2017

Self-Reported Health Status, Perceived Risk for Developing Breast Cancer, and Mammography Screening Use

Idara Sylvanus McPartling
Walden University

Walden University

College of Health Sciences

This is to certify that the doctoral dissertation by

Idara McPartling

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Angela Prehn, Committee Chairperson, Public Health Faculty
Dr. Xianbin Li, Committee Member, Public Health Faculty
Dr. Roland Thorpe, University Reviewer, Public Health Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2016

Abstract

Self-Reported Health Status, Perceived Risk for Developing Breast Cancer, and Mammography Screening Use

by

Idara Sylvanus McPartling

MS, Adelphi University, 2005

BS, SUNY Plattsburgh, 2002

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

Walden University

February 2017

Abstract

Breast cancer is a widespread public health issue in the United States which affects all women. Although mammography is a proven screening tool, screening rates vary widely. Self-reported health status may play a role in how women perceive their risks for developing breast cancer, which may affect mammography use. The purpose of this cross-sectional survey study was to assess the association between self-reported health status and perceived risk for developing breast cancer, as well as perceived barriers towards mammography screening and use. Social action theory, which holds that social and the psychological factors influence health behaviors, served as the theoretical foundation of the study. A convenience sample of 309 African American, non-Hispanic White, and Hispanic women, aged 30+, was recruited to participate in the study. Linear and logistic regression analyses revealed the model including all variables were significance between self-reported health status, demographic characteristics, and the dependent variables– perceived risk of breast cancer, receipt of a mammogram in the last 2 years, and barriers (personal, economic, and health). However, self-reported health status was not a significant individual predictor in any of the analyses, and the null hypotheses for the research questions were not rejected. This study may promote positive social change by providing information on the necessity of interdisciplinary and interrelated educational and intervention approaches to address the challenges of women from diverse populations receiving regular mammograms.

Self-Reported Health Status, Perceived Risk for Developing Breast Cancer, and Mammography Screening Use

by

Idara Sylvanus McPartling

MS, Adelphi University, 2005

BS, SUNY Plattsburgh, 2002

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

Walden University

February 2017

Acknowledgements

Firstly, I would like to express my sincere gratitude to my chairperson Dr. Angela Prehn for the continuous support during my research and dissertation writing. I would like to thank her for her patience, motivation, and immense knowledge. Her guidance helped me throughout my research and writing of this dissertation. I could not have imagined having a better chairperson and mentor for my Ph.D. study.

Besides my chairperson, I would like to thank the rest of my dissertation committee: Dr. Xianbin Li and my university reviewer Dr. Roland Thorpe Jr. for their insightful comments and for the hard questions which incented me to widen my research from various perspectives.

Lastly, I would like to thank my family, my daughters Diamond, Mia and Simone who grew up on this journey with me. I would to thank sister Uduak Nguessan who has encouraged me through every step of my research. Thank you to my dear friends that always encouraged me to remain focused and motivated. And thank you to my mom Melissa Fae Enyiema, and dad Dr. Sylvanus Udo Enyiema who raised me to believe in myself and to overcome all obstacles in my way.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

Background

There are a number of different cancers that can affect the human body. Breast cancer is defined as the uncontrollable growth of malignant cells within the breast that have the ability to invade and spread to surrounding tissue and other areas of the body (American Cancer Society [ACS], 2016a). Breast cancer is the most common cancer found in women (Hines et al., 2010). The Surveillence Epidemiology and End Results (SEER) 1992-2013 database documented an age-adjusted incidence rate of 126.21 cases of invasive breast cancer per 100,000 women and a mortality rate of 20.72 deaths per 100,000 women of all races (National Cancer Institute, 2016). To date, ACS (2016b) estimated that there will be 246,660 new cases of breast cancer, with an estimated 40,450 deaths in 2016. This decrease in the incidence rate of breast cancer may be a direct result of public health efforts to raise awareness about breast cancer.

There are a number of different factors that may have an affect on a women's perceived risk for developing breast cancer. For this research study I focused on the association between self-reported health status and the perceived risk of developing breast cancer, as well as perceived barriers and mammography screening and use. Although self-reported health status has not been widely studied with regards to breast cancer risk, it has been shown to affect disease outcome and treatment and, therefore, has been identified as a gap in this area of study (Harding et al., 2012; Hoffman-Goetz, Meissner, & Thomson, 2009; White, Philogene, Fine, & Sinah, 2009). Healthy People 2020 (2016a) identified self-reported health status as a validated indicator of health,

which allows comparisons among different health conditions. Other scholars have shown that poorer self-reported health status has been linked to negative health outcomes. Harding et al. (2012) showed that poorer health status was linked to worse physical symptom burden and decreased treatment optimism ($p < 0.001$) in persons living with HIV. Other researchers have sought to find associations between self-reported health status and health behaviors such as smoking (Prokhorov et al., 2003). Prokhorov et al. (2003) found that there was an optimism bias regarding smoking-related health. Prokhorov et al. (2003) not only showed that their participants did not understand how smoking impacted their health du eand that there was a vulnerability and lack of understanding of the tobacco-attributed health problems. The optimistic self-rated health enabled them to continue making unhealthy decisions.

There are a number of different factors that may have an effect on perceived risk for developing breast cancer. As reported by Facione (2002), a lower perceived risk for developing breast cancer might play a role in women not seeking health preserving behaviors and nonadherence to screening recommendations. Some women do not get screened for breast cancer or do not adhere to screening guidelines because of fear, finances, and a lack of knowledge, which can all be categorized as barriers towards mammography screening (Ahmed, Fort, Fair, Semenya, & Haber, 2009; Northington et al., 2011). Like perceived risk for developing breast cancer, self-reported health status may play a role in perceived barriers towards mammography screening and use as well. In this research study, I sought to assess the relationship between self-reported health status and perceived barriers towards mammography screening and use.

Healthy People 2020 (2016b) outlines national health-related goals, in which one of the objectives has been the reduction in the number of new cancer cases. Another goal of Healthy people 2020 was a reduction in illness, disability, and death associated with cancer. The Healthy People 2020 goal for the reduction in the number of new cancer cases may be accomplished by assessing how women report their health and rate their perceived risk for developing breast cancer. In this research study, I sought to promote positive social change by studying the impact that self-reported health status may have on a woman's perceived risk for developing breast cancer. In this chapter, I discuss the problem statement surrounding self-reported health status and perceived breast cancer risk, the purpose of the research study, the research questions and their associated hypotheses, and the foundations of the theoretical framework in which the research was grounded in. Other sections in this chapter include a discussion on the nature of the study, definitions of terms used throughout the dissertation, assumptions regarding the research study, scope and delimitations, limitations, and a discussion about the significance of the research study.

I sought to study the association between self-reported health status and a women's perceived risk for developing breast cancer, as well as the association with mammography screening and use. By using an online survey through SurveyMonkey®, the research questions were answered to further understand the role that self-reported health status played in the perceived risk of and screening for breast cancer. There is a need for studies on the association between self-reported health status, breast cancer risk, and mammography screening and use. The findings from this study may providing

information on why some women may feel they are not at risk for developing breast cancer, as well as why they do not adhere to mammography screening recommendations. The research study will promote positive social change by aiding in the understanding of the variables that may have affect a woman's perceived risk for developing breast cancer, as well as the impact of these variables on not receiving a regular mammography.

Problem Statement

Every year the number of new cases of invasive breast cancer changes. According to the ACS (2016b), in 2016, it was estimated that there will be 246,660 new cases of invasive breast cancer diagnosed. There are a number of different variables that play a role in disparities concerning breast cancer screening, diagnosis, treatment, and mortality. One factor that may contribute to the disparities seen in breast cancer mortality is differences in a woman's perceived risk for developing the disease. As shown by Chung and Lee (2013), women who overestimate or underestimate their own breast cancer risk may experience negative backlash, may feel unnecessary stress and worry, and may ignore recommended screening guidelines. Therefore, it is important that women understand their health and are fully aware of their risk for developing breast cancer.

Many researchers have sought to link self-reported health status with disease treatment and outcome. Poorer health status has been associated with decreased optimism and psychological symptoms, as well as unsatisfactory physical symptoms (Harding et al., 2012). Researchers have demonstrated a link between positive emotional support among older adults and better self-reported health status (White et al., 2009). However, there is a gap in the research pertaining to what is known about the role that self-reported

health status plays in perceived risk for developing breast cancer, as well as perceived barriers towards mammography screening and use. In this research study, I sought to address this gap in the literature in order to further understand the different mechanisms that may drive a woman's self-report of her health status and its effects on perceived risk of developing breast cancer and on mammography screening use.

Purpose of the Study

The purpose of this cross-sectional quantitative study was to assess the association between self-reported health status and perceived risk for developing breast cancer, as well as perceived barriers towards mammography screening and use. In this research study, I sought to address the gaps in the literature regarding the association between a woman's self-report of her health status, risk for breast cancer, and nonadherence to mammography screening recommendations. The results from the research study provided insights into a woman's experience with and perceived barriers towards mammography screening that may delay and/or prevent her from seeking services. In addition, I examined sociodemographic differences in self-reported health status, perceived risk for developing breast cancer, as well as mammography screening use in order to see whether or not these variables play a role in women seeking breast cancer screening services.

Research Questions

In this research study, women answered questions on an online survey through SurveyMonkey® for the assessment of their personal perceived risk for developing breast cancer, as well as their personal perceived barriers towards mammography screening.

The research questions were formulated to shed light on the phenomena on how women view their risk of developing breast cancer and the reasons why they either did not get screened or adhered to recommended guidelines for screening. The following research questions were used to shape the focus of this research study:

RQ1: To what extent are self-reported health status and perceived risk for developing breast cancer related after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage?

$H_0$1: There is no relationship between self-reported health status and perceived risk for developing breast cancer, as measured by self-report, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

H_a1: There is a relationship between self-reported health status, and perceived risk for developing breast cancer, as measured by self-report, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

Research Question 1 was addressed by using an ordinal logistic regression model to determine the effect of self-reported health status on perceived risk of developing breast cancer. The dependent variable was perceived risk for developing breast cancer, an ordinal variable with three levels. The independent variables were self-reported health status, age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

RQ2: To what extent are self-reported health status and having a mammogram within the past 2 years related after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage?

$H_0$2: There is no relationship between self-reported health status and having received a mammogram within the past 2 years as measured by self-report after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

H_a2: There is a relationship between self-reported health status and having received a mammogram within the past 2 years as measured by self-report after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

Binary logistic regression was used to assess Research Question 2 to determine the effect that having received a mammogram within the past 2 years had on self-reported health status. Variables were selected via the backward stepwise method. The dependent variable included having a mammography screening in the past 2 years. The independent variables corresponded to self-reported health status, age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

RQ3: To what extent are self-reported health status and perceived personal, economic, and health barriers towards mammography screening related after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage?

$H_0$3: There is no relationship among self-reported health status and perceived personal, economic, and health barriers towards mammography screening as measured by self-report after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

H_a3: There is a relationship among self-reported health status and perceived personal, economic, and health barriers towards mammography screening as measured by self-report after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

Multiple Linear Regression

To address Research Question 3, three multiple linear regression models were used to determine whether there was a significant relationship between perceived barriers towards mammography and self-reported health status. The dependent variables were used to generate a composite score for personal barriers, economic barriers, and health system barriers. The independent variables corresponded to self-reported health status, age, ethnicity, level of education, household income range, marital status, area of residence, and type of insurance coverage. Multiple linear regression was the appropriate statistical analysis because the purpose of the research study was to determine the effect of two or more independent variables on a continuous response variable (Tabachnick & Fidell, 2012). For this analysis, the F test was used in order to assess whether all of the independent variables predicted the dependent variable. In order to specify how much variance in the dependent variable could be accounted for by the independent variables, I used the multiple correlation coefficient of determination (R squared). In order to assess

the significance of each predictor and to determine the extent of prediction for each independent variable, the t-test and beta coefficients were used respectively. For significant predictors, every one-unit increase in the predictor, the dependent variable increased or decreased by the number of unstandardized beta coefficients.

Theoretical Foundation

This research study was grounded in the social action theory. The social action theory is similar to the health belief model in the areas of identifying factors that may impact an individual's assessment and belief in health promoting behaviors (Traube, Holloway, Schrager, & Kipke, 2012). The social action theory includes the areas that involve behavioral change of the individual, environmental influences, as well as the social and the psychological processes regarding maintenance of health behaviors (Traube et al., 2012). For example, a person's capabilities for seeking cancer screening facilities in order to remain adherent to screening guidelines and improve his or her chances of early detection may be influenced by cost and access to mammography facilities, as well as the overarching need to preserve his or her health. One key construct of the social action theory, as outlined by the Institute of Medicine (IOM, 2001), is the discovery of how the "physical and social environments foster and sustain debilitating habits" (p. 190). The IOM further pointed out that the social action theory involves health habit detection and change, which would require identifying goals and strategies to create action steps that will foster good health behaviors and good health. I employed these concepts by identifying various factors within the physical and social environment (see Appendix A) such as access and transportation to mammography screening centers,

education and job status, as well as an individual's income status. These factors may play a role in sustaining or debilitating behaviors in order to assess how women report their health status and how this health status affects their perceived risk for developing breast cancer and perceived barriers towards mammography screening and use. Further discussion of the theory is included in Chapter 2.

Nature of the Study

This research study was a cross-sectional quantitative study. This method was chosen because it is low in cost and because it places an emphasis on statistical analysis and correlational inferences between the independent and dependent variables (Frankfort-Nachmias & Nachmias, 2008). This study was conducted with 309 women 30 years and older. Participants were asked to complete an online survey that was hosted through SyrveyMonkey®. The questions on the survey were geared towards asking the participants to answer questions about their self-reported health status, along with some demographic questions on age, race/ethnicity, level of education, income range, marital status, and type of insurance coverage. Other questions addressed perceived barriers towards mammography screening, as well as mammography screening use and level of personal perceived risk for developing the disease. In this quantitative analysis, the independent variables were self-reported health status, age, race/ethnicity, level of education, household income range, marital status, area of residence, and type of insurance. The dependent variables in the research study were mammography screening and use, perceived risk for developing breast cancer, and perceived barriers towards mammography screening.

Definitions

Breast cancer: Breast cancer is defined as the uncontrollable growth of malignant cells within the breast that have the ability to invade and spread to surrounding tissue and other areas of the body (ACS, 2016a).

