could be overcome by examining patterns of mammography utilization over time. Perhaps future studies can also include independent observations of screening, obtained from health care providers or medical records, to verify the reliability of self-reported mammography screening. Another limitation of this study was the single geographic focus from which the convenient sample of study participants was drawn. All participants were recruited throughout San Diego County, California and most of the sample was recruited by community clinic staff, thus, generalizations to other areas in the United States must be made with caution. Not all of the measures had reliable estimates since several variables were single items (e.g., age, health insurance, and recent physician visit) rather than aggregate reliable scale scores; thus, unreliability of selective independent and dependent variables cannot be completely ruled out as a potential influence on this study's results. In addition, the assumptions of the Andersen Behavioral Model are limited in the sense that the model does not take into account significant contextual features (e.g., time, changes in health insurance coverage, and changes in recommended standards of utilization) that may affect the predisposing, enabling, and need factors and the utilization outcome of interest. There is also a need for longitudinal studies that can examine the sequencing of events that trigger obtainment of

mammography screening services to determine if an annual examination leads to subsequent receipt of mammography screening utilization. Despite these limitations, results from this study have the potential to lend insight to future research, community-based health promotion, and primary care practice in relation to increasing breast cancer screening adherence among Latinas in Southern California.

# CONCLUSION

Increasing breast cancer screening usage is one key tactic in comprehensive cancer control by minimizing the proportion of late-stage diagnoses (True, Kean, Nolan, Haviland, & Hohman, 2005). This study used theoretically-driven analyses to determine significant predictors of breast cancer screening utilization among Latinas 40 years and older in San Diego County, California. Using Andersen's *Behavioral Model of Health Services Use* (Andersen, 1995) as a framework, the *Behavioral Model of Latina Breast Cancer Screening Use* was developed in this study and provided a reasonable framework for explaining and predicting breast cancer screening behavior in this sample of 208 Latinas 40 years and older.

Healthcare policy-makers and community-based practitioners working with Latinas should recognize the importance of individual characteristics and behaviors, such as acculturation, health literacy, age, access to healthcare, and distressful cognitions about developing breast cancer, as crucial facilitators or impediments to mammography screening use among this population. Public health researchers should incorporate the *Behavioral Model of Latina Breast Cancer Screening Use* framework into the process of designing culturally appropriate evidence-based cancer control interventions. Future research is needed to determine if this framework applies to other Latina health behaviors and to other recent immigrant populations to the United States.

This study showed that access to care matters in the process of obtaining preventive services since no other factor was consistently more predictive of adherence breast cancer screening guidelines than undergoing an annual examination. In fact, having a recent physician visit in the last year increased the odds of having a recent

mammogram by 3 or 4 times in adjusted logistic regression models. Future research should explore the role that culturally competent primary care providers as trusted sources of health information play in motivating Latinas to obtain preventive health care services (Metsch, et al., 1998). Future research is also needed to explore the application of the Foot-in-the-Door theory (Burger, 1999; Pascual & Gueguen, 2005), by which access to the health care system through non-invasive means leads to an increased receptivity to recommendations for mammography screening and other more invasive procedures.

# APPENDICES

APPENDIX A

Recruitment Strategies

| Recruitment Location | Strategy | Interviewer (# of Surveys Collected) |
|---|---|---|
| Community-based Clinic event | Word-of-mouth, phone, and internet bulletin | VCC (n=149) |
| Hospital/clinic staff | Word-of-mouth | UCSD (n=15) |
| University staff (main campus and medical centers) | Word-of-mouth | UCSD (n=41) |
| Participant's Home | Phone, email, and word-of-mouth | UCSD (n= 38)<br>VCC (n=114) |
| Participant's Workplace | Phone, flyer, and word-of-mouth | UCSD (n=9)<br>VCC (n=29) |
| Latino Organization (community-based, professional, or educational) | Phone, email, and word-of-mouth | UCSD (n=18)<br>VCC (n=22) |
| Church | Word-of-mouth | VCC (n=37) |
| Community Center | Word-of-mouth | UCSD (n=19) |
| | Recruitment Totals | UCSD (n=140)<br>VCC (n=351)<br>Total (N=491) |

Note: UCSD= Staff from the Moores UCSD Cancer Center Outreach Department, University of California, San Diego (located in La Jolla, California), who recruited participants throughout Central and Southern San Diego County, CA.
Note: VCC= Staff from the Health Promotion Center, Vista Community Clinic (located in Vista, CA), who recruited participants throughout North San Diego County, CA.
Note: Total sample size was n=503 (n=144 (28.6%) participants were recruited and had surveys administered by UCSD and n=359 (71.4%) participants were recruited and had surveys administered by VCC.

APPENDIX B

Consent Documents

English Consent Document

**UCSD Informed Consent Document**

Dr. Georgia Robins Sadler, Associate Director for Outreach at the Moores UCSD Cancer Center and Ms. Natasha Riley, MA Program Manager for Vista Community Clinic are conducting a research study to evaluate the effectiveness of a breast cancer clinical trials education program. The program has been specifically developed to help adult African American and Hispanic American women to learn about clinical trials. You have been asked to participate in the study because you are believed to be a member of one of these two communities.

There are three parts to this study. You are being asked to participate in study checked below.

□ **Study 1** Many surveys have been developed to evaluate people's health and well-being. Few have been proven to work when given to Hispanic Americans. This study is inviting 250 English-speaking and 250 Spanish-speaking women to complete some of the surveys that are frequently used in health and research settings. Those responses will allow us to learn if the surveys work equally well for Hispanic women. The Vista Community Clinic is inviting 500 Hispanic American women to complete those surveys. It will take about 10 minutes to complete the informed consent process and another 40 minutes to complete the surveys. There will also be time afterward for discussion or additional questions once the surveys have been completed. You will also be asked if you would like to help invite other women to join this study. You will be offered light refreshments while you complete the surveys and $20 for your time.

□ **Study 2** The National Cancer Institute created a clinical trials education program and then modified it so it would be culturally appropriate for Hispanics. After testing, the program was not proven to be effective and no program was ever created specifically for the African American community. We have modified the original program in a way that we think will make them useful for both communities. Now we would like to ask you to watch them and give us your opinion of how useful and acceptable these programs will be to your community. The program is approximately 45 minutes plus time for discussion and questions and answers. You will be offered light refreshments and $35 for your time. We are asking 80 African American and Hispanic American women to help with these focus groups.

□ **Study 3** This is a pilot study that will begin to test the clinical trials education programs that are developed in the second study. First you will complete the surveys that were found to be useful in Study 1 and answer some general knowledge questions. Then half of the group will receive the program developed in Study 2 and the other half will

participate in a different health program. After you complete the program, you will be asked to answer some questionnaires again. You will be compensated $35 for your time. We will invite 20 African American, 20 English-speaking Hispanic American, and 20 Spanish-speaking Hispanic American women to join this study.

Participation in this study will help raise awareness about health issues related to breast cancer clinical trials education. The information you learn may benefit you or your family members or other members of your community in the future. Collectively, what we learn from you should help us offer more effective clinical trials education in the future and that will potentially benefit the entire community.

*All personal information that you provide (such as your name, address, e-mail address, phone number) will remain confidential. The only known risk to participating in this study is that an unauthorized person may illegally gain access to university files in spite of the University's and research staff members' best efforts to avoid this possibility. To reduce this risk, personal identifiable information is kept separately from other study information.*

Participation is voluntary. You may discontinue participation at any time without penalty or loss of benefits. If you have study related questions or wish to report a concern please contact Dr. Sadler at (858) 534-7611. If you have other research related questions or are injured as a result of this study, call the Human Research Protection Program at (858) 455-5050.

You have received a copy of this consent document and a copy of the Experimental Subject's Bill of Rights for your records.