Level of education: The United States Census Bureau (2015a) defined educational attainment as the highest level of education that an individual has completed.

Mammogram: A mammogram is used to visualize the breast and the internal structures of the breast through a low-dose-x-ray procedure (ACS, 2016c).

Perceived barriers: Perceived barriers are realized limitations by an individual that prevents him or her from seeking care (Fedele et al., 2014).

Perceived risk: In terms of disease outcome, perceived risk is concerned with the judgment of an individual about the probability that he or she will experience a health issue (Katapodi, Dodd, Lee, & Facione, 2009).

Race/ethnicity: The U.S. Census (2015b) defined race as the national origin or sociocultural groups.

Self-reported health status: Self-reported or self-assessed health status is how an individual perceives his or her overall health (Healthy People 2020, 2016a).

Type of insurance coverage: As of 2013, the U.S. Census listed the types of insurance coverage as any health plan, any private plan (employment-based, or direct purchase), any government plan (Medicare, Medicaid, military health care), and uninsured (U.S. Census, 2015c).

Assumptions

For the research study, it was assumed that the participants answered the questions to the online survey honestly. It was also assumed that the responses made to the survey questions were from the participants and not from anyone else on their behalf. Within the context of this study, these assumptions were necessary because the participants were able to access the online survey through a link provided to them from an e-mail from SurveyMonkey® whereby they were required to answer each question to the best of their knowledge. The survey questions were closed-ended and were worded in a way that encouraged truthful responses. Additionally, the instrument chosen to measure the variables was clear and suitable for the research and was tested through a pilot study.

Scope and Delimitations

I sought to address the gaps in the literature regarding the association between self-reported health status, risk for developing breast cancer, and perceived barriers towards mammography screening and use. This focus was chosen in order to better understand how women view their health and how this view affects their decision to be screened for breast cancer. This investigation included women who were 30 years of age and older with and without a family history of breast cancer. Due to the nature of this study, the results were not generalized to other populations outside of the participants in this research study because the participants were not randomly selected.

Limitations

This study was conducted among women 30+ years. The outcomes were not generalizable due to lack of random sampling. A convenience sampling method was used

in this study. In this research study, the participants were not monitored. The participants were able to access the survey online through SurveyMonkey®. There may inherently be a response and selection bias due to some participants not answering questions truthfully or giving responses that they may believe to be more favorable. Although response and selection bias are both possibilities, all questions were close-ended questions that were worded in a way that encouraged truthful and honest responses. Another limitation in research study was the usage of self-reported health and screening mammography data, in which some participants may not recall accurately. Because the survey was an online survey, the participants had the opportunity to answer the questions at their leisure, which may have inherently allowed them to gather the necessary information needed to answer some of the questions. This action could have decreased the possibility of recall bias occurring and may have addressed issues concerning health status and mammography data accurately.

Significance of the Study

Breast cancer is a disease that affects women of all races and ethnicities (ACS, 2016b). Although non-Hispanic, White women have a higher incidence rate for the disease, African American women have been shown to die from a more aggressive form of breast cancer (ACS, 2016b). Early detection and decreases in mortality rates cannot be achieved without fully understanding where the true disparities lie, which is why research into improving breast cancer awareness is needed.

This research study is significant because I not only sought to find answers as to why some women may not adhere to mammography screening guidelines, but also to see

how women reported their overall health in relation to their personal perceived risk for developing breast cancer. Bringing attention to such issues could lay the groundwork for increased public and organizational awareness on the role that self-reported health status plays in a women's personal perceived risk for developing breast cancer and could help change the way messages are delivered to the public or an overall change to breast cancer awareness campaigns. Lastly, this research is significant because it could aid in increased awareness of the risks of breast cancer and aid women in becoming active participants in their own health and improving health preservation behaviors.

Summary

Chapter 1 included an introduction to the research topic by providing background information on the disparities seen in breast cancer, as well as incidence and mortality rates for the disease. I also stated the problem, the purpose of the research, as well as testable research questions and hypotheses whereby statistical inferences were made and conclusions were drawn. The research questions were chosen in order to bring focus to the research study. By using the social action theory as the theoretical framework, I sought to demonstrate the need for improved understanding on self-reported health status and how it affects perceived risk for developing breast cancer, as well as its effects on perceived barriers towards mammography screening and use. In Chapter 2, I examine the literature concerning self-reported health status, perceived risks for developing breast cancer, perceived barriers towards breast cancer screening, breast cancer screening modalities, as well as breast cancer screening recommendations.

Chapter 2: Literature Review

Introduction

The purpose of this study was to understand how women view their health through self-reported health status and the role this health status plays in perceived risk for developing breast cancer, as well as effects on perceived barriers towards mammography screening and use. This chapter will provide the background literature review, with insights on self-reported health status, the role self-reported health status plays on a woman's perceived risk for breast cancer with and without first-degree relatives, and perceived barriers towards breast cancer screening, and use.

Literature Search Strategy

In this study, the databases that were used in order to access the literature were electronic databases such as EBSCO, CINAHL, Academic Search Premier, Medline, PubMed, NCBI, and ScienceDirect. Articles were also obtained from other sources such as Document Delivery Services and Inter Library Loan Services through Walden University. Research studies conducted in the UK as well as South America and China were also used in this literature review. International research was used to supplement the previous findings from research studies that were conducted in the United States in order to see if there were differences in the results due to cultural differences or the way of life of the participants within the United States. Several textbooks were used to supplement findings provided from the research articles. Information from governmental websites such as CDC.gov is included in this chapter as well. Seminal research was used in this literature review in which the inclusion years were from 1991-2016.

Studies with information regarding health perception, breast cancer screening, and perceived risk for breast cancer were researched, as well as studies with similar methodologies. The key words that were used in the literature search were African American, non-Hispanic White women, Hispanic women, perceived risk, breast cancer, health perception, breast self-examination (BSE), clinical breast examination (CBE), mammography screening, education, income, mammography use, perceived breast cancer risk, perceived barriers for breast cancer screening, social action theory, self-reported health status, self-assessed health status, self-rated health status, and general health status.

Theoretical Foundation

This research study was grounded in the social action theory. The social action theory is similar to the health belief model in the areas of identifying factors that may impact an individual's assessment and belief in health promoting behaviors (Traube et al., 2012). It is a theory that focuses on the effects of social contextual factors on psychological processes in order to help predict health protective behaviors and outcome (Ewart, 1991; IOM, 2001). In the social action theory, the person is viewed as being influenced by the environmental, biological, and social contexts (IOM, 2001). Similar to the health belief model, there are other characteristics of the social action theory that expand on the social cognitive theory, models of self-regulation, and the process of social interdependence and social interaction (IOM, 2001).

The underlying goal of the social action theory is the identification of key characteristics, behaviors, and/or health habits that sustain debilitating habits (Ewart, 2009; Lightfoot, Rotheram-Borus, Milburn, & Swendemn, 2005). This identification then

leads to goal setting and strategizing in order to reduce debilitating habits and to foster new and positive ones. For example, a person's capabilities for seeking cancer screening facilities in order to remain adherent to screening guidelines and improve his or her chances of early detection may be influenced by his or her perceived health status, perceived risk for developing breast cancer, cost and access to mammography facilities, and the overarching need to preserve his or her health. The environmental, biological, social, and behavioral aspects of the social action theory were represented in the current study by analysis of the survey questions. In this research study, the environmental variables included questions about transportation to and from mammography screening facilities, getting time off of work for mammography screening, and cost of screening. The biological variables included a question about family history of breast cancer. The social aspects of this study included questions about trusting the physicians and whether or not women are given adequate information about breast cancer. Lastly, the behavioral aspect of this study included questions about fear of pain from the mammogram, as well as the unwillingness to have a mammogram. I used the social action theory to assess how women prioritized their health in regards to their self-reported health status and how this health status affected their perceived risk for developing breast cancer and perceived barriers towards mammography screening and usage.

Although the social action theory has not been applied to studies on a woman's self-reported health status and perceived risk for breast cancer or perceived barriers towards screening mammography, it has been applied to a number of studies on various health behaviors (Lightfoot et al., 2005; Reynolds et al., 2010; Traube et al., 2012).

Traube et al. (2012) applied the social action theory to test drug-related behaviors, as well as risk behaviors among young men who have sex with men. Lightfoot et al. (2005) used the social action theory to focus on health promotion and social identity formation for youth living with HIV (YLH) in hopes of reducing the transmission of HIV. Similar to Lightfoot et al., Reynolds et al. (2010) applied the social action theory to study HIV risk behaviors among substance users. Traube et al. (2012) showed that the social action theory was useful in examining correlates of illicit drug use among young men who have sex with men (YMSM). By using the social action theory, Traube et al. studied health concerns such as anxiety, substance abuse, and childhood sexual abuse as well as population-specific factors like gay-related stress and the coming out process. These factors were the contexts that shaped YMSM's illicit drug use behaviors (Traube et al., 2012).

In this research study, I sought to assess the link between health status and breast cancer risk perception and mammography use. The theoretical premise of the social action theory is the identification of health habits and the creation of action control loops that sustain health protective routines (Ewart, 1991; Traube et al., 2012). These associations may be considered a form of action control that may sustain health protective routines such as adhering to breast cancer screening recommendations. Once health habits have been identified, a self-regulatory process can begin where goals are set to elicit change. Once these goals are set, a strategy to accomplish these goals and the identification of a person's capabilities to accomplish said goals can be outlined. Other factors such as motivational appraisal and family support are associated with health

protective behaviors (Traube et al., 2012). In the current research study, the social action theory was applied in order to identify factors that affect a woman's perceived risk for developing breast cancer, as well as factors that affect her decision to receive mammography screening.

Traube et al.'s (2012) study had a lack of generalizability and issues with power. These limitations were a result of the researchers using a venue-based probability sampling design (Traube et al., 2012). By using this form of sampling method, the YMSM who were included in the study were those who frequented the selected venues (Traube et al., 2012). Although the researchers experienced these limitations, this study offered the opportunity to understand the influential risk and protective behaviors related to illicit drug use among their participants, and opened the door for other researchers to apply the social action theory in this field (Traube et al., 2012). In the current research study, there was also a lack of generalizability beyond the target population, but the results offered insights into self-reported health status and perceived risk for developing breast cancer that could later be expanded upon.

Similar to Traube et al., (2012), Lightfoot et al. (2005) also applied the social action theory to their research. Lightfoot et al. found that youth at the greatest risk were likely to be disenfranchised, from ethnic minority groups, as well as live in poor urban neighborhoods. By applying the social action theory in order to reduce drug and alcohol abuse among the YLH, Lightfoot et al. focused on identifying and avoiding triggers, stopping thoughts of drug and alcohol, as well as identifying life problems associated with drug and substance abuse. Grounded in the use of the social action theory, Lightfoot

et al. successfully identified and changed high risk behaviors among the participants of YLH in order to decrease transmission of the disease. Lightfoot et al.'s study is a good example of the usage of the social action theory and was applicable to this study research because Lightfoot et al. used the social action theory to identify key characteristics and behaviors within the target population that were triggers and used that knowledge to reduce drug and alcohol abuse. Following the foundation of the social action theory Lightfoot et al. was able to understand why the YLH participants used drugs and alcohol.

Similar to Traube et al. (2012) and Lightfoot et al. (2005), Reynolds et al. (2010) applied the social action theory in order to study a variety of influences of risky sexual behavior (RSB) in the form of condom nonuse, which has been reported to be one of the leading causes of HIV/AIDS. Their study participants consisted of urban substance users. In relation to the social action theory, Reynolds et al. studied environmental influences, peoples' mental health (psychopathology and affect), attitudes surrounding HIV, and the ability to control aspects of self-regulatory skills/and its setbacks. Reynolds et al. was able to identify that a regular sexual partner, negative attitudes towards condom usage, as well as being prone to take risks were associated with engagement in RSB among urban substance users. By identifying these factors, future researchers can create and implement intervention studies to target these risk behaviors in order to reduce the spread of HIV/AIDS in this population.

In this study, I used the social action theory to understand the different mechanisms that play a role in a woman's perceived risk for breast cancer, as well as perceived barriers towards breast cancer screening and use. The findings from the current

research study can aid in future intervention programs that may be able to address these factors in order to help women understand what factors may play a role in her personal perceived risk for developing breast cancer, and thus improve on mammography screening rates.

Literature Related to Key Concepts

There is a need for improved breast cancer awareness in terms of what breast cancer is, who is at risk, the difference between being at an average risk or increased risk for the disease, as well as various methods for screening and detection in order to reduce incidence rates, late stage diagnosis, and mortality from invasive breast cancer. The purpose of this research study was to determine how women perceive their health in regards to self-reported health status and its effects on perceived risk for developing breast cancer and perceived barriers towards mammography screening and use.

Self-Reported Health Status

There are a number of different categories a person may select to label their health status. According to Healthy People 2020 (2016a), self-reported health status is based on how an individual perceives his or her health; this perception can fall under a number of different ratings (excellent, very good, fair, or poor). Self-reported health status has been widely studied in different fields and has become important in measuring disease, treatment, and care outcomes (Harding et al., 2012; Healthy People 2020, 2016a). According to Chandola and Jenkinson (2000), self-rated health status has become meaningful in research studies, especially studies concerning different social groups, because of the differences in the interpretation of the notion of health. This difference in

interpretation may lead to the completion of health measures in different ways (Chandola & Jenkinson, 2000).

Although self-reported health status has not been applied to breast cancer risk and screening, it has been for examining psychosocial factors of HIV outpatients (Harding et al., 2012), distrust in the health care system (Armstrong et al., 2005), literacy and cancer anxiety (Hoffman-Goetz, Meissner, &Thomson, 2009), and social support concerning older adults (White et al., 2009). Other research concerning self-reported health status has been in the areas of dementia and diagnostic disclosure to patients (Campbell et al., 2008); comparison of self-reported health status among different race/ethnic groups (Sorkin et al., 2008); assessing the association between self-rated health status and smoking behavior (Prokhorov et al., 2003); using self-reported health status to predict mortality among men with prostate cancer (Hoffman et al., 2015); assessing the association between self-rated health and experience with discrimination (Mont & Forte, 2016); as well as evaluating the relationship between self-reported health status and sociodemographic, lifestyle, and health care factors (Gallagher et al., 2016).

Many of these researchers have shown associations between self-reported health status and disease outcomes. For example, Harding et al. (2012) showed that poorer health status was linked to worse physical symptom burden and decreased treatment optimism ($p < 0.001$) in persons living with HIV. Like Harding et al., Gallagher et al. (2016) used physical, medical, and laboratory responses from the NHANES questionnaires from 2003-2004 and 2005-2006 to determine how the participants rated their health (i.e., excellent, very good, good, fair, or poor). Gallagher et al. reported that

poorer self-reported health status was associated with being Mexican American; non-Hispanic Black; having a lower educational level; having low income, and having nutritional vitamins such as Vitamins C, D, and calcium (Gallagher et al., 2016). Gallagher et al. concluded that their analysis of self-reported health status was a significant predictor in their analysis for determining physical, medical, and laboratory outcomes.

White et al. (2009) used a secondary cross-validation analysis using the National Health and Nutrition Examination Survey from 199-2002 in order to study social support among older adults. When older adults are satisfied with the emotional support made available to them, there was a better self-reported health status ($p < .001$; White et al., 2009). Those who reported having poor self-reported health status also reported being dissatisfied with emotional support available ($p < .001$; White et al., 2009). Like Harding et al. (2012) and White et al. (2009), Hoffman et al. (2015) performed an observational study among men diagnosed with localized prostate cancer from October 1994 to October 1995. Using the SEER program, Hoffman et al. showed that men who reported their health as excellent were less likely ($p<.001$) than men who reported their health as fair/poor ($p<.001$) to die during follow-up or other causes other than prostate cancer. Hoffman et al. also reported that 27% of deaths were among men who reported their health status as excellent in comparison with 66% of men reporting their health as fair/poor.

Researchers have linked positive health status to positive health outcomes. Like Harding et al. (2012) and White et al. (2009), Prokhorov et al. (2003) reported that

nonsmokers reported having the best health ratings ($p < .001$), former smokers rated themselves as having average health, and the poorest self-reported health status was found among smokers ($p < .001$). Similar to the research presented above, Campbell et al. (2008) observed that participants who had been told by their physician that they had dementia had poorer self-rated health ($p = .04$). Patients who reported subjective memory problems did report their health as poor (Campbell et al., 2008).

On the other hand, Arnsberger, Lynch, and Li (2012) sought to ascertain variables that could be categorized as predictors of self-assessed health status. In their study, Arnsberger et al. sought to compare self-assessed health status among female caregivers who resided in the United Kingdom, United States, and China. Arnsberger et al. observed that higher incomes (Z value = 8.830) and being employed full-time (Z value = 5.073) were predictors of higher self-assessed health status. Another factor that was found to be associated with a higher self-assessed health status was higher educational level (Z value = 6.590; Arnsberger et al., 2012). The factors that were associated with lower Z values or a lower self-assessed health status were caregiver having a chronic health condition (Z value = -16.300), the presence of emotional stress/strain (Z value = -8.410), as well as sleep difficulties (Z value = -7.00; Arnsberger et al., 2012). Arnsberger et al. showed that there are a number of different factors that may be associated with a higher self-assessed health status. Being educated, having a good job, and having a high income were all associated with a higher self-assessed health status. The participants in this study related higher self-assessed health status with good socioeconomic standing. Arnsberger et al.

identified that social and demographic factors are associated with the different levels of self-reported health status.

Like Arnsberger et al. (2012), Morris, James, Holder-Nevins, and Eldemire-Shearer (2013) used a cross-sectional study with cluster sampling to study self-reported health status among men aged 60 years and older living in Jamaica. Morris et al. performed a quantitative cross-sectional survey, in which the targeted group was men living in the parish of St Catherine, and had almost 1,530 participants. Morris et al. also performed bivariate and logistic regression analyses on variables that were statistically associated with self-reported health status. In their study, 19.8% of men categorized their health as excellent, 54.8% categorized their health as good, and 25.4% categorized their health as fair (Morris et al., 2013). According to Morris et al., participants who were diagnosed with a disease reported favorable health as seen in their analysis of self-reported health status by health condition. Among the men who were diagnosed with diabetes, 35.8% reported excellent health, whereas 18.5% of those who were not diagnosed with diabetes reported being in excellent health (Morris et al., 2013). Among the men diagnosed with heart disease, 59.3% reported good health in comparison with 54.6% of the men who did not have heart disease (Morris et al., 2013). Among the men living in Jamaica who had a self-reported health status of excellent or good health, there was an underuse of clinical services (Morris et al., 2013). The participant's perception of their own health differed from their actual health and that although the participants may feel healthy, this misconception of their personal health also led them to underuse health facilities. Self-reported health status may play a positive or negative role in the

participants' perceived risk for developing chronic diseases and their subsequent need to seek out care, such as screening for breast cancer.

Self-reported health status plays an important role in disease treatment and outcome (Harding et al., 2012). As seen from the studies described above, health status has been linked to socioeconomic standing, where a good job, high income and education have been linked to a higher self-assessed health status as seen in the study by Arnsberger et al. (2012). A misunderstanding of ones personal perceived health status in comparison to actual health status has also led to the underutilization of health facilities as seen in the study by Morris et al., (2013).

Unlike the studies discussed previously, Mont and Forte (2016) sought to assess the link between self-rated health status and discrimination. Instead of using self-reported health status to predict disease treatment and outcome, Mont and Forte (2016) performed bivariate and multivariate analyses as well as logistic regression analyses and showed that participants who experienced discrimination in the past five years was higher among participants who rated their health as fair and poor (21.8%) compared to those participants who rated their health as excellent or good (14.5%, $p<.0001$). Other significant associations were seen between perceived discrimination in age, disability, ethnicity or culture, and physical appearance among participants who had a self-reported health status of fair/poor in comparison with participants who had a self-reported health status of excellent (Mont and Forte, 2016). The researchers concluded further research is needed in order to understand the mechanisms by which discrimination may have an impact on health (Mont and Forte, 2016).

One of the focuses in this research study was to address the gap in the literature pertaining to self-reported health status and perceived risk of developing breast cancer. After seeing how self-reported health status affects health behaviors and use of health care services, it is possible that it may also be a predictor of cancer risk and non-adherence to mammography screening. This study may possibly provide crucial information as to why some women get screened for breast cancer, and why others do not.

Perceived Risk for Breast Cancer

A woman's perceived risk for developing breast cancer can initiate two pathways. One pathway involves high-perceived risk for developing the disease, and the other pathway is a lower perceived risk for the disease. In the event of a high perceived risk for developing breast cancer women may be more knowledgeable about the disease, seek health preservation behaviors, as well as adhere to recommended guidelines for screening (Facione, 2002). In the case where a woman has a lower perceived risk for developing breast cancer, she may not seek health preservation behaviors, and may not consistently adhere to screening recommendations (Facione, 2002). Non-adherence to cancer screening recommendations greatly decreases the likelihood that a breast lump will be detected in the early stages, in turn increasing the chances of suffering and dying from breast cancer (Facione, 2002).

Many researchers have conducted studies on women's perceptions and perceived risk of developing breast cancer but have used different methods with conflicting results. Chung and Lee (2013) used a cross-sectional survey design in order to determine

women's perceived personal risk for breast cancer. Using a convenience sample of 222 Korean women the researchers found that among the women in this study, 67.6% of them had a low risk perception of their possibility of getting breast cancer. This low risk perception of breast cancer may be tied into their culture as Asian women. According to Lu (1995), Asian women may feel that developing cancer is more linked to their fate. Chung and Lee (2013) also showed that 50.4% of the women in their study felt that women in the same age group as them would get breast cancer. The researchers concluded that women who overestimate or feel that their risk is high when it is not and underestimate or feel their risk is low when it is not may experience a negative backlash, may feel unnecessary stress and worry, and may ignore recommend screening guidelines (Chung & Lee, 2013).

Similar to Chung and Lee (2013), and Lee and Ham (2010), Katapodi et al., (2010) by using a cross-sectional survey found that women would be less likely to follow up with screening recommendations with either a higher optimistic bias or an underestimation of perceived risk for developing breast cancer. Lee and Ham (2010) used data collected from questionnaires of a convenience sample of 600 Korean, American, Chinese, and Japanese women. In their study the goal was to identify the relationship between optimistic bias about cancer and cancer preventive behaviors (Lee and Ham, 2010). Katapodi et al. performed a cross-sectional community-based survey. From their studies, Chung and Lee (2013), Lee and Ham (2010), and Katapodi et al., (2010) have shown that women with a low perceived risk for breast cancer may miss the opportunity

to benefit from advances in breast cancer from screening methods such as mammography to treatments such as chemoprevention.

Unlike Chung and Lee (2013), Lee and Ham (2010), and Katapodi et al., (2010), Facione (2002) used a convenience sample to collect data from a community-based survey investigation in order to examine women's estimated risk for breast cancer. In this study the researchers used data from a convenience sample and administered surveys at various locations such as community organizations, work places, and churches. The researchers found that women who perceived a lower risk for breast cancer also reported adherence to mammography screening guidelines (chi square = 4.148; $p = 0.042$) (Facione, 2002). According to Facione, this finding supports their fourth hypothesis that women who in fact were adherent and participated in cancer screening seemed to display a false or misleading control over developing breast cancer. To elaborate, in this study women who had a lesser perceived risk for breast cancer also had an optimistic bias about their personal perceived risk of having breast cancer due to their screening patterns and behavior. Similarly to Katapodi et al., Facione (2002) concluded women that felt an optimistic bias towards developing breast cancer also felt that they were invulnerable to developing the disease, which in turn may present a threat to early detection. Similar to Facione (2002), Orom, Kiviniemi, Shavers, Ross, and Underwood (2013) used data from Black, White, and Hispanic respondents to the 2003 Health Information National Trends Survey (HINTS). In their analysis the researchers used liner regression to assess their continuous outcome variables (associations between race and absolute risk and worry), and used multinomial logistic regression to assess their categorical variables (associations

with comparative risk) (Orom et al., 2013). Studying racial ethnic variability in relation to perceived risk the researchers showed a significant association with being Black and a lower perceived absolute risk for developing breast cancer ($B = -0.17$, $p<.05$) (Orom et al, 2013). Although perceived absolute risk for developing breast cancer yielded significant results, there were no significant associations with race/ethnicity and perceived comparative risk for developing breast cancer (Orom et al., 2013). The researchers concluded that their study extended what is known about cross-cultural variability and perceived risk and may aid in targeted interventions (Orom et al., 2013). Other studies such as Facione, Giancarlo, and Chan (2000) have shown why some women may feel invulnerable to developing breast cancer and how this has effects on their perceived risk for developing the disease.

Facione et al., (2000) reported that the Chinese-American women in their study felt invulnerable to breast cancer because it would not happen to them; they also felt protected from the disease because they breastfed. Similarly, Spector et al., (2009) conducted a qualitative study to test the association between breast cancer risk, and risk perception among Black and White women between the ages of 35-74 with a family history of breast cancer. In their study some of the women that had a below-to-average perceived risk for developing breast cancer felt that it wasn't family history that put them at risk for breast cancer, but being a woman and having a breast put them at risk for developing the disease (Spector et al., 2009). Women who had a slightly elevated perceived risk felt less concerned for developing breast cancer, but chose to just live and enjoy their lives (Spector et al., 2009). Women that were categorized in the moderate-to-

high perceived risk for developing breast cancer understood that family history played a role in development of the disease as well as increasing their risk. Given the studies that measured risk it was seen that when women were provided information on how to gauge their own personal risk they were able to understand how to measure their risk of the disease and were able to rate their own personal perceived risk for developing breast cancer (Facione et al., 2000).

In the research studies analyzed, Facione (2002) asked the participants to rate their risk for breast cancer in comparison to other women either being high or low. Like Facione (2002), Facione et al., (2000) used the variables high and low as a measure of perceived risk among the participants. Although Facione (2002), and Facione et al., (2000) used a two-point scale to measure perceived risk, Chung and Lee (2013) used a similar but expanded scale 0-4, where 0 was "definitely none", and 3 was "very high". Unlike Facione (2002), and Facione et al., (2000), and Chung and Lee (2013), Spector et al., (2009) used different variables to measure risk. In the study by Spector et al., (2009) the variables used to measure risk were below-to-average, slightly elevated, and moderate to high perceived risk (Spector et al., 2009). In the study by Katapodi et al., (2010) the researchers used a scale of 0-10 to define a participant's personal risk for breast cancer. Some of the limitations of the studies experienced were the use of convenience samples, non-accuracy of self-reports of perceived risk, as well as limited information about personal perceived risk. A strength that was outlined by Spector et al. (2009) was methodology allowing for in-depth analysis of the subject matter. Like Facione (2002) and Facione et al., (2000) the proposed research study will use a 3-point scale in which

the variables will be low risk, medium risk and high risk. These variables were chosen so that the participants can accurately measure their level of risk without the confusion of having to understand a combination of choices such as low – medium, or medium – high.

Studies have shown that there are other factors that may have an effect on a woman's perceived risk of developing breast cancer. In a study conducted by Rowe et al., (2005) the researchers reported that in comparison with unmarried women, married women were probable to have a lower perceived risk for developing the disease. Like other studies, family history was also correlated with a higher perceived risk for developing breast cancer (Rowe et al., 2005). Aside from family history, and marital status, age is another factor that has been studied. Haas et al., (2005) reported that in comparison with older women, younger women seemed to be under the impression that they were more at risk of developing breast cancer. In conjunction with Rowe et al., (2005), Haas et al., (2005) reported that women that had a family history of breast cancer seemed to miscalculate the threat for developing breast cancer, in that because of having a family history, they were sure they would be diagnosed with the disease over women that did not have a family history of breast cancer. Also reported in their study were differences in perceived risk among black and white women. Haas et al., (2005) showed that in comparison with Latina women Black women at high objective risk were less likely (OR = 0.18, and OR = 1.11 respectively) to accurately perceive their risk for developing the disease, where by White women were the reference group within this study.