Dr. Sadler, Ms. Riley, or one of their assistants _____ has explained this study to you. By signing below you are agreeing to take part in this study.

| | |
|---|---|
| _____ | _____ |
| Participant Signature | Date |
| _____ | _____ |
| Witness Signature | Date |

Spanish Consent Document

**UCSD Documento de Consentimiento Informado**

Dra. Georgia Robins Sadler, Directora Asociada de 'Outreach' del Centro para Cáncer Moores de UCSD y Natasha Riley, Gerente del Programa MA de la Clínica de la Comunidad de Vista, dirigen la investigación y los estudios para evaluar la efectividad de un programa de educación sobre las pruebas clínicas del cáncer de seno. El programa es desarrollado específicamente para ayudar a las mujeres Hispanas y Afro Americanas adultas, para dar a conocer las pruebas clínicas. Le hemos pedido que participe en el estudio porque usted es creído ser un miembro de una de estas comunidades.

La investigación consiste de tres estudios. Le pedimos que participe en el marcado a continuación:

□ **Estudio 1.** Se han desarrollado muchas encuestas para evaluar la salud y el bienestar, sin embargo, muchas fallan cuando se les dan a los Hispanos Americanos. Este estudio consiste en invitar a 250 mujeres Hispanas que hablan Español y 250 que hablan Inglés a responder parte de las encuestas que son usadas comúnmente en lugares de salud e investigación. Las respuestas nos permitirán aprender si dichas encuestas tienen la misma efectividad con la mujer Hispana. La Clínica de la Comunidad de Vista ha invitado a 500 mujeres Hispano Americanas a completar las encuestas. Le tomará unos 10 minutos para el procedimiento para su consentimiento y otros 40 minutos para contestar las encuestas. Además, tendrá tiempo extra para hacer preguntas adicionales, después de completar la encuesta. También le pediremos si gusta invitar a otras mujeres para participar en este estudio. Le ofrecemos $20 dólares y bebidas ligeras por su tiempo.

□ **Estudio 2.** El Instituto Nacional del Cáncer creo el programa de educación para pruebas clínicas y después lo modificó para hacerlo culturalmente adecuado para los Hispanos Americanos. Después de las pruebas se encontró que el programa no es efectivo y no se creo ningún programa específico para la mujer Afro Americana. Hemos modificado el programa original de forma que creemos será útil para ambas comunidades. Hoy, le pedimos que lo vea y nos diga, en su opinión ¿Qué útiles y aceptados serán estos programas en su comunidad? Su duración es de 45 minutos, más tiempo extra para preguntas y respuestas, se le ofrecen bebidas ligeras y $35 dólares por su tiempo. Se le pedirá a 80 mujeres Hispano Americanas y Afro Americanas que nos ayuden con estos grupos.

□ **Estudio 3.** Este es un estudio piloto para empezar a probar los programas de educación para las pruebas clínicas, que serán desarrollados en el Estudio 2. Primero deberá contestar algunas preguntas de conocimiento general y las encuestas que se encontraron útiles en el Estudio 1. La mitad del grupo recibirá el programa desarrollado en el Estudio 2 y la otra mitad participará en un programa de salud diferente. Después de completar el programa se le pedirá que conteste otras encuestas. Se le ofrecen bebidas ligeras y $35 dólares por su tiempo. Se le pedirá participación a 20 Hispano Americanas y 20 Afro Americanas que hablan Inglés y 20 Hispano Americanas que solo hablan Español.

Su participación en estos estudios nos ayuda a concientizar sobre los problemas del cáncer de seno y las pruebas clínicas para educación y salud. La información que usted aprenda le puede beneficiar en el futuro, así como a su familia y a otros miembros de la comunidad. Lo que aprendemos de usted, potencialmente deberá ayudarnos a dar mejor educación sobre las pruebas clínicas que puede beneficiar a la comunidad entera.

*Toda la información que usted nos dé (nombre, domicilio, teléfono y correo electrónico) es confidencial. El único riesgo posible es sí alguna persona no autorizada, a pesar de los mejores esfuerzos del personal universitario para evitar esta posibilidad, pueda obtener acceso a los archivos de la universidad. Para reducir este riesgo, la información identificable se mantiene separada del resto del estudio.*

Su participación es voluntaria y puede suspenderla en cualquier momento, sin penalidad o pérdida de sus beneficios. Si tiene alguna pregunta o quiere reportar alguna preocupación, por favor llame a la Dra. Sadler al (858) 534-7611. Si tiene otras preguntas relacionadas al estudio o se ha lastimado como resultado de participar, llame por favor al Programa de Protección para Investigaciones Humanas al (858) 455-5050.

Para su información y registros, se le ha entregado una copia de este Documento de Consentimiento Informado y una copia de Las Leyes y Derechos de los Sujetos a Experimentación.

La Dra. Sadler, Sra. Riley, o uno de sus asistentes _____ le ha explicado este estudio.

Con su firma abajo usted acepta participar en este estudio.

_____ _____

Firma del Participante Fecha

_____ _____

Firma del Testigo Fecha

APPENDIX C

Selected Pages from English and Spanish Surveys

**PERSONAL HEALTH SURVEY**

Please answer the questions the best you can. You may skip questions that make you uncomfortable.

**BACKGROUND**

**1. What is your date of birth (mm/dd/yyyy)?** __ __/__ __/__ __ __ __

**2. What is your current employment status?**

O Employed for wages
O Self-employed
O Out of work for **more** than one year
O Out of work for **less** than one year
O Homemaker
O Student
O Retired
O Unable to work
O SSI

**3. What is your marital status?**

O Married
O Divorced
O Widowed
O Separated
O Never been married
O Living with a partner

**4. Do you have children?**

O No O Don't know O Yes →

**a. IF YES: How many?** _____

**5. What is the highest level of school you completed?**

O Never attended school or only attended nursery school/kindergarten
O Elementary school or primary school
O Middle school or junior high school
O Some high school but no diploma
O High school graduate (high school diploma or equivalent, such as GED, foreign equivalent)
O Vocational or trade school graduate

O Some college, but no degree
O Associate degree in college
O Bachelor's degree
O Master's degree
O Professional school or doctorate degree (MD, DDS, JD, DVM, Ph.D., Ed.D., etc.)
O Don't know

**6. What is your religious preference?**

O Christian
O Catholic
O Jewish
O Muslim/Islamic
O Buddhist
O Unitarian/Universalist
O Hindu
O Native American
O None
O Other _____

**7. In what country were <u>you</u> born?** _____

**<u>HEALTH CARE ACCESS</u>**

**8. Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMO's, or government plans such as Medicare/MediCal?**

O No O Don't know O Yes →

**a. IF YES: What type?**

O Medi-Cal/Medicaid
O Medicare
O HMO
O PPO
O Employer-provided
O Other _____

**9. Was there a time in the past 12 months when you needed to see a doctor but couldn't?**

O No O Don't know O Yes →

**a. IF YES: Why couldn't you go?**

O Did not know where to go
O Language barriers (Didn't understand; no Hispanic/bilingual staff)

O Don't have a regular doctor
O No health insurance
O Cost too much (for co-pay or sliding scale fee)
O Lack of doctors who provide services to Medicaid patients
O Lack of transportation (or lack of money for gas)
O Lack of time (had to work)
O Fear of being reported to the immigration service
O Not sick
O Other_____

**10. About how long has it been since you last visited a doctor for a routine checkup? A routine checkup is a general physical exam, not an exam for a specific injury, illness, or condition.**

O Within past year (anytime less than 12 months ago)
O Within past 2 years (1 year but less than 2 years ago)
O Within past 5 years (2 years but less than 5 years ago)
O 5 or more years ago
O Don't know
O Never

**11. Have you ever been to a traditional healer like a curandero?**

O No O Don't know O Yes →

**a. If yes, how long ago did you see the healer?** _____ (months)

**b. Where did you go see the healer?** _____ (country)

**c. What type of healer was it?**

O Curandero (faith healer)
O Huesero (bone-setter)
O Espiritualista (spiritualist)
O Sobador (massage therapist)
O Yerbero (herbalist)

**d. What problem did you go to the healer for?**

_____

**e. Why did you go to the healer instead of the clinic or doctor?**

O Some illnesses cannot be treated by clinical medicine.
O Less expensive than clinical medicine
O Have tried clinical care, and it did not work
O Someone advised me to see a traditional healer
O Prefer natural medicines
O Other_____
O Don't know