Like the research studies discussed previously other researchers have sought to assess whether or not women that are considered to be average or high risk for breast caner perceive their cancer risk correctly. In the study by Fehniger et al., (2014) the researchers analyzed data from women ages 40-74. Using multivariate analysis their results showed that age was a significant predictor of risk perception (Fehniger et al., 2014). In their study 81.9% of women aged 51-65 and were categorized as being at an average risk for developing breast cancer correctly perceived their risk for developing the disease in comparison with women aged 65 and older (90.2%) (Fehniger et al., 2014). For women who were considered high risk, 27.5% of women aged 51-65 correctly perceived their risk of developing breast cancer in comparison with women aged 65 and older (13.3%) (Fehniger et al., 2014). Fehniger et al. also performed multivariate analysis on predictors of concern for developing breast cancer. In their analysis race/ethnicity, age, and education were significant among women at average and high risk. The results from their analysis show 42.2% of Black/African American women at an average risk were very concerned about the disease compared to non-Latina White (11.7%), Latina white (23.0%), and Asian Pacific Islander (21.3%) (Fehniger et al., 2014). 29.8% of women at an average risk were very concerned about breast cancer compared to women aged 51-65 (24.2%), and women aged 65 and older (11.8%) (Fehniger et al 2014). Lastly, 31.4% of women at average risk who had some college were very concerned about the disease compared to women who were high school graduates or less (17.8%), and women who were college graduates or more (15.9%) (Fehniger et al., 2014). The researchers

concluded that well designed and tailored interventions are needed in order to help women correctly perceived their risk for breast cancer.

Like Fehniger et al. (2014) Hubbard et al. (2016) found the same correlation among older women and adherence to mammography screening. In their study among women aged 66-67 their results showed women that were 70 years of age were less adherent to mammography screening (9.2%), in comparison with women 66 years of age (21.0%, $p<0.001$). Their findings confirmed what has been seen, older women are more likely to die from breast cancer in comparison with younger women, perhaps due to lack of understanding ones risk for the disease (ACS, 2016b), and recommendations for screening among older women should be an individualized decision (Hubbard et al., 2016; Walter & Covinsky, 2001).

Using different methods and varying racial/ethnic groups, perceived risks for developing breast cancer have been found to vary from woman to woman. Factors such as family history, marital status, and age along with racial/ethnic group have been shown to have an effect on perceived risk. These very same factors along with others may hold true when examining women's perceived barriers towards breast cancer screening.

Perceptions, Feelings/Beliefs and Barriers Towards Breast Cancer Screening

As stated previously, perceived risks for developing breast cancer vary from woman to woman, in which each woman's perception of risk for breast cancer is unique to them because of either personal or society reasons. Perceived barriers towards screening modalities such as BSE, CBE, and mammography may fall under the same umbrella, in a sense that a perceived barrier is unique to each woman, or racial/ethnic

group. The barriers that women have experienced towards the various screening modalities have been widely studied among different racial/ethnic groups, as well as among different cultures, and geographic locations. In the past studies have categorized women in different groups according to their adherence to screening recommendations, and have provided characteristics of each category. One such study was one performed by Champion and Springston (1999).

In their study the researchers sought to illustrate the relationship between perceptions of perceived breast cancer risks and perceived barriers to mammography screening (Champion & Springston, 1999). The participants in their study were composed of low-income African American women (Champion & Springston, 1999). The researchers identified some of the barriers their participants experienced towards mammography screening (Champion & Springston, 1999). The barriers in their study were the beliefs of the participants and were outlined as (1) fear that there could be something wrong, (2) embarrassment, (3) didn't have enough time to be screened, (4) fear of the pain from mammography screening, (5) people (clinicians) were rude, (6) fear of radiation, and (7) cost.

Other studies have sought to address the underutilization of mammography screening services among different racial ethnic groups of women. In a study by Jandorf et al., (2012) the researchers sought to examine probable barriers experienced by Mexican immigrant women living in Arkansas (AR). The researchers found that 64.6% of the Mexican immigrants in this study felt that language was a problem in seeking medical attention regarding cancer screening and diagnosis (Jandorf et al., 2012). The

researchers also found that 81.5% ($p < .001$) of the Mexican immigrants living in AR were not able to understand what their doctor or health care provider was telling them (Jandorf et al., 2012). These results were based on interpersonal and cultural variables that behaved as barriers towards cancer screening. This study showed that lack of understanding medical information and language played a role as a barrier towards cancer screening. The researchers concluded that these findings from the Mexican immigrant women living in AR might have been attributed to feelings of discrimination towards treatment when seeking health care (Jandorf et al., 2012).

As seen in the study by Jandorf et al., (2012), language and lack of understanding pertinent health information may be considered contributors towards a woman's perceived barrier towards screening. Other researchers such as Schueler et al., (2008), Avis-Williams, Khoury, Lisovicz, and Graham-Kresge (2009), Ahmed et al., (2009), Kwok and White (2011), Lopez, Khoury, Dailey, and Chisholm (2009), and Kim et al., (2011) have sought to examine attitudes/beliefs as well as perceived barriers experienced by women of different racial/ethnic backgrounds towards seeking mammography screening for breast cancer detection.

Unlike Jandorf et al., (2012), Kim et al., (2011) sought to ascertain breast cancer screening and health promoting behaviors and screening practices among Chinese women living in Beijing, Shanghai, Guangzhou, and Xi'an China. Some of the reasons why the Chinese women in this study were not screened for breast cancer is because some of these women simply did not feel that breast cancer screening was necessary while other participants felt that they were to busy to be screened for the disease (Kim et al., 2009).

The feelings that cancer screening was not necessary may be linked to their culture as Asian women, as outlined previously by Lu (1995). While the Chinese women in this study may have felt that breast cancer screening was neither necessary nor convenient, other studies have shown different reasons why some women do not get screened for the disease.

Unlike Jandorf et al., (2012), and Kim et al., (2009), Northington et al., (2011) studied African American and Caucasian women ages 20 to 70 years and above located in the Southern United States. The participants in this study communicated that fear of cancer, being shy, no insurance, finances, and lack of knowledge about the disease and detection methods would keep them from going to a doctor if they ever found a lump/knot in their breast (Northington et al., 2011). All of these factors behave as barriers because they prevent women from receiving the proper care and medical attention they need.

Similar to Northington et al., (2011), Schueler et al., (2008) found that women with poor access to physicians are less likely to undergo mammography screening. In a study performed by Ahmed et al., (2009), the researchers reported that not having access to care, insurance coverage, a usual source of care, a regular health care provider, were major barriers to mammography screening. Similarly, Lopez et al., (2009) reported that the various factors enabling women to be overdue or never have had a mammogram were poor access to care as seen in the study by Schueler et al., (2008), and Ahmed et al., (2009). Other factors that were outlined as preventing women from receiving a mammogram were no annual health checks, no health insurance, no form of social

support for screening, no health care, the belief that treatment was worse than the disease, and feeling that not much could be done to prevent breast cancer once a diagnosis was confirmed (Lopez et al., 2009).

Lastly, Avis-Williams et al., (2009) sought to assess attitudes beliefs and practices of underserved African American women in Mississippi towards breast cancer. Through the use of focus groups the researchers found that the women in this study understood the importance of screening mammography, and felt that it was the best screening method, but also felt that breast self-examination was sufficient for early detection of breast cancer (Avis-Williams et al., 2009). Some of the women felt that money was an issue for being screened while others talked about the pain associated with screening mammography that they had heard from other women who had previously been screened for breast cancer (Avis-Williams et al., 2009). Perceived barriers towards breast cancer screening as seen previously have been related to knowledge, necessity, fear, finances, availability, and presence of a health care provider. Self-reported health status may play a role in a women's perceived barriers towards mammography screening, and may inherently act as a barrier if theoretically a woman rates her health as good or excellent she may not believe that she is at risk for developing the disease and may not adhere to screening recommendations. In light of identifying whether or not a women's self-reported health status plays a role in mammography screening, it is important that the benefits of each of the screening modalities be better communicated so that women are not making decisions to be screened based on the experience of someone else, but on information gained about their own health status and risk for developing the disease.

Study Design Methods

The majority of the research studies discussed in this chapter used a cross-sectional study design. Some of the studies used secondary data, or performed a meta-analysis. Although the methods used by the researchers may have had some variability, they were in line with what the proposed research study is aiming to accomplish. A cross-sectional study design is one of the most prominent study designs used in social sciences, and it is often associated with survey research (Frankfort-Nachmias & Nachmias, 2008). The studies discussed in this chapter were aiming to describe the pattern of relation between their variables. The proposed study will also aim to describe the pattern of relation between self-reported health status and perceived risk of developing breast cancer, as well as mammography screening and use. Some of the limitations that were observed throughout the studies were small sample sizes, the use of secondary data for analysis, as well as non-generalizability of the results to other populations. Since the proposed study will not be using a random sampling method the results will not be generalizable to other populations. Other factors such as age, education, race/ethnicity, household income, health insurance, and marital status will also be studied as covariates, and will be used to define the demographic profile of the participants.

Other Factors Associated with Breast Cancer

In addition to self-reported health status and perceived risk, there are other variables that may play a role in actual breast cancer risk, diagnosis, and mammography screening and use. The covariates that have been identified in this study are age, level of education, race/ethnicity, household income, and marital status.

Age

The variable age has been used in a number of studies in different fields. The variable age has been shown to play a role in breast cancer screening mammography. As reported by Freitas et al., (2011), it was shown that 35.1% of women aged <50 years were adherent to mammography screening, in comparison with 21.8% of women in the same age group that were non-adherent to mammography screening. The researchers also reported 21.1% of women in the age range of 50-55 were adherent to mammography screening, in comparison with 45.4% of women in the same age range that were non-adherent to mammography screening (Freitas et al., 2011). As seen from the results presented by Freitas et al. age played a significant role in mammography screening where it was reported that older women were less adherent to mammography screening, in comparison with younger women.

Age has also been linked to perception of risk of breast cancer. Haas et al., (2003), reported younger women were more likely in comparison with older women to accurately perceive that they were at high risk for developing breast cancer. Conversely Fehniger et al., (2014) reported 81.9% of women aged 51-65 and were categorized as being at an average risk for developing breast cancer correctly perceived their risk for developing breast cancer in comparison with women aged 65 and older (90.2%). In the context of perceived risk of breast cancer, Oleseke, Galvez, Cobleigh, and Ganschow (2007) reported women aged 30 – 39 were more likely to perceive a higher risk (25.8%) for breast cancer in comparison to women aged 40 – 49 (22.9%), and women aged 50 – 69 (20.1%; chi square = 65.22; $p < .001$). In conjunction with Hass et al., (2003), and

Oleseke et al., Jones et al., (2011) significantly predicted a higher perceived risk of breast cancer among women of lower age ($\beta = 0.012$; $p < .001$). Although age has been well studied it will be included in the proposed research as a covariate in order to show the participants' characteristics, as well as show any significant associations with the dependent variables. Another covariate that will be studied in the proposed research is education.

Education

Healthy People 2020 list education as a contributing factor of the observed disparities in cancer incidence and mortality (Healthy People 2020, 2011b). Level of educational attainment is often associated with improvement in job status, which may create an opportunity for the attainment of higher income. The level of educational attainment is among a variety of factors that has been associated with breast cancer incidence and mortality, as well as screening behaviors and late-stage breast cancer diagnosis (Mandelblatt et al., 1991; Wells and Horm, 1998; Lannin et al., 1998; Rohlfs et al., 1999; Qureshi et al., 2000; O'Malley et al., 2001; Engleman et al., 2002; Taplin et al., 2004; Freeman and Chu, 2005; Virnig et al., 2009; Desantis, Jemal, & Ward, 2010; Akinyemiju et al., 2012; Markossian and Hines, 2012; Lantz et al., 2006).

According to DeSantis, Jemal, and Ward (2010), women living in residential areas categorized as having lower educational attainment were more likely to present with metastatic breast cancer. Lower educational attainment was also associated with large tumor size and/or high-grade breast cancer in comparison to women living in

residential areas with higher levels of educational attainment (DeSantis, Jemal, and Ward 2010).

Using a logistic regression model, Mandelblatt et al., (1991) showed that late-stage breast cancer was associated with women of lower educational level. In conjunction with the results from Mendelblatt et al., Wells and Horm (1998) reported that the odds of having a mammogram increased as level of education increased. Their data showed that women with less than 12 years of education had an odds ratio of 1.69 for never having a mammogram, in contrast to women with 12-15 years of education (OR = 1.28) (Wells and Horm, 1998). Using a multivariate analysis and logistic regression models Rohlfs et al., (1999) showed that women with a secondary education level in comparison to women with a primary education level had an odds ratio of 1.34 and 1.40 respectively for having a regular mammogram. Similarly Qureshi et al., (2000) reported that 59.4% of women had a mammogram within 2 years, whereas 40.6% of women either never had a mammogram or hadn't had a mammogram in more than two years. In 2010 58.4% of women with less than a high school completion and aged ≥40 reported having a mammogram within the past two years in comparison to women that were high school graduates (69.5%), women that had some college (73.9%), and women who were college graduates or higher (80.8%) (CDC, 2014). Another area where education has been studied in breast cancer is the study of its association with perceived risk for developing the disease.

According to Jones et al., (2007), having a higher education level was significantly associated with higher perceived risk of breast cancer. Other researchers

have shown that level of educational attainment has also been associated with breast cancer and optimistic bias. According to Facione (2002), in comparison to women without a college education, women that had a college education demonstrated more knowledge about breast cancer symptoms. The researchers also reported that decreased optimistic bias was associated with women that had higher educational level (chi-square = 7.28, p = .007). The results of their study showed 72% of women with higher education, that is some college or those holding a graduate degree displayed a lower risk than others without a higher education, in comparison with 81.0% of women without a college education perceiving a lower risk of developing breast cancer. Like Facione (2002), Fehniger et al., (2014) reported in their study that 31.4% of women at average risk who had some college were very concerned about the disease compared to women who were high school graduates or less (17.8%), and women who were college graduates or more (15.9%). Therefore, through research it has been shown that education is a variable that can be associated with perceived risk of breast cancer. Aside from age, and education, race/ethnicity has also been linked to disparities seen in breast cancer screening.

Race/Ethnicity

Racial/ethnic disparities in breast cancer have been widely studied. Many have come to the same conclusion as Lepeak et al., (2011), which was that African American women are most often diagnosed with a later stage and more aggressive form of breast cancer (Lepeak et al., 2011).

Mammography screening is the optimal method for breast cancer detection. Although racial/ethnic disparities in breast cancer screening are still persistent, there has been progress in closing the screening gap between African American and White women (Freeman & Chu, 2005). Freeman and Chu (2005) have shown that mammogram usage within the last 2 years was highest in non-Hispanic white women (72%), with 68% accounting for African American women mammographic usage (Freeman & Chu, 2005).