**12. A mammogram is an x-ray of each breast to look for breast cancer. Have you ever had a mammogram?**

O No O Don't know O Yes →

**a. IF YES: How long has it been since you had your last mammogram?**

- O Within past year (anytime less than 12 months ago)
- O Within past 2 years (1 year but less than 2 years ago)
- O Within past 5 years (2 years but less than 5 years ago)
- O 5 or more years ago
- O Don't know
- O Never

**13. A clinical breast exam is when a doctor, nurse, or other health professional feels the breast for lumps. Have you ever had a clinical breast exam?**

O No O Don't know O Yes →

**a. IF YES: How long has it been since your last breast exam?**

- O Within past year (anytime less than 12 months ago)
- O Within past 2 years (1 year but less than 2 years ago)
- O Within past 5 years (2 years but less than 5 years ago)
- O 5 or more years ago
- O Don't know
- O Never

**14. Has a family member ever had breast cancer?**

O No O Don't know O Yes →

**a. IF YES: Which family member?**

- O Mother
- O Grandmother
- O Sister
- O Aunt
- O Cousin
- O Other _____

**15. Have you ever had breast cancer?**

O No O Don't know O Yes

## ENCUESTA SOBRE LA SALUD PERSONAL Y FAMILIAR

Por favor responda las preguntas lo mejor que pueda. Se puede pasar las preguntas que lo hagan sentir incomodo.

**ANTECEDENTES**

1. **¿Su fecha de nacimiento (mes/día/año)?** __ __/__ __/__ __ __ __

2. **¿Cuál es su posición de empleo actual?**
   - O Empleo a salariado
   - O Auto-empleado
   - O Sin trabajo por **más** de un año
   - O Sin trabajo por **menos** de un año
   - O Ama de casa
   - O Estudiante
   - O Retirada
   - O Incapacitada para trabajar
   - O Seguro Social (SSI)

3. **¿Cuál es su estado civil?**
   - O Casada
   - O Divorciada
   - O Viuda
   - O Separada
   - O Soltera
   - O Viviendo con mi pareja

4. **¿Tiene niños?**

   O No  O Sí →

   **a. Si sí: ¿Cuántos?** _____

5. **¿Cuál es su nivel más alto de escolaridad completado?**
   - O Nunca asistí a la escuela, o solo al kínder
   - O Primaria
   - O Secundaria
   - O Preparatoria, pero sin diploma o certificado
   - O Graduada de preparatoria (diploma, certificado o equivalente extranjero, ejemplo GED)
   - O Graduada de escuela vocacional o técnica
   - O Universidad, pero sin diploma o certificado
   - O Certificado Universitario Asociado
   - O Diploma o certificado de licenciatura
   - O Diploma o certificado de Maestría

O Doctorado de Escuela Profesional Universitaria (Doctor, Dentista, Abogado, Doctorado, etcétera)
O No sé

**6. ¿Cuál es su preferencia religiosa?**

O Cristiana
O Católica
O Judía
O Musulmana / Islámica
O Budista
O Unitaria / Universalista
O Hindú
O Nativa Americana
O Ninguna
O Otra _____

**7. ¿En qué país nació usted?** _____

## ACCESO A CUIDADOS DE SALUD

**8. ¿Tiene cualquier tipo de cobertura de salud? Incluyendo: Seguro médico, planes HMO, o del gobierno como Medicare o Medi-Cal?**

O No O No sé O Sí →

**a. Si sí: ¿De qué tipo?**

O Medi-Cal / Medicaid
O Medicare
O HMO
O PPO
O Proporcionado por su trabajo (empresa)
O Otro _____

**9. ¿En los últimos 12 meses, necesitó ver a un doctor pero no pudo?**

O No O No sé O Sí →

**a. Si sí: ¿Por qué no pudo verlo?**

O No sabía dónde acudir
O Problemas de idioma (No entendía; no tenían personal Hispano/bilingüe en español)
O No tengo un doctor regular
O No tengo seguro de salud (médico)
O Muy caro (de co-pay o pago escalonado)
O Falta de doctores para los pacientes de Medicaid
O Falta de transporte (o dinero para gasolina)

O Falta de tiempo (tenía que trabajar)
O Temor de ser reportada a los servicios de migración (migra)
O No he estado enferma
O Otra razón _____

**10. ¿Más o menos hace cuánto que le hicieron un examen médico de rutina? Un examen de rutina en general es una revisión física, no por causa de herida, enfermedad o condición especial.**

O En este año (cualquier vez en los últimos 12 meses)
O Últimos 2 años (más de un año, pero menos de dos)
O En los últimos 5 años (más de dos, pero menos de cinco)
O 5 o más años
O No sé
O Nunca

**11. ¿Alguna vez ha consultado a un curandero tradicional?**

O No O No sé O Sí →

**a. Si sí ¿hace cuánto tiempo que vio al curandero?**_____ (meses)
**b. ¿Dónde vio al curandero?** _____ (país)

**c. ¿Qué tipo de curandero?**
O Curandero
O Huesero
O Espiritualista
O Sobador
O Yerbero

**d. ¿Por qué problema fue al curandero?**

_____

**e. ¿Por qué fue al curandero en lugar de ir a un doctor o a una clínica?**
O Porque algunas enfermedades no pueden ser curadas por la medicina clínica
O Más barato que la medicina clínica
O He tratado con la medicina clínica pero no sirvió
O Alguien me recomendó al curandero tradicional
O Prefiero la medicina naturista
O Otro _____
O No sé

**12. Una mamografía son rayos-X en cada seno para buscar cáncer. ¿Alguna vez le han hecho una mamografía?**

O No O No sé O Sí →

**a. Si sí: ¿Hace cuánto tiempo le hicieron su última mamografía?**

O En este año (cualquier vez en los últimos 12 meses)
O Últimos 2 años (más de un año, pero menos de dos)
O En los últimos 5 años (más de dos, pero menos de cinco)
O 5 o más años
O No sé
O Nunca

**13. Un examen clínico de los senos es cuándo un doctor, enfermera, u otro profesional de salud palpa su seno buscando bultos. ¿Alguna vez le han hecho un examen clínico de seno?**

O No O No sé O Sí →

**a. Si sí: ¿Cuánto hace de su último examen clínico de seno?**

O En este año (cualquier vez en los últimos 12 meses)
O Últimos 2 años (más de un año, pero menos de dos)
O En los últimos 5 años (más de dos, pero menos de cinco)
O 5 o más años
O No sé
O Nunca

**14. ¿Ha tenido un miembro de la familia el cáncer de seno?**

O No O No sé O Sí →

**a. Si sí: ¿Cuál miembro familiar?**

O Mamá
O Abuela
O Hermana
O Tía
O Prima
O Otro _____

**15. ¿Ha tenido usted el cáncer de seno?**

O No O No sé O Sí

**Health Literacy (English)**

1. How confident are you filling out medical forms by yourself?

   (1) Extremely (2) Quite a bit (3) Somewhat (4) A little bit (5) Not at all

2. How often do you have someone (like a family member, friend, hospital/clinic worker, or caregiver) help you read hospital materials?

   (1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never

**Health Literacy (Spanish)**

1. ¿Cuánta confianza siente usted para llenar las formas médicas?

   (1) Mucha (2) Suficiente (3) Regular (4) Poca (5) Nada

2. ¿Qué tan frecuente le ayuda alguien a leer los materiales del hospital? (familiar, amiga, trabajador del hospital / clínica, cuidador)

(1) Siempre (2) Frecuente (3) A veces (4) Ocasional (5) Nunca

**Language-based Acculturation (English)**

**BASH**

The next questions are about your use of English and Spanish.

| | Only Spanish (1) | Spanish more than English (2) | Both Equally (3) | English more than Spanish (4) | Only English (5) |
|---|---|---|---|---|---|
| 1. In general, what language do you read and speak? | | | | | |
| 2. What language do you usually speak at home? | | | | | |
| 3. In what language do you usually think? | | | | | |
| 4. What language do you usually speak with your friends? | | | | | |

**Language-based Acculturation (Spanish)**

**BASH- Español**

*Las próximas preguntas son acerca de su uso de inglés y español.*

| | Solo Español (1) | Español más que Inglés (2) | Los Dos Por Igual (3) | Inglés más que Español (4) | Solo Inglés (5) |
|---|---|---|---|---|---|
| 1. En general, ¿Qué lenguaje Ud. lee y habla? | | | | | |
| 2. ¿Qué idioma habla usualmente en su hogar? | | | | | |
| 3. ¿En qué idioma piensa usualmente? | | | | | |
| 4. ¿En qué idioma habla usualmente con sus amigos? | | | | | |

**DUREL: Duke University Religion Index (English)**

Directions: Please answer the following questions about your religious beliefs and/or involvement. Please indicate your answer with a checkmark.

(1) How often do you attend church or other religious meetings?

1. More than once/wk
2. Once a week
3. A few times a month
4. A few times a year
5. Once a year or less
6 Never

(2) How often do you spend time in private religious activities, such as prayer, meditation or Bible study?

1. More than once a day
2. Daily
3. Two or more times/week
4. Once a week
5. A few times a month
6. Rarely or never

*The following section contains 3 statements about religious belief or experience. Please mark the extent to which each statement is true or not true for you.*

(3) In my life, I experience the presence of the Divine (i.e., God).

1. Definitely true of me
2. Tends to be true
3. Unsure
4. Tends *not* to be true
5. Definitely *not* true

(4) My religious beliefs are what really lie behind my whole approach to life.

1. Definitely true of me
2. Tends to be true
3. Unsure
4. Tends *not* to be true
5. Definitely *not* true

(5) I try hard to carry my religion over into all other dealings in life.

1. Definitely true of me
2. Tends to be true
3. Unsure
4. Tends *not* to be true
5. Definitely *not* true

**DUREL: Duke University Religion Index (Spanish)**

Para las preguntas 1 y 2, rodee con un círculo el número que sea más adecuado:

1. ¿Con cuanta frecuencia atiende usted a la iglesia u otros encuentros religiosos?

1. Nunca
2. Una vez al año o menos
3. Unas pocas veces al año
4. Unas pocas veces al mes
5. Una vez a la semana
6. Más de una vez a la semana

2. ¿Con cuanta frecuencia dedica usted tiempo a actividades religiosas privadas, como por ejemplo rezar, meditar, o estudiar la Biblia?

1. Más de una vez al día
2. Diariamente
3. Dos o más de dos veces al día
4. Una vez a la semana
5. Unas pocas veces al mes
6. Raras veces o nunca

*Lea las siguientes frases y rodee con un círculo el número que sea más adecuado:*

3. En mi vida, yo siento la presencia de lo Divino (por ejemplo, Dios)
    1. Definitivamente no es cierto
    2. Tiende a no ser cierto
    3. No estoy segura
    4. Tiende a ser cierto
    5. Definitivamente cierto para mi

4. Mis creencias religiosas son lo que realmente está detrás de mi enfoque hacia la vida.
    1. Definitivamente no es cierto
    2. Tiende a no ser cierto
    3. No estoy segura
    4. Tiende a ser cierto
    5. Definitivamente cierto para mi

5. Trato de llevar mis fundamentos religiosos a todos los demás aspectos de mi vida.
    1. Definitivamente no es cierto
    2. Tiende a no ser cierto
    3. No estoy segura
    4. Tiende a ser cierto
    5. Definitivamente cierto para mi

## HEALTH RELATED QUALITY OF LIFE (HRQOL-4) (English)

**1. Self-Perceived Health**

Would you say that in general your health is:

O Excellent
O Very good
O Good
O Fair
O Poor

**2. Recent Physical Health**

Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?

_____

### 3. Recent Mental Health

Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?

_____

### 4. Recent Activity Limitation

During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?

_____

## Calidad de la Vida en Relación a La Salud (HRQOL-4) (Spanish)

### 1. Estado de Salud

¿Diría usted que su estado de salud general es:

O Excelente
O Muy bueno
O Bueno
O Regular
O Malo

### 2. Salud Física Reciente

Con respecto a su estado de salud física, lo que incluye tanto enfermedades como lesiones físicas, ¿cuántos días durante los últimos 30 días tuvo problemas de salud?

_____

### 3. Salud Mental Reciente

Con respecto a su estado de salud mental, lo que incluye estrés, depresión y problemas emocionales, ¿cuántos días durante los últimos 30 días sintió que su estado de salud mental no era bueno?

_____

### 4. Limitación Reciente de Actividad

Durante los últimos 30 días, ¿en cuántos días sintió que los problemas relacionados con su salud mental o física le impidieron realizar sus actividades habituales, tales como cuidados personales, trabajo o recreación?

_____

## Cancer Worry Scale (English)

During the past month, how often have you thought about your own chances of developing breast cancer?

| Not at all, or rarely | Sometimes | Often | Almost all the time |
|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 |

During the past month, how often have you worried about your own chances of developing breast cancer?

| Not at all, or rarely | Sometimes | Often | Almost all the time |
|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 |

During the past month, how often have thoughts about your chances of getting breast cancer affected your mood?

| Not at all, or rarely | Sometimes | Often | Almost all the time |
|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 |

During the past month, how often have thoughts about your chances of getting breast cancer affected your ability to perform daily activities?

| Not at all, or rarely | Sometimes | Often | Almost all the time |
|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 |

The next question asks about any feelings of distress you may have about your risk of breast cancer. During the past four weeks, which one of the following best describes you?

☐ 1 Generally happy and free from worry
☐ 2 Occasionally distressed
☐ 3 Often distressed
☐ 4 Almost always or extremely distressed

If yes to 4, would you say you have been so extremely distressed that you require hospitalization?

☐ Yes
☐ No

**Cancer Worry Scale (Spanish)**

**Escala de Preocupación del Cáncer**

Durante el mes pasado ¿Que tanto ha pensado usted en su propia posibilidad de desarrollar cáncer de seno?

| Nunca/raramente | A veces | Frecuentemente | Casi todo el tiempo |
|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 |

Durante el mes pasado ¿Qué tanto se ha preocupado usted en la posibilidad de desarrollar cáncer de seno?

| Nunca/raramente | A veces | Frecuentemente | Casi todo el tiempo |
|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 |

Durante el mes pasado ¿Qué tanto le ha afectado la posibilidad de tener cáncer de seno en su estado de ánimo?

| Nunca/raramente | A veces | Frecuentemente | Casi todo el tiempo |
|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 |

Durante el mes pasado ¿Qué tanto le ha afectado la posibilidad de tener cáncer de seno en su habilidad para hacer sus actividades diarias?

| Nunca/raramente | A veces | Frecuentemente | Casi todo el tiempo |
|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 |

La siguiente pregunta es acerca de sus sentimientos de estrés, por la posibilidad del riesgo del cáncer de seno. Durante las últimas cuatro semanas ¿Cual descripción siguiente la describe mejor?

☐ 1 Generalmente feliz y libre de preocupación
☐ 2 Estresada ocasionalmente
☐ 3 Estresada frecuentemente
☐ 4 Casi siempre o estresada extremadamente

Si responde sí a la anterior (4), ¿Diría que ha estado tan estresada que requeriría hospitalización?