There are a number of different underlying factors as to why there are racial/ethnic differences in screening mammography. As outlined by Freeman and Chu (2005) some of these factors are financial issues relating to access to care, insurance status, transportation, distance to cancer care, time off work or daycare issues, lack of information concerning cancer, and language and cultural barriers. Each factor alone cannot cause the disparities seen between racial/ethnic groups concerning late stage breast cancer diagnosis, but together these factors have the ability to provide insights into the dynamics affecting the racial divide in health and disease outcome.

In the study by Paisley, Brown and Greenberg (2008) the researchers assessed the information needed by women concerning breast cancer risk among women currently attending a breast cancer risk assessment clinic at the Ottawa Regional Women's Breast Health Centre. The significance of this study was to provide information on different types of barriers women might face concerning breast cancer screening. The study was composed of 252 women, who were 20 years of age, in which 221 of the participants had household incomes ranging from less than $40,000 to over $100,000 (Paisley et al., 2008). The results from this study indicated women who were at risk for breast cancer

who attended the breast cancer risk assessment clinics at the Toronto Sunnybrook Regional Cancer Centre (TSRCC) and a number of other locations identified the need for more information about factors such as healthy eating, active living, and healthy body weight and how these factors may play a role in reducing breast cancer risk (Paisley et al., 2008).

Information needs such as the ones described above might act as a barrier to breast cancer screening. Not receiving the correct information may prevent some women from seeking screening mammography. There are women that may not consider themselves at risk that are experiencing barriers to breast cancer screening.

Like mammography screening, studies have shown differences in self-reported health status and race/ethnicity. To further study the differences in self-reported health among different race/ethnicities, Kandula, Lauderdale, and Baker (2007) sought to assess differences in self-reported overall health (SROH) among non-Hispanic White, Latinos, and Asians by focusing on observed differences in socioeconomic status (SES), or language or nativity. In their study the researchers used cross-sectional data that was obtained from the 2001 California Health Interview Survey (Kandula et al., 2007). The categories by which the racial/ethnic groups could use to categorize their SROH were "excellent", "very good", "fair, or "poor health" (Kandula et al., 2007). Similar to this research study, the researchers used the Chi Square (X^2) with pairwise comparison as well as a multinomial regression model in order to determine the effect of SES, nativity, and linguistic differences on SROH. The researchers concluded that overall compared with non-Hispanic Whites all other ethnic groups were less likely to report excellent or very

good health, and further observed that the Latinos, Chinese, Filipinos, Koreans, and Vietnamese more likely to report fair or poor health (Kandula et al., 2007). Lastly, the researchers observed worse SROH among individuals with limited English proficiency (Kandula et al., 2007). Their study showed that aside from race/ethnicity there were other factors that had an effect on SROH.

Similar to Kandula et al. (2007), Sentell, Zhang, Davis, Baker, and Braun (2014) used X^2, as well as multi-level logistic regression models in order to predict poor self-reported health. The categories used for self-report of health in this study were good health, and poor health (Sentell et al., 2014). Using Whites as the reference group, Hawaiians had a higher odds ratio (OR = 1.86) for poor individual self-reported health status in comparison with Chinese, Filipino, and Japanese (OR = 1.12, OR = 1.41, OR = 1.12 respectively) (Sentell et al., 2014). In their study the researchers also observed that low health literacy was associated with poor health status (Sentell et al., 2014).

Self-reported health status has been shown to be a good predictor of disease, and treatment. The previous studies have shown differences in self-reported health status among different race/ethnic groups. These studies have also shown that not only race/ethnicities can have an effect on self-reported health status of individuals. Factors such as culture, language and understanding of health may also play a role in an individual's self-report of their health. I sought to assess the effects of self-reported health status on perceived risk of developing breast cancer while controlling for factors such as age, race/ethnicity, marital status, insurance coverage, as well as household income that may also have an effect of self-reported health status.

Household Income, Health Insurance, and Marital Status

Age and education have a trickle down/up effect. For example, level of education has the potential to have a negative or positive effect on job status. This in turn may ultimately play a role in a persons' income depending on job status. It is believed that the higher an individuals' educational achievement the more likely they are to attain a good paying job (Berkman & Kawachi, 2000). In review of the life expectancy curve outlined by Berkman and Kawachi (2000), life expectancy increases as level of income increases, and vice versa. There may be underlying factors that may arise due to low income that may affect life expectancy outcomes. In relation to breast cancer screening and diagnosis, level of income has been related to noncompliance with mammography screening.

Zhao, Zhang, and Rao (2011) examined the possible relationship between health insurance and annual household income, and how this relationship may affect mammography-screening usage. Through multivariate logistic regression from the Behavioral Risk Factor Surveillance System (BRFSS) on American women aged 40-64 years the researchers reported that increased mammography utilization increased with annual household (Zhao et al., 2011). Participants whose household income range that were within $25,001 to $35,000 had an OR = 1.17 for mammography utilization in 2004 in comparison to rates in 2000 (OR = 1.46) (Zhao et al., 2011). Women within the income ranges of $35,001 to $50,000 had an OR = 1.32 for mammography utilization in 2008 in comparison to women in the same income range (OR = 1.58) in 2002 (Zhao et al., 2011).

Like Zhao et al., (2011), Selvin and Brett (2003) report, non-Hispanic White women were more likely to have a recent mammogram (70.3%), in comparison to non-Hispanic Black women (66.7%) (Selvin & Brett, 2003). When women were surveyed for self reporting of health status, non-Hispanic White women who considered themselves in excellent, very good, and good health were more likely to have a mammogram (90.1%) in comparison to non-Hispanic Black women (76.8%) (Selvin & Brett, 2003). Their results also showed, among women with private health insurance, 87.5% of non-Hispanic White women had a recent mammogram, in comparison to 67.8% of non-Hispanic Black women (Selvin & Brett, 2003). These results did not hold true among women with Medicaid. The results show, 3.4% of non-Hispanic White women had a recent mammogram, in comparison to 13.0% of non-Hispanic Black women (Selvin & Brett, 2003). Inadequate health insurance, which is thought to be one of the underlying factors of poverty, may be a plausible explanation for the results reported by Selvin and Brett (2003) and Gerend and Pai, (2008).

Marital status has been linked to mammography screening like the other covariates of age, education, race/ethnicity and household income range. According to Freitas et al., (2011), 25.3% of women that were never married, divorced, or widowed were adherent to mammography screening, in comparison with 74.4% of women who were married or living as married. As seen previously the covariates of age, education, race/ethnicity, household income range health insurance and marital status play a role in different aspects of breast cancer. To address disparities seen in breast cancer screening it

will be necessary to understand the different aspects of the breast cancer screening modalities and screening recommendations in order to improve screening adherence.

According to Sentell et al., (2014) 33.10% of the participants that were married reported their health as poor, in comparison with 42.44% of married participants that reported their health as good ($p<0.001$). Unlike Sentell et al., (2014), Bourne (2009) did not show any significant associations between marital status and self-reported health status. In the study Bourne (2009) showed that among women aged 46 – 54 years of age, 69.3% of married women reported their health to be moderate to very poor, in comparison with 64.3% of non-married women in the same age range. Although there were not significant differences in this age range, significant differences were seen as the ages increased. Among women in the age range of 65-74 years 80.6% of married women reported their health as moderate to very poor, in comparison with 68.5% of non-married women (Bourne, 2009). There are a number of different factors that may have an affect on disease and disease outcome, as well as characteristics of populations that are affected by disease outcome. From the studies previously discussed race/ethnicity, income range, health insurance, and marital status play a role in self-reported health status. I sought to assess these variables as they pertain to breast cancer risk, and mammography screening and use.

Breast Cancer Screening Modalities

Early detection of breast cancer is the best possible method to increase the likelihood of surviving the disease. Detection of breast cancer can be accomplished by several different methods. The most widely used methods today are breast self-examinations (BSE), clinical breast examinations (CBE), and screening mammography (Vahabi, 2003).

Breast-Self Examination (BSE)

According to ACS there is not enough data to show a clear benefit of a breast self examination, but women still be familiar with their breasts and detect any abnormalities (ACS, 2015). For those women interested in learning about the BSE method, it can be explained to them through numerous sources. The most widely used learning source is a primary care physician (Elmore, Armstrong, Lehman, & Fletcher, 2005). One of the benefits of the BSE method is that it is noninvasive. Women will be able to detect any abnormalities in their breast usually before seeing their physician (Elmore et al., 2005). Since the BSE method is non-invasive, it is dependent on a woman's compliance and proper use of the technique (Vahabi, 2003).

A limitation of the BSE method is that unless the tumor is sizeable, it is difficult for a person to detect tumors that are less than 1 cm (Vahabi, 2003). Compliance and proper use is vital in tumor recognition. BSE has also led to increased benign biopsy results in both trials in Russia and China (Nelson et al., 2009; Elmore et al., 2005). These limitations have decreased the efficacy of the BSE method. A more effective method of breast examination other than BSE is the clinical breast examination (CBE).

Clinical Breast Examination (CBE)

Unlike the breast self-examination (BSE), the clinical breast examination (CBE) is performed by a trained clinician and not by the patient (Barton, Harris, & Fletcher, 1999). CBEs are often used as a means of screening for breast cancer rather than a tool for diagnosis (Barton, Harris, & Fletcher, 1999). Further diagnostic tests are required to diagnose a woman with breast cancer. Like BSE, the success of a CBE in screening for breast cancer is dependent on the attending physician accurately performing the examination (Barton et al., 1999). Other factors that may affect the sensitivity of the CBE are the age of the woman, tumor size, and breast density (Barton et al., 1999). A composite rating from all documented randomized trials have yielded the calculated sensitivity of the CBE to be 54%, and the specificity to be 94% (Elmore et al., 2005). Like other screening methods, a benefit of early detection is the reduction of mortality from breast cancer (Elmore et al., 2005). Another screening methodology that is currently used by physicians is screening mammography.

Mammography Screening

Of the three methodologies/modalities for breast cancer screening, mammography screening is the most widely used procedure and the best method for detection of a breast lump (Elmore et al., 2005). A mammogram is a procedure that uses an X-ray to visualize the breast in order to detect breast cancer (American Cancer Society, 2016c). There are two widely used forms of screening mammography, film, and digital mammography. Both forms of screening mammography are used for detection except in cases where a woman's breast contains dense breast tissue, which in this case a digital mammography

would be able to detect the breast lump due to an increased rate of cancer detection in comparison to film mammography (U.S. Preventive Services Task Force [USPSTF], 2009). Although more clinics are switching from film mammography to digital mammography, the later is more expensive and may not be widely covered and available to those that cannot afford to use this procedure (USPSTF, 2009). USPSTF (2009) concentrates on effects of racial/ethnic disparities in late stage breast cancer diagnosis and it is important to understand the methods used for the diagnosis of breast cancer and the methodologies/modalities for breast cancer screening. Mammography screening is widely used and helps in decreasing the further risks of breast cancer.

Breast Cancer Screening Recommendations

Breast cancer is a disease that affects women of all races. A commonality is that screening is the optimal method for detection. Different institutions have provided recommendations for screening where there are some areas of agreement and obvious areas of differences (U.S. Department of Health & Human Services, 2012). The institutions by which the comparison of the screening recommendations have been are from the American College of Obstetricians and Gynecologists (ACOG), the American College of Physicians (ACP), the Kaiser Permanente Care Management Institute (KPCMI), and the U.S. Preventative Services Task Force (USPSTF), in which all recommendations are for women at average risk for breast cancer (U.S. Department of Health & Human Services, 2012). With the exception of the ACP, the ACOG, USPSTF, and KPMCI recommend mammography screening for women that are asymptomatic and

are at an average risk for breast cancer beginning at age 50 (U.S. Department of Health & Human Services, 2012).

There have been reported differences regarding screening recommendations. Although each institution may have the same goal in mind when outlining recommendations for screening, their recommendations diverge in regards to frequency. With the exception of the USPSTF, ACP recommends biannually screening, KPCMI recommends an interval of one to two years, and ACOG recommend screenings on regular period of time (U.S. Department of Health & Human Services, 2012). The differences in screening recommendations for each institution involves screening for women aged 40-49. The ACOG recommends annual screening for women within this age range. Conversely, the ACP, KPCMI, and USPSTF are not in agreement and recommend that clinicians along with their patients decide on whether or not the benefits outweigh the harms of mammography screening (U.S. Department of Health & Human Services, 2012). Although the USPSTF recommends against teaching BSE, the ACOG, and KPCMI believe that women should be taught breast self-awareness with the inclusion of BSE (U.S. Department of Health & Human Services, 2012). According to ACOG, and KPCMI, there are no benefits for BSE and should not be recommended by physicians to their patients (U.S. Department of Health & Human Services, 2012). From the studies mentioned above the benefits of BSE may be smaller in comparison to CBE and mammography screening. Women who are non adherent to breast cancer screening may be more inclined to perform the BSE if taught the proper method their physicians

According to ACS (2015), although there are limitations as well as benefits to mammography usage, it is still one of the best methods in reducing death from breast cancer. Table 1 below shows the recommendations for breast cancer screening among various age groups of women as outlined from the American Cancer Society. Breast cancer screening guidelines are represented below from three agencies. It is necessary to know and understand the importance of a yearly mammogram for women 40 and older (ACS, 2015). Table 1, 2, and 3 show the recommendation guidelines from the American Cancer Society, the US Preventive Service Task Force, as well as the National Comprehensive Cancer Network. There is some variability concerning recommendations regarding screening guidelines from agency to agency. The decision to be screened, or follow recommendations should be left to the individual and their primary care giver (ACS, 2015).

Table 1

ACS Guidelines of Recommended Breast Cancer Screening

Women in their 20 – 39	Not enough data to show a cleat benefit
Women age 40 and older	Mammogram every year, and a clinical breast exam every year

Note. "American Cancer Society recommendations for early breast cancer detection in women without breast symptoms," by ACS, 2013. Retrieved from **http://www.cancer.org/cancer/breastcancer/moreinformation/breastcancerearlydetection/breast-cancer-early-detection-acs-recs**

Table 2

US Preventive Service Task Force Breast Cancer Screening Recommendation Summary

Population	Recommendation
Women, age 50-74 years	The USPSTF recommends biennial screening mammography for women 50-74 years.
Women, before the age of 50 years	The decision to start regular, biennial screening mammography before the age of 50 years should be an individual one and take patient context into account, including the patient's values regarding specific benefits and harms.
Women, 75 years and older	The USPSTF concludes that the current evidence is insufficient to assess the benefits and harms of screening mammography in women 75 years and older.
All Women	The USPSTF recommends against teaching breast self-examination (BSE).
Women, 40 years and older	The USPSTF concludes that the current evidence is insufficient to assess the additional benefits and harms of clinical breast examination (CBE) beyond screening mammography in women 40 years or older.
All women	The USPSTF concludes that the current evidence is insufficient to assess the additional benefits and harms of either digital mammography or magnetic resonance imaging (MRI) instead of film mammography as screening modalities for breast cancer.