☐ Sí
☐ No

**Powe Fatalism Inventory (English)**

Directions: Please answer the following questions.

| | | |
|---|---|---|
| 1. I think if someone is meant to have cancer, it doesn't matter what kinds of food they eat, they will get cancer anyway. | *YES* | *NO* |
| 2. I think if someone has cancer, it is already too late to get treated for it. | *YES* | *NO* |
| 3. I think someone can eat fatty foods all their life, and if they are not meant to get cancer, they won't get it. | *YES* | *NO* |
| 4. I think if someone is meant to get cancer, they will get it no matter what they do. | *YES* | *NO* |
| 5. I think if someone gets cancer, it was meant to be. | *YES* | *NO* |
| 6. I think if someone gets cancer, their time to die is soon. | *YES* | *NO* |
| 7. I think if someone gets cancer, that's the way they were meant to die. | *YES* | *NO* |
| 8. I think getting checked for cancer makes people scared that they may really have cancer. | *YES* | *NO* |
| 9. I think if someone is meant to have cancer, they will have cancer. | *YES* | *NO* |
| 10. I think some people don't want to know if they have cancer because they don't want to know they may be dying from it. | *YES* | *NO* |
| 11. I think if someone gets cancer, it doesn't matter whether they find it early or late, they will still die from it. | *YES* | *NO* |
| 12. I think if someone has cancer and gets treatment for it, they will probably still die from the cancer. | *YES* | *NO* |
| 13. I think if someone was meant to have cancer, it doesn't matter what doctors and nurses tell them to do, they will get cancer anyway. | *YES* | *NO* |
| 14. I think if someone is meant to have cancer, it doesn't matter if they eat healthy foods, they will still get cancer. | *YES* | *NO* |
| 15. I think cancer will kill you no matter when it is found and how it is treated. | *YES* | *NO* |

**Powe Fatalism Inventory (Spanish)**

**Tabla de Fatalismo de Powe**

Instrucciones: Por favor conteste las siguientes preguntas. Marque sus respuestas con un círculo en la contestación correcta.

| | | |
|---|---|---|
| 1. Yo pienso que si a una persona le va a dar cáncer, no importa qué tipo de comidas coma, de todos modos le va a dar cáncer. | *SI* | *NO* |
| 2. Yo pienso que si alguien tiene cáncer, ya es demasiado tarde para tratar de buscar tratamiento. | *SI* | *NO* |
| 3. Yo pienso que una persona puede comer comida con grasa toda su vida, pero si no le toca que le de cáncer, no le va a dar cáncer. | *SI* | *NO* |
| 4. Yo pienso que si a una persona le va a dar cáncer, le va a dar no importa lo que haga. | *SI* | *NO* |
| 5. Yo pienso que si a una persona le da cáncer, así le tocaba. | *SI* | *NO* |
| 6. Yo pienso que si a una persona le da cáncer, esa persona se va a morir pronto. | *SI* | *NO* |
| 7. Yo pienso que si le da cáncer a una persona, ese es el modo en cual le tocaba morirse a esa persona. | *SI* | *NO* |
| 8. Yo pienso que a la gente le da miedo examinarse para el cáncer porque les da miedo que de veras vayan a tener cáncer. | *SI* | *NO* |
| 9. Yo pienso que si a una persona le toca que le de cáncer, le va a dar cáncer. | *SI* | *NO* |
| 10. Yo pienso que algunas personas no quieren saber si tienen cáncer, porque no quieren saber si ya se están muriendo de esa enfermedad. | *SI* | *NO* |
| 11. Yo pienso que si alguien tiene cáncer, no importa si se lo encuentran temprano o tarde, porque de todos modos va a morir de cáncer. | *SI* | *NO* |
| 12. Yo pienso que si alguien tiene cáncer y recibe tratamiento para curarse, de todas maneras se va a morir de esta enfermedad. | *SI* | *NO* |
| 13. Yo pienso que si a una persona le toca que le de cáncer, no importa qué le digan los doctores y enfermeras que haga, de todos modos le va a dar cáncer. | *SI* | *NO* |
| 14. Yo pienso que si a una persona le toca que le de cáncer, no importa si come comidas saludables, pues de todos modos le va a dar cáncer. | *SI* | *NO* |
| 15. Yo pienso que el cáncer matará a una persona no importa cuando lo encuentren o como lo curen. | *SI* | *NO* |

APPENDIX D

Descriptive and Bivariate Statistics

Table A. *Descriptive Statistics for Categorical Variables (Total Sample)*

| Variable | Response | | % (n) |
|---|---|---|---|
| Chosen language for survey administration | English | | 43.8 (92) |
| | Spanish | | 56.3 (117) |
| | | Total | 100.0 (208) |
| Age categories | 40-49 years old | | 49.5 (103) |
| | 50+ years old | | 50.5 (105) |
| | | Total | 100.0 (208) |
| What is the highest level of school you completed? | Never attended or only nursery school/ kindergarten | | 3.9 (8) |
| | Elementary or primary school | | 25.1 (52) |
| | Middle or junior high school | | 16.9 (35) |
| | Some high school but no diploma | | 6.8 (14) |
| | High school graduate | | 17.4 (36) |
| | Vocational or trade school graduate | | 5.8 (12) |
| | Some college but no degree | | 14.0 (29) |
| | Associate degree in college | | 3.9 (8) |
| | Bachelor's degree | | 3.4 (7) |
| | Master's degree | | 2.9 (6) |
| | | Total | 100.0 (207) |
| Education Categories | Did not graduate high school | | 52.7 (109) |
| | High school graduate or higher | | 47.3 (98) |
| | | Total | 100.0 (207) |
| Do you have any kind of health care coverage? | Yes | | 67.6 (140) |
| | Otherwise | | 32.4 (67) |
| | | Total | 100.0 (207) |
| Health insurance type categories | Private (HMO, PPO, or military) | | 51.7 (104) |
| | Public (Medicaid or Medicare) | | 14.9 (30) |
| | No health insurance | | 33.3 (67) |
| | | Total | 100.0 (201) |
| About how long has it been since you last visited a doctor for a routine checkup? | <1 year ago | | 67.1 (139) |
| | 1 year to < 2 years ago | | 15.0 (32) |
| | 2 + years ago | | 11.6 (24) |
| | Don't know | | 1.4 (3) |
| | Never | | 4.8 (10) |
| | | Total | 100.0 (207) |

| Variable | Response | | % (n) |
|---|---|---|---|
| Recent physician visit categories | < 1 year ago | | 67.1 (139) |
| | Otherwise | | 32.9 (68) |
| | | Total | 100.0 (207) |
| In what country were you born? | Mexico | | 76.3 (151) |
| | United States | | 23.7 (47) |
| | | Total | 100.0 (205) |
| Has a family member ever had breast cancer? | Yes | | 26.4 (55) |
| | No | | 68.3 (142) |
| | Don't know | | 5.3 (11) |
| | | Total | 100.0 (208) |
| If "yes", who? | 1st degree relative (mother, sister, daughter) | | 32.7 (18) |
| | Other family (aunt, niece, grandmother, in-law) | | 67.3 (37) |
| | | Total | 100.0 (55) |
| Have you ever had breast cancer? | Yes | | 2.9 (6) |
| | No | | 93.3 (194) |
| | Don't know | | 3.8 (8) |
| | | Total | 100.0 (208) |
| History of breast cancer categories | Personal or family history of breast cancer | | 28.4 (59) |
| | Otherwise | | 71.6 (149) |
| | | Total | 100.0 (208) |
| Have you ever had a mammogram? (40+) | Yes | | 84.6 (176) |
| | No | | 14.9 (31) |
| | Don't know | | .5 (1) |
| | | Total | 100.0 (208) |
| If yes, how long has it been since you had your last mammogram? (40+) | < 1 year ago | | 57.4 (116) |
| | 1 year to < 2 years ago | | 18.8 (38) |
| | 2 + years ago | | 7.9 (16) |
| | Don't know | | .5 (1) |
| | Never | | 15.3 (31) |
| | | Total | 100.0 (202) |
| Time since last mammogram (40+) | < 1 year ago | | 57.4 (116) |
| | Otherwise | | 42.6 (86) |
| | | Total | 100.0 (202) |

| Variable | Response | | % (n) |
|---|---|---|---|
| Time since last mammogram (50+) | < 1 year ago | | 63.4 (64) |
| | Otherwise | | 36.6 (37) |
| | | Total | 100.0 (101) |
| Time since last mammogram (40+) | < 2 years ago | | 76.2 (154) |
| | Otherwise | | 23.8 (48) |
| | | Total | 100.0 (202) |
| Time since last mammogram (40-49) | < 2 years ago | | 71.3 (72) |
| | Otherwise | | 28.7 (29) |
| | | Total | 100.0 (103) |