Note. "US Preventive Service Task force Breast Cancer Screening" (2009), Retrieved from, http://www.uspreventiveservicestaskforce.org/Page/Topic/recommendation-summary/breast-cancer-screening

Table 3

National Comprehensive Cancer Network Breast Cancer Screening Recommendations

Women aged 25-39	Clinical breast exam every 1-3 years
Women Age 40 and older	Mammogram every year starting at age 40, and clinical breast exam every year

Note. "Breast Cancer Screening Recommendations" (2014), Retrieved from, http://ww5.komen.org/BreastCancer/BreastCancerScreeningforWomenatAverageRisk.html

Although the three agencies may have different guidelines for mammography screening, it is still important for women to discuss with their health care provider in deciding which guidelines better suits their personal situations. Adherence to screening recommendations is key to detecting and treating breast cancer early in order to prevent late-stage diagnosis, and/or mortality from the disease. The information provided by these guidelines will aid in the further analysis of data obtained from the study participants. This information will also be used to see if women are adherent to mammography screening guidelines within their age group.

Summary

Chapter 2 reviewed the over arching determinants of self-reported health status and its effects on health/disease outcome, and women's perceived risk for developing breast cancer, as well as perceived barriers towards breast cancer screening modalities among various racial/ethnic groups. This chapter also reviewed the social action theory, which is the theory by which the study will be based on. The social action theory was chosen because it encompasses areas of behavioral change, environmental, social, and psychological contexts that may have an affect on identification and sustaining health behaviors (Traube et al., 2012). The main variables within this study are mammography use, perceived barriers towards mammography screening, self-reported health status, and perceived risk for developing breast cancer. Although the social action theory has not been applied to breast cancer risk studies, other studies that have used this theory were discussed in this chapter.

Healthy People 2020 (2016b) list as one of its goals to achieve a reduction in the areas of new cases of cancer, the illness itself and the disability and death caused by the disease. This can be accomplished in part by assessing how women rate their health through self-reported health status, and how this affects their perceived risk for developing the disease, as well as addressing issues relating to perceived barriers towards mammography screening.

Although self-reported health status has not been researched in the areas concerning perceived risk of developing breast cancer, and mammography screening use it has been applied to areas concerning psychosocial factors of HIV outpatients (Harding

et al., 2012), distrust in the healthcare system (Armstrong et al., 2005), literacy and cancer anxiety (Hoffman-Goetz, Meissner, and Thomas, 2009), and social support concerning older adults (White et al., 2009). At present there is a gap in the literature regarding the association between self-reported health status and perceived risk for developing breast cancer, and mammography screening use. Participant responses to the online survey will aid in the identification of the role self-reported health status plays in breast cancer.

Several researchers had similar and differing classifications on perceived risk for breast cancer (Facione, 2002; Facione et al., 2000; Chung and Lee, 2013; Katapodi et al., 2010; Spector et al., 2009). This chapter discussed the covariates of age, education, race/ethnicity, household income range, marital status and insurance coverage and the role they play in self-reported health status, perceived risk of developing breast cancer, as well as mammography screening and use. In the studies by Freitas et al., (2011), Haas et al., (2003), Oleseke et al., (2007), and Jones et al., (2011) the researchers showed that there are differences in mammography screening adherence among different age groups. In the proposed research study the participant responses will aid in answering the research questions. The following chapter will discuss the research design, methodology utilized, target population, sample size, data analysis plan, as well as ethical considerations.

Chapter 3: Methodology

The purpose of this research study was to assess the association between self-reported health status and perceived risk for developing breast cancer. I also sought to understand how self-reported health status affects a woman's perceived barriers towards mammography screening and use. In this chapter, a discussion will be presented on the justification for selecting a cross-sectional study design to collect responses from an online survey. The population and eligibility criteria will be discussed, as well as the data collection methods and operationalization of the constructs. A detailed explanation of the data analyses will be provided and will include the statistical procedures necessary for testing the research questions and hypotheses. Other information that will be presented in this chapter includes a discussion on the validity and ethical procedures.

Research Design and Rationale

For this research study, a cross-sectional quantitative method of inquiry was used instead of a qualitative or mixed-methods research design. Data were collected, organized, and analyzed in order to make statistical inferences. There are a number of different reasons why it is advantageous to use a quantitative cross-sectional study design. Some of the advantages of using a cross-sectional study designs is that external validity increases, and the design does not require the random assignment of participants into groups (Frankfort-Nachmias & Nachmias, 2008). This method was chosen because a quantitative method of inquiry places emphasis on statistical analysis and correlational inferences between the independent and dependent variables (Frankfort-Nachmias & Nachmias, 2008).This method allowed for the identification of variables that are

significantly associated with one another. In contrast, a qualitative method of inquiry specializes in formulating questions or surveys that will allow data collection within the setting of the participants' setting, in which the data are interpreted in order to produce meaning and to improve understanding (Creswell, 2009). For this study, the data were collected from an online survey and transformed and coded so that statistical analysis could be conducted in order to observe any significant associations between the independent and dependent variables after controlling for potential covariates.

Methodology

In this research study, I used a cross-sectional design to survey background information about the participants, such as age, race/ethnicity, level of education completed, household income range, area of residence, and marital status. This research study design also aided in my assessment of self-reported health status, perceived risk for developing breast cancer, and perceived barriers towards mammography screening and use. The results of this study could not be generalizable due to nonrandomization of the sampling method.

Population

The target population for this study included women who were 30 years of age or older. According to the United States Preventive Services Task Force (2014), in 2009 women aged 50 to 74 years were recommended to have screening mammography for breast cancer every 2 years. The United States Preventive Services Task Force also reported that it is an individual's choice to be screened for breast cancer if he or she is younger than 50 years of age. The age of 30 was chosen because I wanted to be inclusive

of women not waiting until they were 50 years of age to be screened for breast cancer (i.e., those who may have decided to be screened early for breast cancer due to family history with the disease). Choosing a population and sample size were essential parts of this study design.

In this research study, I included all racial/ethnic groups. Including all race/ethnic groups of women will combine what is learned from these women in the present study, to what has already been studied in order to make plausible connections and improve on what is currently known about breast cancer and the role health status plays in disease outcome, as well as reasons why some women adhere to screening recommendations. The main focus of this study was on the effects of self-reported health status on a woman's perceived risk for developing breast cancer. The target sample size for this research study was 236 participants. Once the target population was established, the sampling unit was then defined.

Sampling and Sampling Procedures

In this research study, the sampling frame included women who had SurveyMonkey® Contribute accounts and who met the eligibility criteria. SurveyMonkey® is a company that provides web-based survey solutions. SuveryMonkey® provides a platform for researchers to create and launch online surveys. The company also has the ability to recruit participants for researchers. For the purposes of this research, study participants were excluded from the research study if they were younger than 30 years of age, male, and had ever had a diagnosis of breast cancer (of any kind). The sampling method that I used for this study was a nonprobability sampling

method. Nonprobability samples are different from probability samples in that they do not involve a random selection of the participants (Trochim & Donnelly, 2008). All women who met the eligibility requirements and volunteered for the research study were allowed to participate in the study.

For this study, it was important to include the right amount of participants in order to make any conclusions of effect. In most research, it is important to calculate the sample size necessary to detect an effect; thus, it will be important to determine the statistical power, the significance level (alpha α), and the effect size (Munro, 2005). A value for the significance level that is most commonly used is .05 (Munro, 2005). Using a α of .05 means that there is a 5% chance that the null hypothesis will be rejected when it is in fact true. The effect size is used to determine how large an effect is or how strong a relationship is (Munro, 2005).

Extensions of the general linear model were used, including ordinal logistic regression and multivariate linear regression. These analyses require a sufficient sample size in order to rule out chance as an explanatory mechanism for the observed relationships between the variables. The power analysis for the logistic regression was conducted using the guidelines established in Lipsey and Wilson (2001) and G*Power 3.1.9 (Faul, Erdfelder, Buchner, & Lang, 2014) to determine a sufficient sample size. The model contains eight independent variables, some of which are categorical. When a categorical variable is entered into a linear regression model, each category is treated as a separate dichotomous variable (Skrivanek, 2009). This is known as dummy coding, and each dummy variable requires its own parameter estimate. A two-tailed test was chosen

for this test. Due to some of the independent variables being dichotomous, a binary X distribution with a probability of success equal to 0.5 was chosen in G*Power to calculate the sample size *a priori*. An alpha of 0.05 and a statistical power of 0.80 were selected for this study. Based on prior research, the probability of success under the alternative hypothesis was specified as 0.32. Based on the aforementioned assumptions, the minimum sample size to achieve a statistical power of 0.80 was 236. Although a sample size of 236 participants was required to achieve a statistical power of 0.80, the sample size was increased by 20% to achieve a total of 284 participants. The sample size was increased to account for incomplete surveys.

Procedures for Recruitment

For this research study, I collected data using the SurveyMonkey® online survey service. SurveyMonkey® is a tool that allows researchers to conduct studies by using surveys created online through their program (SurveyMonkey®, 2016a). Through the use of SurveyMonkey® each survey is encrypted using socket layer technology (SSL; SurveyMonkey®, 2016a). Data obtained from a survey were stored on the SurveyMonkey® server in an isolated database that is only accessible by the researcher using his or her correct username and password (SurveyMonkey®, 2016a).

The participants who had SurveyMonkey® contribute accounts were recruited on my behalf by SurveyMonkey®. SurveyMonkey® sent e-mails and/or text messages to participants who met the inclusion criteria of being female, age 30 years and older, and notifying them that a survey was available for them to take. Within this e-mail/text message was a link that directly took the participants to the survey to complete.

Participants provided implied consent through participation in the online survey through SurveyMonkey®. A notice was provided to the participants outlining the eligibility requirements, which asked them to answer yes or no if they met the eligibility requirements. Once the participants acknowledged that they met the requirements, they could then proceed to answering the survey questions. Participants who chose to proceed to the survey questions provided implied consent to participate in the study.

The first sections of the survey included questions on family history of breast cancer, health status, and perceived risk for developing breast cancer. The second part included questions on perceived barriers towards mammography screening, as well as mammography screening use. Lastly, the final section included questions on demographic information. Once the participants completed the survey, counseling information was provided for any of the participants who experienced any emotional stress during the course of the survey. A brief statement was presented thanking the participants for volunteering and answering the survey questions. Follow-up with the participants was not necessary. Participants who were interested in being notified of the results of the survey were asked to contact me through e-mail. Once the research study was approved by the institutional review board, data collection was started. Once SurveyMonkey® sent e-mail notifications to the participants that a survey was ready for the participants, data were collected for 30 days or until the minimum number of required participants were reached.

Pilot Study

A pilot study was conducted because the study survey instrument was comprised of questions from other researchers, which were modified to suit the overall goals of this research study. Therefore, they had never been administered within the scope of this research. The goals of the pilot study were to ensure that the survey layout was simple and easy-to-follow (Issel, 2009). The pilot study was also used to verify that the survey questions correspond with the research objectives (Issel, 2009). According to Baker (1994), a pilot study is used to test the validity and reliability of the survey instrument, in which a sample size of about 10-20% of the actual study sample size was a reasonable number of participants for the pilot. For this pilot study, 10% of the actual study sample size was used, in which 24 women were e-mailed/texted a link to the survey where they were given the opportunity to volunteer for the research study. The sample size was increased by 20% to account for incomplete surveys. The participants for the pilot study were recruited using SurveyMonkey® audience.

I assessed the reliability and internal consistency using Cronbach's alpha by which internal consistency was assessed through responses to the open-ended questions at the end of the pilot survey. The pilot study was conducted electronically and was reported in detail. At the end of the online survey, the participants were asked questions regarding ease in understanding each of the questions, with a section for them to make comments in order to aid me in making necessary improvements. Along with computing reliability and internal consistency, a demographic profile of the participants who answered the survey questions was constructed.

The pilot study followed the same ethical guidelines as the research study. No personal information was collected from the participants. The online survey was conducted using SurveyMonkey®, in which there was an informed consent portion before participants were allowed to move on to the survey questions. In the event the pilot study indicated problems, the survey instrument would be reassessed, as well as the recommendations made by the participants, at the end of the survey. This would allow me to make the necessary modifications to the survey instrument and address any issues that may have arisen so that they could be minimized in the larger study.

Eligibility Requirements

The target population for this study was women of all race/ethnicities. To be eligible, the participants must also have been within the age range of 30 years of age and older. Participants were excluded from this study if they were male, not within the specified age range, and ever had a diagnosis of breast cancer (*in situ* or invasive).

Instrumentation

For this research study, the instrument that I used was a survey that was constructed online through SurveyMonkey®. The study survey questions can be found in Appendix A. In this research study, I was granted permission to use questions from different surveys from research conducted by Ahmed et al. (2009) and Chung and Lee (2013). The questions that were incorporated from Chung and Lee were the "Women's perception of chance of getting breast cancer" and "Differences in risk factors by risk perception" In the study by Chung and Lee, the survey data were obtained from a convenience sample of 222 women who were in their 30s and 40s from a community

setting in Seoul, South Korea. As explained by Dr. Chung, the items described in the survey were single-item questions (C. Chung, personal communication, April 13, 2014). Although Dr. Chung stated that the items have been used in other studies, reliability information was not available.

In the study by Ahmed et al. (2009), the survey data were obtained from low-income females residing in Middle Tennessee who were 40 years and older. The questions adapted from Ahmed et al. study were from the cancer supplement of the National Health Interview Survey, the Behavioral Risk Factor Surveillance System, and focus group discussions adapted from a previous study by Ahmed et al. These are questions about perceived barriers towards mammography screening that included personal barriers, economic barriers, and health system barriers. There were five subcategories under personal barriers, four subcategories under economic barriers, and eight subcategories under health system barriers. The questions were modified in order to fit the scope of the study and for better clarity and understanding. In order to understand which barriers the participants experienced the most, they were asked to select all barriers that applied by selecting yes if it did apply and no if it did not (See Appendix A for barriers).