Table B. *Comparison of Sample Demographics with County and State Data*

| Variable | Response | | Sample (Latinas, 40+) % (n) | San Diego County (Latinas, 40+) % (n) | California (Latinas, 40+) % (n) |
|---|---|---|---|---|---|
| Age[a] | 40-49 years old | | 49.5 (103) | 46.1 (56,000) | 44.7 (832,000) |
| | 50+ years old | | 50.5 (105) | 55.9 (65,000) | 55.3 (1,028,000) |
| | | Total | 100.0 (208) | 100.0 (121,000) | 100.0 (1,860,000) |
| Education[a] | Did not graduate high school | | 52.7 (109) | 60.2 (61,000) | 54.1(858,000) |
| | High school or higher | | 47.3 (98) | 39.8 (40,000) | 45.9 (729,000) |
| | | Total | 100.0 (207) | 100.0 (101,000)** | 100.0 (1,587,000) |
| Has health insurance[a] | Yes | | 67.6 (140) | 77.5 (93,000) | 79.1 (1,471,000) |
| | Otherwise | | 32.4 (67) | 22.5 (27,000) | 20.9 (389,000) |
| | | Total | 100.0 (207) | 100.0 (120,000)* | 100.0 (1,860,000)* |
| Health insurance categories[a] | Private | | 51.7 (104) | 52.4 (63,000) | 45.3 (842,000) |
| | Public | | 14.9 (30) | 25.1 (30,000) | 33.8 (629,000) |
| | None | | 33.3 (67) | 22.5 (27,000) | 20.9 (389,000) |
| | | Total | 100.0 (201) | 100.0 (120,000)* | 100.0 (1,860,000)* |
| Country of birth[a] | Mexico | | 76.3 (151) | 62.5 (70,000) | 53.8 (836,000) |
| | United States | | 23.7 (47) | 37.5 (42,000) | 45.9 (714,000) |
| | | Total | 100.0 (198) | 100.0 (112,000)* | 100.0 (1,555,000)* |
| Ever had a mammogram[a] | Yes | | 84.6 (176) | 85.7 (104,000) | 88.0 (1,637,000) |
| | No | | 15.4 (32) | 14.3 (17,000) | 12.0 (224,000) |
| | | Total | 100.0 (208) | 100.0 (121,000) | 100.0 (1,861,000) |
| Mammogram within the past 2 years (40 +)[b] | Yes | | 76.2 (154) | n/a | 76.4 (274) |
| | No | | 23.8 (48) | | 23.6 (89) |
| | | Total | 100.0 (202) | | 100.0 (363) |
| Mammogram within the past 2 years (50+)[b] | Yes | | 81.2 (82) | n/a | 84.8 (168) |
| | No | | 18.8 (19) | | 15.2 (35) |
| | | Total | 100.0 (101) | | 100.0 (203) |
| Health status[a] | Excellent | | 8.3 (17) | 16.8 (20,000) | 10.2 (190,000) |
| | Very Good | | 19.0 (39) | 17.7 (21,000) | 20.0 (372,000) |
| | Good | | 37.1 (76) | 27.4 (33,000) | 30.7 (571,000) |
| | Fair | | 29.8 (61) | 32.3 (39,000) | 31.0 (576,000) |
| | Poor | | 5.9 (12) | 5.8 (7,000) | 8.1 (151,000) |
| | | Total | 100.0 (205) | 100.0 (120,000)* | 100.0 (1,860,000) |

[a] Source: 2007 California Health Interview Survey (http://www.chis.ucla.edu/; San Diego County, California sample only includes Latinas 40 years and older.

[b] Source: 2006 Behavioral Risk Factor Surveillance Survey Data (http://apps.nccd.cdc.gov/BRFSS/); California sample only includes Latinas 40 years and older.

Note: Chi-square tests were used to compare state versus sample and county versus sample data.

*Difference from sample data statistically significant ($p \leq .01$)

**Difference from sample data statistically significant ($p \leq .05$)

*Table C. Descriptive Statistics of Scales and Continuous Items (Total Sample)*

| Dimensions | Scale and Item # | M (SD) (N= 208) | Range of Scores | Possible Range | Cronbach Alpha | Skew | Kurtosis |
|---|---|---|---|---|---|---|---|
| Language-based acculturation[1] | BASH #1-4 | 2.35(1.34) (n=200) | 1-5 | 1-5 | .96 | .65 | -.91 |
| Intrinsic religiosity | DUREL #3-5 | 4.44 (.80) (n=204) | 1-5 | 1-5 | .75 | -1.61 | 2.05 |
| Organizational religiosity | DUREL #1 | 3.24 (1.27) (n=194) | 1-5 | 1-6 | n/a | -.12 | -1.25 |
| Nonorganizational religiosity | DUREL #2 | 3.12 (1.39) (n=162) | 1-5 | 1-6 | n/a | -.41 | -1.26 |
| Predetermination | PFI #1,4,5,9 | .45 (.36) (n= 198) | 0-1 | 0-1 | .76 | .14 | -1.34 |
| Inevitability of death | PFI #11,12,15 | .17 (.31) (n=204) | 0-1 | 0-1 | .78 | 1.69 | 1.51 |
| Fear | PFI #8,10 | .65 (.39) (n=206) | 0-1 | 0-1 | .32* | -.58 | -1.11 |
| Breast cancer worry | CWS #1-3 | 1.68 (.67) (n=205) | 1-4 | 1-4 | .86 | .99 | .66 |
| Distress about breast cancer | CWS #5 | 1.59 (.71) (n=206) | 1-4 | 1-4 | n/a | 1.20 | 1.50 |
| Self-rated health status | HRQOL #1 | 3.06 (1.03) (n=205) | 1-5 | 1-5 | n/a | -.26 | -.45 |
| Summary index for unhealthy days[2] | HRQOL #2-3 | 9.57 (11.00) (n=201) | 0-30 | 0-30 | n/a | .94 | -.66 |
| Days of activity limitation[3] | HRQOL #4 | 5.37 (9.23) (n=147) | 0-30 | 0-30 | n/a | 1.86 | 2.18 |
| Days of activity limitation(New)[4] | HRQOL #4 | 1.13 (.20) (n=147) | 1-1.6 | 1-1.6 | n/a | 1.44 | .70 |
| Confidence in filling out medical forms | HL #1 | 3.96 (1.05) (n=208) | 1-5 | 1-5 | | -.874 | .170 |
| Assistance needed for reading | HL#2 | 3.75 (1.37) (n=207) | 1-5 | 1-5 | .24* | -.688 | -.761 |
| Age continuous | Age #1 | 50.98 (8.81) (n=208) | 40+ | 40.01-80.35 | n/a | 1.33 | 1.77 |

*Correlation is significant at the .01 level;

[1]Higher scores denote higher acculturation to English language usage, greater religiosity, higher levels of breast cancer worry and distress, higher levels of fatalistic beliefs, higher health literacy (more confidence in filling out forms and less assistance needed reading), higher age; and lower self-rated health status

[2]Sum of physical and mental distress in the last 30 days

[3]Activity limitation due to physical/ mental distress in the last 30 days (valid only if previous item "summary index for unhealthy days" is > 0)

[4]Transformed variable [new activity limitation= log10 (activity limitation + 10)]

Tables D-P. Psychometric Properties of Scales (English and Spanish Versions)

Table D. *Brief Acculturation Scale for Hispanics (BASH): Language-based Acculturation*

| Language-based Acculturation | English (n=87) | | Spanish (n=113) | |
|---|---|---|---|---|
| Items | Mean (SD) | Item-Total Correlations | Mean (SD) | Item-Total Correlations |
| 1 In general, what language do you read and speak? | 3.59 (1.06) | .86 | 1.61(.78) | .67 |
| 2 What language do you usually speak at home? | 3.46 (1.25) | .88 | 1.39 (.70) | .75 |
| 3 What language do you usually think? | 3.53 (1.30) | .91 | 1.41 (.78) | .59 |
| 4 What language do you usually speak with your friends? | 3.56 (1.26) | .91 | 1.37 (.70) | .73 |

| Version | Mean (SD) | Range of Scores | Possible Range | Cronbach Alpha |
|---|---|---|---|---|
| Spanish | 1.44 (.61) | 1-3 | 1-5 | .84 |
| English | 3.53 (1.14) | 1-5 | 1-5 | .95 |

Note: Scale ranges from 1- 5, with higher scores indicating greater acculturation, (1= only Spanish, 2= Spanish more than English, 3=both equally, 4= English more than Spanish, and 5=only English).