These questions are crucial to the research study because they may aid in the answering of the research questions. Within the survey, Questions 1, 4, and 5 were used as descriptive questions in which frequencies and percentages of these items were conducted. Questions10-16 pertained to the demographic characteristics of the participants. These questions were about age, race/ethnicity, and highest level of

education completed. The participants were also asked to answer questions regarding their annual household income range, current marital status, as well as the type of health insurance coverage they currently received. For the goals of this research, the form of validity that I conducted on the survey instrument was face validity (Issel, 2009). A panel of experts reviewed the survey instrument for face validity.

Health Status and Perceived Risk for Developing Breast Cancer

Questions 1-6 involved the participants' health status and their perceived risk for developing breast cancer. The participants were asked if they had a family history (first degree relative) of breast cancer, their current health status, the possibility that they will get breast cancer in their life, whether or not they currently perform a breast self-examination, have or have not received a clinical breast exam or mammography screening in the past 2 years. The question on health status was measured as an ordinal variable where 1 = *excellent health*; 2 = *good health*; 3 = *fair health*; 4 = *poor health*. Perceived risk of developing breast cancer was the outcome variable, which was answered by Question 3 in the survey. The question for perceived risk of developing breast cancer was measured as an ordinal variable where 1 = *low risk*, 2 = *medium risk*, and 3 = *high risk*.

Perceived Barriers Towards Mammography Screening

Questions 7-9 consisted of questions that were constructed to assess the perceived barriers towards mammography screening of the participants. Each variable was measured on the nominal scale. As there were a number of multiple answers for each question, the participants were instructed to select all answers that applied to them, after

which a composite score was used for analysis. Taking an average of the corresponding responses for each barrier generated the composite score for each barrier. Means and standard deviations were calculated for perceived barriers towards mammography screening. This style was chosen because no one variable could be the complete answer for this question; as such, it was important that the participants selected all answers that affected their perceived barriers towards mammography screening. These barriers were also broken down into personal beliefs, economic, and health system for further clarification and analysis.

Operationalization of Constructs

The independent variables that were studied were age, race/ethnicity, educational level, household income range, type of insurance coverage, marital status, area of residence, and self-reported health status. These variables were descriptive in nature, and were collected as demographic information on the participants. These variables were used to measure any significant associations with perceived risks for developing breast cancer, as well as perceived barriers towards mammography screening, and use. In order to measure the effects of the independent variables on the dependent variables, the data was transformed such that statistical measurements could be made.

The independent variables in this research study were coded in order to give numerical values to variables that contained non-numerical values. For example, the ordinal level of measurement was used to transform data regarding age. The number 1 was designated for the age ranges of 30-40, the number 2 for 41-50, the number 3 for 51-60, and the number 4 for 60+. In this example there was a ranked-order of the numbers

whereby as the age ranges increased their numerical designations increased as well. Table 4 below outlined the survey question variables along with their corresponding level of measurement, and their selection category. It is important to keep in mind that the distance between each attribute does not have any meaning (Trochim and Donnelly, 2008).

Table 4

Survey Questions, Level of Measurement, and Selection Categories

Variables	Level of Measurement	Selection Categories
Age	Ordinal	1- 30--40
		2- 41-50
		3- 51-60
		4- 61+
Level of Education	Ordinal	1- <High School
		2- High School Grad
		3- Some College
		4- College Graduate
		5- Graduate School
Marital Status	Nominal	1- Married
		2- Divorced
		3- Single
		4- Widowed
		5- Cohabitation
		6- Other
Income Range	Ordinal	1- $40,000-$49,000
		2- $50,000 to $59,999
		3- $60,000 to $69,000
		4- $70,000 to $79,999
		5- $80,000+
Area of Residence	Dichotomous	1- Rural
		2- Urban
		3- Suburban
Family History of Breast Cancer	Nominal	1- Yes
		2- No
		3- I don't know
Current Health Status	Ordinal	1- Excellent Health
		2- Good Health
		3- Fair Health
		4- Poor Health
Level of Perceived Risk	Ordinal	1- Low risk
		2- Medium risk
		3- High risk
Type of Health Insurance	Nominal	1- I have health insurance coverage through my job
		2- I have health insurance coverage through direct purchase
		3- I have health insurance coverage through Medicare
		4- I have health insurance coverage through Medicaid
		5- I have health insurance coverage through the military
		6- I am currently uninsured
Race/Ethnicity	Nominal	1- White not Hispanic or Latino
		2- Black or African American alone
		3- Asian alone
		4- Native Hawaiian and other Pacific Islander alone
		5- Two or more races
		6- Hispanic or Latino

Table 4

Survey Questions, Level of Measurement, and Selection Categories (continued)

Perceived Barriers Towards Mammography	Dichotomous	**Personal Barriers** 1- Not much can be done to avoid cancer a) Yes b) No 2- Cancer treatment is not worth going through c) Yes d) No 3- The fear of finding something wrong prevents me from getting a mammogram a) Yes b) NO 4- When sick, delay seeing doctors a) Yes b) No **Economic Barriers** 1- I have a problem finding transportation to the mammography clinic a) Yes b) No 2- I have difficulty taking time off from work for an appointment a) Yes b) No 3- The cost of medical care prevents me from going to the doctor a) Yes b) No **Health System Barriers** 1- Lack of trust in doctor's capability a) Yes b) No 2- Made to feel uncomfortable by doctors a) Yes b) No 3- Medical procedure not explained adequately by doctors a) Yes b) No 4- Fear of pain associated with medical visits a) Yes b) No 5- Worried about radiation exposure during mammography a) Yes b) No 6- Unwilling to have a mammogram unless doctor recommends a) Yes b) No 7- It takes too long to get doctor's appointment a) Yes b) No **8-** Unaware of health services available in the community a) Yes **b)** No
Mammography Screening Usage in the past 2 years	Ordinal	1- No, I have never had a mammogram 2- I have had a mammogram within the past 2 years but do not have them annually 3- I have a mammogram every year 4- I have had a mammogram in the past but it was more than 2 years ago

Data Analysis Plan

Preliminary Data Screening

After data was collected from the pilot survey and final survey the information was checked for thoroughness by a process called data cleaning. SPSS was used to screen the data in the form of frequency tables. This helped to identify any inconsistent or missing responses. All data was imported from SurveyMonkey® via Microsoft Excel spreadsheet. According to Frankfort-Nachmias and Nachmias (2008) data cleaning is a form of proof reading of statistical data in order to address issues with data entry errors, and missing values. For this study data was cleaned using the IBM® SPSS statistic version 23.0 or later. Once the data is collected it was analyzed using SPSS. Data cleaning can be accomplished by running a descriptive statistical analysis creating frequency tables in order to identify if there are any missing data or unrealistic values. Statistical analysis was carried out using the SPSS program as well. Once data was cleaned was then be analyzed.

Data was entered into IBM® SPSS statistics version 23.0. Descriptive statistics were conducted on the study variables, which included nominal, ordinal, and dichotomous variables. Frequencies and percentages were calculated for categorical data, including age, level of education, marital status, income range, ethnicity, type of health insurance, and mammography screening usage in the past two years. Family history of breast cancer and perceived barriers towards mammography screening were all dichotomous variables, with only two possible outcomes. Frequencies and percentages were calculated for family history of breast cancer and perceived barriers towards

mammography. The data was analyzed using ordinal logistic regression, a type of regression that allows for response variables that have non-normal error distributions. In this research study, the response variable was perceived risk, which was measured by a categorical survey question, and is an ordinal variable with three levels. Ordinal logistic regression uses maximum likelihood to estimate the model parameters. Viewing the model as a function of the parameters, and selecting the parameter values that maximize the probability that the data were produced by the model conduct maximum likelihood.

Perceived Barriers to Mammography Screening

In this study I used one main survey instrument in the data collection process. The survey instrument measured self-reported health status, level of perceived risk of developing breast cancer, and level of perceived personal, economic, and health system barriers to mammography screening. Each perceived barrier had multiple response items. The items corresponded to each barrier were summed to create an overall score for each barrier. The corresponding score was then interpreted as the approximate strength of each subject's perception toward each barrier.

Reliability

In order to verify that it was valid to combine the items of each barrier, an analysis on the correlations between the elements was used to determine their internal consistency. I investigated these correlations to determine how well the items worked together to measure the factor of interest. In order to test for reliability and internal consistency, Cronbach's alpha was calculated. In Cronbach's alpha calculation there is a correlation between the pair of items and the number of items within a scale (Brace,

Kemp & Snelgar, 2006). Cronbach's alpha coefficients were evaluated using the guidelines suggested by George and Mallery 2010. According to their guidelines values greater than .9 indicate excellent reliability, values greater than .8 indicate good reliability, values greater than .7 indicate acceptable reliability, values greater than .6 indicate questionable reliability, and values less than .5 indicate unacceptable reliability (George & Mallery, 2010). In this research study a Cronbach's alpha value of .7 will be used as the criterion for combining the items of each barrier. For items with a Cronbach's alpha value lower than .7 will not be combined. According to Field (2005), items that receive a calculated alpha lower than .7 will be removed from the analysis but will be reanalyzed to assess it's impact of removal on the alpha. Items with an alpha lower than .7 may still be of value and will be used individually.

Bivariate Analysis

Prior to addressing the hypotheses, bivariate analyses was conducted to explore the relationships between each of the study variables and the outcome variables. The variables in this study were all categorical and measured on the nominal, ordinal, or dichotomous level. The Chi-Square test of independence was used to determine whether each pair of variables was related. The Chi-Square test is the appropriate analysis to determine if the simultaneous occurrences of two outcomes were statistically independent (McHugh, 2013). A Chi-Square test is set up as an r x c contingency table, where r and c represent the number of categories in each variable. The assumptions of a Chi-Square test require that no cell frequencies are equal to 0, and that at least 80% of cells have frequencies of 5 or above**.**

Research Questions and Analyses

The following are the research questions as written in chapter 1. The responses from the survey questions were used to answer each of the research questions. Survey questions #10-15, and 2-3 were used to answer research question #1, survey questions #10-15, 2, and 6 were used to answer research question #2, survey questions #10-15, 2, and 7-9 were used to answer research question #3.

Ordinal Logistic Regression

Ordinal logistic regression was used to assess each of the research questions. The ordinal logistic regression model that was used is known as the Proportional-Odds Cumulative Logit Model, referred to hereon as Ordinal Logistic Regression. Ordinal logistic regression is suitable when the dependent variable is categorical, has more than two levels, and can be arranged in a particular order such as from smallest to largest (Hosmer & Lemeshow, 2000; Agresti, 2002). Unlike a discrete choice model such as multinomial logistic regression, in ordinal logistic regression models there is a probability of an observation falling into a particular category or any previous category. In other words, the ordinal categories are treated as binary for each threshold.

I used the backward stepwise method of variable selection, in which all variables were initially entered into the model, and added or subtracted in order to see the effect on overall model fit (Venables, 2002). The chi-square goodness of fit model was used to establish the model that was appropriate for the analysis. The goodness of fit model determined whether the likelihood ratio between two models were significant (Venables, 2002). The likelihood ratio took the ratio of model log-likelihood values (Venables,

2002). The log-likelihood represents the probability that the data were produced by a specific model, the higher the log-likelihood value, the better the model fit (Venables, 2002). The AIC statistic was used as the criterion for determining the best model. The AIC statistic was calculated as $-2LL + k$, where LL is the log-likelihood and k as the number of parameters being estimated in the model (Venables, 2002). This statistic penalizes the model for including additional parameters, and therefore favors a parsimonious model over a heavily parameterized model (Venables, 2002).

Logistic regression analysis has many advantages over ordinary least squares regression (OLS). Many of the assumptions of OLS are not required for logistic regression. The assumptions relevant to the OLS model include linearity, normality of the error distribution, and homogeneity of variance. However, a logistic regression is conducted only under the assumption that there is a lack of outliers, which will be assessed in the preliminary data analysis.

The model significance for the ordinal logistic regression was examined by the collective effect of the independent variables, as measured by the χ2coefficient. Predicted probabilities of an event occurring was determined by exponentiating the beta coefficients. In logistic regression, the outcome variable was transformed using a logarithmic function, which models the odds ratio as a linear function of the independent variables (Agresti, 2002). Therefore, it was necessary to retransform the coefficients using an exponential function. Individual predictors were evaluated by considering their Wald coefficients (Tabachnick & Fidell, 2012). The Wald test determines whether a coefficient is significantly different from 0. Since the Wald statistic asymptotically

follows a normal distribution, this is accomplished using a z test, which determines the probability of observing the Wald test statistic under a standard normal distribution with mean 0. Significant predictors were evaluated as Exp (B), which represents the change in the odds ratio of an event occurring versus not occurring (Tabachnick & Fidell, 2012).

RQ1: To what extent are self-reported health status and perceived risk for developing breast cancer related, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage?

*H*01: There is no relationship between self-reported health status, and perceived risk for developing breast cancer, as measured by self-report, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

*H*a1: There is a relationship between self-reported health status, and perceived risk for developing breast cancer, as measured by self-report, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

Research question 1 was addressed using an ordinal logistic regression model to determine the effect of self-reported health status on perceived risk of developing breast cancer. The backward stepwise method as described above was used for variable selection. The dependent variable was perceived risk for developing breast cancer, which was measured by a categorical survey question, and was an ordinal variable with three levels. The independent variables corresponded to self-reported health status, age,

race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

RQ2: To what extent are self-reported health status and having a mammogram within the past two years related, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage?

*H*02: There is no relationship between self-reported health status, and having received a mammogram within the past two years as measured by self-report, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

*H*a2: There is a relationship between self-reported health status, and having received a mammogram within the past two years as measured by self-report, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

Binary logistic regression was also used to assess research question 2 to determine the effect of having received a mammogram within the past two years and self-reported health status. Variables were selected via the backward stepwise method. The dependent variable included having a mammography screening in the past two years. The independent variables corresponded to self-reported health status, age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

RQ3: To what extent are self-reported health status, and perceived personal, economic, and health barriers towards mammography screening related, after controlling for age,

race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage?