Table E. *Duke University Religion Inventory (DUREL): Organizational Religiosity*

Item 1 How often do you attend church or other religious meetings?

| Version | Mean (SD) | Range of Scores | Possible Range | Cronbach Alpha |
|---|---|---|---|---|
| Spanish | 3.17 (1.22) | 1-5 | 1-6 | n/a |
| English | 3.32 (1.34) | 1-5 | 1-6 | n/a |

Note: Scale ranges from 1- 6, with higher scores indicating more religiosity, (1= never, 2= once a year or less, 3=a few times a year, 4= a few times a month, 5=once a week, and 6= more than once a week).

Table F. *Duke University Religion Inventory (DUREL): Non-Organizational Religiosity*

Item 2 How often do you spend time in private religious activities, such as prayer, mediation or Bible study?

| Version | Mean (SD) | Range of Scores | Possible Range | Cronbach Alpha |
|---|---|---|---|---|
| Spanish | 3.16(1.36) | 1-5 | 1-6 | n/a |
| English | 3.07 (1.44) | 1-5 | 1-6 | n/a |

Note: Scale ranges from 1- 6, with higher scores indicating more religiosity, (1= rarely or never, 2= a few times a month, 3=once a week, 4= two or more times a week, 5= daily, and 6= more than once a day).

Table G. *Duke University Religion Inventory (DUREL): Intrinsic Religiosity Subscale*

| | Intrinsic Religiosity | English (n=89) | | Spanish (n=115) | |
|---|---|---|---|---|---|
| | Items | Mean (SD) | Item-Total Correlations | Mean (SD) | Item-Total Correlations |
| 3 | In my life, I experience the presence of the Divine (i.e., God). | 4.47 (.94) | .65 | 4.67 (.81) | .41 |
| 4 | My religious beliefs are what really lie behind my whole approach to life. | 4.30 (.88) | .69 | 4.58 (.93) | .64 |
| 5 | I try hard to carry my religion over into all other dealings in life. | 4.08 (1.13) | .63 | 4.41 (1.00) | .66 |

| Version | Mean (SD) | Range of Scores | Possible Range | Cronbach Alpha |
|---|---|---|---|---|
| Spanish | 4.55 (.76) | 1-5 | 1-5 | .74 |
| English | 4.28( .84) | 1-5 | 1-5 | .80 |

Note: Scale ranges from 1- 5, with higher scores indicating more religiosity, (1= definitely not true of me, 2= tends to be true of me, 3=unsure, 4= tends to be true, and 5=definitely true of me).

Table H. *Powe Fatalism Scale (PFI): Predetermination Subscale*

| | Predetermination | English (n=86) | | Spanish (n=112) | |
|---|---|---|---|---|---|
| | Items | Mean (SD) | Item-Total Correlations | Mean (SD) | Item-Total Correlations |
| 1 | I think if someone is meant to have cancer, it doesn't matter what kinds of food they eat, they will get cancer anyway | .48 (.50) | .56 | .58 (.50) | .40 |
| 4 | I think if someone is meant to get cancer, they will get it no matter what they do | .55 (.50) | .66 | .51 (.50) | .49 |
| 5 | I think if someone gets cancer, it was meant to be | .34 (.48) | .58 | .39 (.49) | .536 |
| 9 | I think if someone is meant to have cancer, they will have cancer | .33 (.47) | .43 | .43 (.50) | .43 |

| Version | Mean (SD) | Range of Scores | Possible Range | Cronbach Alpha |
|---|---|---|---|---|
| Spanish | .48(.37) | 0-1 | 0-1 | .69 |
| English | .42 (.37) | 0-1 | 0-1 | .76 |

Note: Scale ranges from 0-1, with higher scores indicating more cancer fatalistic beliefs, (0= no, 1=yes).

Table I. *Powe Fatalism Scale (PFI): Inevitability of Death Subscale*

| Inevitability of Death | | English (n=88) | | Spanish (n=116) | |
|---|---|---|---|---|---|
| | Items | Mean (SD) | Inter Item Correlations | Mean (SD) | Item-Total Correlations |
| 11 | I think if someone gets cancer, it doesn't matter whether they find it early or late, they will still die from it | .11 (.32) | .66 | .14 (.35) | .65 |
| 12 | I think if someone has cancer and gets treatment for it, they will probably still die from the cancer | .20 (.41) | .52 | .16 (.36) | .69 |
| 15 | I think cancer will kill you no matter when it is found and how it is treated | .10 (.30) | .54 | .28 (.45) | .69 |

| Version | Mean (SD) | Range of Scores | Possible Range | Cronbach Alpha |
|---|---|---|---|---|
| Spanish | .19(.33) | 0-1 | 0-1 | .82 |
| English | .14 (.28) | 0-1 | 0-1 | .71 |

Note: Scale ranges from 0-1, with higher scores indicating more cancer fatalistic beliefs, (0= no, 1=yes).

Table J. *Powe Fatalism Scale (PFI): Fear Subscale*

| Fear | | English (n=90) | | Spanish (n=116) | |
|---|---|---|---|---|---|
| | Items | Mean (SD) | Inter-item Correlation | Mean (SD) | Inter-item Correlation |
| 8 | I think getting checked for cancer makes people scared that they may really have cancer | .61 (.49) | | .66 (.48) | |
| 10 | I think some people don't want to know if they have cancer because they don't want to know they may be dying from it | .74 (.44) | .32* | .60 (.49) | .34* |

| Version | Mean (SD) | Range of Scores | Possible Range |
|---|---|---|---|
| Spanish | .63 (.40) | 0-1 | 0-1 |
| English | .68 (.38) | 0-1 | 0-1 |

Note: Scale ranges from 0-1, with higher scores indicating more cancer fatalistic beliefs, (0= no, 1=yes).

Table K. *Powe Fatalism Scale (PFI): Deleted items based on factor analysis and reliability testing of English and Spanish versions*

Items originally part of the Predetermination Scale

3 I think someone can eat fatty foods all their life, and if they are not meant to get cancer, they won't get it

13 I think if someone was meant to have cancer, it doesn't matter what doctors and nurses tell them to do, they will get cancer anyway

14 I think if someone is meant to have cancer, it doesn't matter if they eat healthy foods, they will still get cancer

Item originally part of the Inevitability of Death Scale

7 I think if someone gets cancer, that's the way they were meant to die

Items originally part of the Pessimism Scale

2 I think if someone has cancer, it is already too late to get treated for it

6 I think if someone gets cancer, their time to die is soon

Table L. *Health Literacy: Confidence in filling out medical forms*

Item 1 How confident are you filling out medical forms by yourself?

| Version | Mean (SD) | Range of Scores | Possible Range | Cronbach Alpha |
|---|---|---|---|---|
| Spanish | 3.78 (.93) | 1-5 | 1-5 | n/a |
| English | 4.20 (1.16) | 1-5 | 1-5 | n/a |

Note: Scale ranges from 1- 5, with higher scores indicating more health literacy or greater confidence, (1= not at all, 2= a little bit, 3=somewhat, 4= quite a bit, and 5=extremely).

Table M. *Health Literacy: Assistance in reading hospital materials*

Item 2 How often do you have someone (like a family member, friend, hospital/clinic worker, or caregiver) help you read hospital materials?

| Version | Mean (SD) | Range of Scores | Possible Range | Cronbach Alpha |
|---|---|---|---|---|
| Spanish | 3.22 (1.36) | 1-5 | 1-5 | n/a |
| English | 4.43 (1.03) | 1-5 | 1-5 | n/a |

Note: Scale ranges from 1- 5, with higher scores indicating more health literacy or less help needed in filling out medical forms, (1= always, 2= often 3=sometimes, 4= occasionally, and 5=never).

Table N. *Cancer Worry Scale: Breast Cancer Worry*

| Breast Cancer Worry | English (n=89) | | Spanish (n=116) | |
|---|---|---|---|---|
| Items | Mean (SD) | Item-Total Correlations | Mean (SD) | Item-Total Correlations |
| 1 During the past month, how often have you thought about your own chances of developing breast cancer? | 1.70 (.73) | .78 | 1.76 (.78) | .73 |
| 2 During the past month, how often have you worried about your own chances of developing breast cancer? | 1.58 (.67) | .85 | 1.91 (.85) | .84 |
| 3 During the past month, how often have thoughts about your chances of getting breast cancer affected your mood? | 1.29 (.59) | .58 | 1.72 (.79) | .70 |

| Version | Mean (SD) | Range of Scores | Possible Range | Cronbach Alpha |
|---|---|---|---|---|
| Spanish | 1.80 (.72) | 1-4 | 1-4 | .87 |
| English | 1.52 (.59) | 1-3.33 | 1-4 | .86 |

Note: Scale ranges from 1- 4, with higher scores indicating more worry, (1= not at all, or rarely, 2= sometimes, 3=often, and 4= almost all the time).

Table O. *Cancer Worry Scale (CWS): Deleted item based on factor analysis and reliability testing of English and Spanish versions:*

Item originally part of the breast cancer worry scale

4 During the past month, how often have thoughts about your chances of getting breast cancer affected your ability to perform daily activities?

Table P. *Cancer Worry Scale: Breast Cancer Distress*

Item 5 The next question asks about any feelings of distress you may have about your risk of breast cancer. During the past 4 weeks, which of the following best describes you?

| Version | Mean (SD) | Range of Scores | Possible Range | Cronbach Alpha |
|---|---|---|---|---|
| Spanish | 1.72 (.76) | 1-4 | 1-4 | n/a |
| English | 1.42 (.62) | 1-4 | 1-4 | n/a |

Note: Scale ranges from 1- 4, with higher scores indicating more distress, (1= generally happy and free from worry, 2= occasionally distressed, 3=often distressed, and 4= almost always or extremely distressed).

Table Q. *Correlation Matrix Used for Confirmatory Factor Analysis*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1. EDU | -- | | | | | | | | |
| 2. BASH | .633** | -- | | | | | | | |
| 3. COB | .425** | .726* | -- | | | | | | |
| 4. INS | .383* | .412* | .221* | -- | | | | | |
| 5. PHYS | .131 | .065 | .069 | .286* | -- | | | | |
| 6. AGE | -.148** | .030 | .109 | .168** | .116 | -- | | | |
| 7. HRQOL1 | -.313* | -.256* | -.162** | -.241* | -.106 | .154** | -- | | |
| 8. HRQOL2 | -.066 | .001 | .018 | -.068 | -.018 | .155** | .318* | -- | |
| 9. HRQOL3 | -.005 | -.029 | .029 | .079 | .079 | .225* | .236* | .552* | -- |

Note: * P ≤ .01; ** P ≤ .05.

1) Education (dichotomous), 2) Language-based acculturation, 3) Country of birth (dichotomous), 4) Insurance (dichotomous), 5) Recent physician visit (dichotomous), 6) Age (continuous), 7) Health status, 8) Unhealthy days, and 9) Activity limitation.

Higher scores denote greater education, higher language-based acculturation, being U.S.-born (1= US, 0= Mexico), having insurance, a recent physician visit < 1 year, a greater age, a lower health status, less amount of unhealthy days, and a less amount of activity limitation.

Activity limitation is not transformed.

Table R. *Correlation Matrix of Variables in Final Behavioral Model of Latina Breast Cancer Screening Use, Used for Confirmatory Factor Analysis*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1. HL | -- | | | | | | | |
| 2. EDU | .384* | -- | | | | | | |
| 3. BASH | .318* | .633* | -- | | | | | |
| 4. AGE | -.195* | -.148** | .030 | -- | | | | |
| 5. INS | .174** | .383** | .412* | .168** | -- | | | |
| 6. PHYS | -.013 | .131 | .065 | .116 | .286* | -- | | |
| 7. WORRY | -.082 | -.195* | -.236* | .043 | -.014 | .099 | -- | |
| 8. DISTRESS | -.188* | -.108 | -.177** | -.008 | -.089 | -.042 | .378* | -- |

Note: * P ≤ .01; ** P ≤ .05.

1) Health literacy: confidence in filling out medical forms (continuous), 2) Education (dichotomous), 3) Language-based acculturation (continuous), 4) Age (continuous), 5) Insurance (dichotomous), 6) Recent physician visit (dichotomous), 7) Recent breast cancer worry (continuous), and 8) Recent breast cancer distress (continuous)

Note: Higher scores denote higher health literacy, greater education, higher language-based acculturation, a greater age being having insurance (1=yes, 0=no), a recent physician visit < 1 year (1=yes, 0=no), and greater recent worry and distress about one's own risk of developing breast cancer.

*Table S.* Behavioral Model of Latina Breast Cancer Screening Use, With and Without Suppressed Variables

| *Factors* | Model 1 Mammography (< 2 years)[a] | | | Model 2 Mammography (< 2 years)[b] | | |
|---|---|---|---|---|---|---|
| | OR | 95% C.I. | P-value | OR | 95% C.I. | P-value |
| Education | | | | | | |
| Less than high school[c] | -- | -- | -- | 1.00 | | |
| High school or greater | -- | -- | -- | 2.937 | (.854, 10.103) | 0.087^ |
| Language-based Acc. | -- | -- | -- | 0.509 | (.331, .782) | 0.002* |
| Age | 1.068 | (1.009, 1.130) | 0.023** | 1.087 | (1.025, 1.152) | 0.005* |
| Health insurance | | | | | | |
| None[c] | 1.00 | | | 1.00 | | |
| Public | 1.484 | (0.431, 5.102) | 0.531 | 2.038 | (0.525, 7.914) | 0.304 |
| Private | 1.632 | (0.694, 3.837) | 0.262 | 2.541 | (0.865, 7.468) | 0.090^ |
| Physician visit < 1 yr | | | | | | |
| No[c] | 1.00 | | | 1.00 | | |
| Yes | 4.610 | (2.055, 10.344) | 0.000* | 4.170 | (1.793, 9.698) | .001* |
| *Contextual Factors* | | | | | | |
| Breast cancer distress | 0.614 | (0.372, 1.014) | 0.056^ | .582 | (.347, .976) | .040** |
| Confidence in filling out medical forms | 1.517 | (1.039, 2.215) | 0.031** | 1.701 | (1.134, 2.552) | .010* |
| -2 log likelihood | 163.946[d] | | | 153.484[e, f] | | |

Note: C.I. = confidence interval. Analyses substituting the insurance dummy variables (private, public, and none) with a dichotomous variable (yes/no) and the continuous age with a dichotomous (40-49 versus 50+) variable changed the results slightly. Age became non-significant in Model 1(OR=1.745, CI=.801-3.802, p=.161) and Model 2 (OR=2.073, CI=.919-4.687, p=.079). An analysis without 4 outlier cases did not change the results.

^ Approaching significance at the .05 level (.05 > p < .10); * P ≤ .01; ** P ≤ .05

[a] $n$ = 186; [b] $n$ = 186; [c] Reference category;

[d] Model chi-square: 37.195 (df = 6, p = .000); GOF $\chi^2$ = 5.383, (df = 8, p = .716)

[e] Model chi-square: 47.657 (df = 8, p = .000); GOF $\chi^2$ = 6.392, (df = 8, p= .603)

[f] A Likelihood Ratio $\chi^2$ Test indicated that the two additional predisposing variables significantly added to the reduced model 1 [$\chi^2_{(2)}$ = 10.462 > critical value ($\chi^2_{2\ (\alpha=.01)}$ = 9.210), p ≤ .01].

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