*H*03: There is no relationship among self-reported health status, and perceived personal, economic, and health barriers towards mammography screening as measured by self-report, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

*H*a3: There is a relationship among self-reported health status, and perceived personal, economic, and health barriers towards mammography screening as measured by self-report, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

Multiple Linear Regression

To address research question 3, three multiple linear regression models were used to determine whether there was a significant relationship between perceived barriers towards mammography screening and self-reported health status. The dependent variables included the composite scores for personal barriers, economic barriers, and health system barriers. The independent variables corresponded to self-reported health status, age, ethnicity, level of education, household income range, marital status, area of residence, and type of insurance coverage. Multiple linear regression is the appropriate statistical analysis when the purpose of the research is to determine the effect of two or more independent variables on a continuous response variable (Tabachnick & Fidell,

2012). For this analysis the *F* test was used in order to assess whether all of the independent variables predicted the dependent variable. In order to specify how much variance in the dependent variable could be accounted for by the independent variables I used the multiple correlation coefficient of determination (R squared). In order to assess the significance of each predictor, and to determine the extent of prediction for each independent variable, the *t*-test and beta coefficients were used respectively. For significant predictors, every one-unit increase in the predictor, the dependent variable increased or decreased by the number of unstandardized beta coefficients.

The assumptions of linear regression were examined prior to conducting the analyses. The assumptions of linear regression include normality, homogeneity of variance, independence of error terms, and absence of multicollinearity. Normality assumes that the model residuals are normally distributed (bell shaped) and will be assessed visually using a normal Q-Q plot (Stevens, 2009). Independence of errors and homogeneity of variance was assessed visually using a residuals scatterplot. In many cases, multiple linear regression is considered a robust analysis with large sample sizes, and minor violations to the assumptions produce relatively minor effects (Howell. 2010).

Threats to Validity

Validity is concerned with measuring what it is intended to be measured in a study (Frankfort-Nachmias and Nachmias, 2008). In this study I sought to examine how women prioritize their health and the identification of any correlations with health prioritization and personal perceived risk for breast cancer as well as perceived risks and barriers towards mammography screening. Because of the nature of this study threats to

external validity will arise. Since a non-probability sampling method was used, the data collected from the surveys could not be generalized to other populations living in other areas. Unlike external validity, internal validity is concerned with causal relationships and outcomes from a program or intervention to show whether or not changes can be attributed to the program, and that the outcome was caused by a particular treatment (Trochim & Donnelly, 2008).

Internal validity can be ensured by a number of different methods, one method is the inclusion of a control group, which is the group that is not exposed to an intervention (Trochim & Donnelly, 2008). As stated previously a random sample was not used for this research design. The sample size for this study was calculated using the G*Power software and was an accurate estimation of the number of participants needed for this research study. In terms of bias in ensuring internal validity of the study although the participants were not randomly selected they were not selected from a convenience sample, and the survey questions did not have any leading questions. These measures of control ensured that bias was minimized in terms of the participants and survey instruments. Once concerns for validity within the study were identified there were ethical procedures that were considered regarding privacy of participant information.

Ethical Procedures

This research study was a quantitative, cross-sectional study. Before the study commenced approval from the Institutional Review Board of Walden University was needed. The surveys were administered through a survey system called SurveyMonkey® and were inherently 100% anonymous, thereby eliminating the need for separate signed

consent forms from each participant, and the collection of identifying information. Therefore the participants were not asked for identifying information, and all responses were kept confidential. Within the survey instrument consent from the participants was obtained by asking the participants to click continue if they consented to participate in the research study. After data is collected it was then stored on the SurveyMonkey® secure and encrypted system where I have the rights to retain and delete all data after the required data retention time has been reached.

Summary

The focus of this analysis was the effects of self reported health status, perceived risk of developing breast cancer, and mammography screening and use. Chapter 3 outlined that a cross-section study design was used, in which ordinal logistic regression and multiple linear regression was used to analyze the data obtained from the online surveys. This chapter also discussed the method and analysis for the pilot study, as well as recruitment of the target population. The eligibility requirements, sampling procedure, as well as the independent and dependent variables being studied were also discussed in this chapter. Because this study used data in the form of participant responses to an online survey, it was important that the ethical considerations were taken to ensure that there was no breech of confidentiality. No personal information was collected and participant responses were kept private. In the next section, Chapter 4 will include the data collection and interpretation, as well as the findings and the results from the study on the effects of self-reported health status, perceived risk for developing breast cancer, and mammography screening and use.

Chapter 4: Results

Introduction

The purpose of this quantitative, cross-sectional research study was to assess the association between self-reported health status and perceived risk for developing breast cancer, as well as perceived barriers towards mammography screening and use among women of all races who were 30+ years of age. In this chapter, I present a discussion of the pilot study, as well as the findings of the data collection process. Data were first screened for completion. Frequencies and percentages are presented for demographic and health characteristics, followed by means and standard deviations for the scales. A reliability analysis was conducted using Cronbach's alpha measure of internal consistency on the variables. Ordinal logistic regressions, binary logistic regressions, and multiple linear regressions were the primary statistical analyses used to address the research questions. The analyses were evaluated for statistical significance at the widely accepted significance level, $\alpha = .05$.

Pilot Study

A pilot study was conducted because the study survey instrument was comprised of questions from other researchers, which have been modified to suit the overall goals of this research study. A total of 58 participants were involved in the pilot study process. The participants were recruited through SurveyMonkey® Audience. Through SurveyMonkey Audience, participants who had a SurveyMonkey Contribute account and who met the inclusion criteria are sent a text or e-mail notifying them that a new survey is

available for them. Once the participants received this notification, they were able to click a link that was embedded within the message that took them directly to the survey.

Descriptive Statistics (Pilot Sample)

Frequencies and percentages of demographic characteristics. Table 5 presents the frequencies and percentages of the pilot sample demographics. The data showed that 79.3% of participants were of White ethnicity (n = 46), with 50% of the participants within the age range of 60+ years old (n = 29). Most of the participants had completed graduate school (n = 19, 32.8%). The highest frequency for income brackets corresponded to $40,000-49,999 ($n$ = 18, 31.0%) and $80,000+ ($n$ = 17, 29.3%). A majority of the pilot sample was married (n = 32, 55.2%). Most participants were either insured through their job (n = 23, 39.7%) or insured through Medicare (n = 20, 34.5%). A majority of the sample resided in suburban areas (n = 29, 50%), in comparison with rural (n = 14, 24.1%) and suburban (n = 15, 25.9%).

Table 5

Frequencies and Percentages of Pilot Sample Demographics

Demographic	*n*	%
Ethnicity		
White (not Hispanic or Latino)	46	79.30
Black	5	8.60
Hispanic or Latino	2	3.40
Mixed or Other	3	5.20
No response	2	3.40
Age		
31-40	7	12.10
41-50	6	10.30
51-60	16	27.60
60+	29	50.00
Highest education level		
High school grad	10	17.20
Some college	12	20.70
College graduate	16	27.60
Graduate school	19	32.80
No response	1	1.70
Annual household income		
$40,000-49,999	18	31.00
$50,000-59,999	8	13.80
$60,000-69,999	5	8.60
$70,000-79,999	5	8.60
$80,000+	17	29.30
No response	5	8.60
Marital status		
Married	32	55.20
Divorced	9	15.50
Single	9	15.50
Widowed	4	6.90
Cohabitation	1	1.70
Other	2	3.40
No response	1	1.70
Current health insurance coverage		
Insured through job	23	39.70
Insured through direct purchase	6	10.30
Insured through Medicare	20	34.50
Insured through Medicaid	3	5.20
Insured through military	5	8.60
No response	1	1.70
Area of residence		
Rural	14	24.10
Urban	15	25.90
Suburban	29	50.00

Note. All percentages may not sum to 100 due to rounding error.

Frequencies and percentages of health characteristics. Table 6 presents the frequencies and percentages of the health characteristics for the pilot sample. The data showed that 79.3% of the participants did have a family history of breast cancer (n = 46), with 51.7% of the pilot sample indicating that they were in good current health (n = 30) and had a low perceived risk for breast cancer (n = 35, 60.3%). According to the participants, 87.9% of the participants had performed a breast self-examination (n = 51), in comparison with those who received a clinical breast examination (n = 57, 98.3%). Of the participants who received a clinical mammogram, 39.7% had received one within the previous 2 years, but did not receive them annually (n = 23), in comparison with participants who had a mammogram in the past but more than 2 years ago (n = 15, 25.9%), those who had a mammogram every year (n = 12, 20.7%), and those who have never had a mammogram (n = 8, 13.8%).

Table 6

Frequencies and Percentages of Health Characteristics (Pilot Sample)

Demographic	*n*	%
Family history of breast cancer		
Yes	46	79.30
No	12	20.70
Current health status		
Poor health	4	6.90
Fair health	11	19.00
Good health	30	51.70
Excellent health	13	22.40
Perceived risk of breast cancer		
Low risk	35	60.30
Medium risk	20	34.50
High risk	3	5.20
Performed breast self-examination		
Yes	51	87.90
No	7	12.10
Received clinical breast examination		
Yes	57	98.30
No	1	1.70
Received mammogram screening in last two years?		
No, I have never had a mammogram	8	13.80
I have had a mammogram in the past but it was more than two years ago	15	25.90
I have had a mammogram within the past two years but do not have them annually	23	39.70
I have a mammogram every year	12	20.70

Note. All percentages may not sum to 100 due to rounding error.

Perceived Barriers toward Mammography (Pilot Sample)

Three composite scores were generated from the Perceived Barriers toward Mammography (PBTM) instrument. Personal barriers were computed by a sum of four survey items. Economic barriers were computed by a sum of three survey items, and health systems barriers were computed by a sum of eight survey items. Personal barriers scores ranged from 0.00 to 4.00, with M = 0.74 and SD = 1.04. According to the average personal barriers scores, the participants in the pilot sample generally did not experience any personal barriers. Economic barriers scores ranged from 0.00 to 2.00, with M = 0.47

and SD = 0.63. According to the average economic barriers scores, the participants in the pilot sample generally did not experience any economic barriers. Health systems barriers scores ranged from 0.00 to 7.00, with M = 1.29 and SD = 1.50. According to the average health systems barriers scores, the participants in the pilot sample generally had low amounts of health system barriers. Means and standard deviations of the three scales for the pilot sample are presented in Table 7.

Table 7

Means and Standard Deviations for Perceived Barriers to Mammography

Continuous Variables	*Min.*	*Max.*	*M*	*SD*
Personal barriers	0.00	4.00	0.74	1.04
Economic barriers	0.00	2.00	0.47	0.63
Health systems barriers	0.00	7.00	1.29	1.50

Reliability

To evaluate reliability for the scales, Cronbach's alpha tests of reliability and internal consistency were evaluated. The alpha values were assessed by applying an incremental criteria in which, $\geq$ .9 *Excellent*, $\geq$ .8 *Good*, $\geq$ .7 *Acceptable*, $\geq$ .6 *Questionable*, $\geq$ .5 *Poor*, < .5 *Unacceptable* (George & Mallery, 2016). All three scales had Cronbach's alpha values below the acceptable threshold. This low reliability can potentially be attributed to the relatively low number of items in the scale or the small sample size involved for the pilot study (George & Mallery, 2016). In addition, the reliability statistics for the full study were greater than the coefficients calculated for the pilot study. Although the reliability statistics for the personal, economic, and health scales were relatively low for the pilot sample, the overall feedback suggested that the

questions were properly phrased. I did not make any modifications to the survey for the administration of the final questionnaire with the full sample. The results of the reliability statistics are presented in Table 8.

Table 8

Cronbach's Alpha Reliability Statistics for Scales (Pilot Sample)

Scales	*No. of Items.*	A
Personal barriers	4	.593
Economic barriers	3	.071
Health systems barriers	8	.619

Full Study

Preanalysis Data Screen

Using SurveyMonkey Audience, participants with SurveyMonkey Contribute accounts who met the inclusion criteria were recruited for the research study by e-mail and/or text messages depending on which mode of communication the participants elected through their private accounts. After the survey was launched through SurveyMonkey, data were collected over the course of 3 days in April 2016. Once all data were collected from the survey, they were then exported into a Microsoft Excel worksheet. I entered data into SPSS version 23.0 for Windows from the Excel worksheet. A total of 362 participants answered the survey questionnaire. The responses were examined for completion to ensure that the variables could be measured for each participant. Fifty-three participants did not complete significant portions of the questionnaire and were subsequently removed. Final analyses were conducted on 309 participants.

Descriptive Statistics

Frequencies and percentages of demographic characteristics. Table 9 presents the frequencies and percentages of the sample demographics. The data showed that 75.1% of participants were of White ethnicity (n = 232), with 41.4% of the participants within the age range of 31-40 years of age (n = 128). In regards to education, 34.6% of the participants were college graduates (n = 107), in comparison with 29.1% of the participants completing graduate school (n = 90) and 10.7% having completed high school (n = 33). In regards to annual income, 40.5% of the participants reported their household income to be $80,000 or greater ($n$ = 125). Approximately half of the participants were married (n = 176), where 68.3% of the participants had health insurance coverage through their job (n = 211). About half of participants resided in rural (n = 67, 21.7%) and urban areas (n = 86, 27.8%), while 50.2% of the participants resided in a suburban location (n = 155).

Table 9

Frequencies and Percentages of Sample Demographics

Demographic	*n*	%
Ethnicity		
White not Hispanic or Latino	232	75.1
African American	37	12.0
Hispanic or Latino	19	6.1
Asian	7	2.3
Native Hawaiian or other Pacific Islander	2	0.6
Mixed or Other	11	3.6
No response	1	0.3
Age		
31-40	128	41.4
41-50	68	22.0
51-60	68	22.0
60+	45	14.6
Highest education level		
High school	10	3.2
High school grad	33	10.7
Some college	69	22.3
College graduate	107	34.6
Graduate school	90	29.1
Annual household income		
$40,000-49,999	83	26.9
$50,000-59,999	39	12.6
$60,000-69,999	34	11.0
$70,000-79,999	18	5.8
$80,000+	125	40.5
No response	10	3.2
Marital status		
Married	176	57.0
Divorced	43	13.9
Single	55	17.8
Widowed	10	3.2
Cohabitation	21	6.8
Other	4	1.3
Current health insurance coverage		
Insured through job	211	68.3
Insured through direct purchase	26	8.4
Insured through Medicare	29	9.4
Insured through Medicaid	24	7.8
Insured through military	10	3.2
Currently uninsured	7	2.3
No response	2	0.6
Area of residence		
Rural	67	21.7
Urban	86	27.8
Suburban	155	50.2
No response	1	0.3

Note. All percentages may not sum to 100 due to rounding error.

Frequencies and percentages of health characteristics. The data showed that 79.3% of the participants did not have a family history of breast cancer (n = 245), in comparison with 17.8% of the participants who did (n = 55). The results from the current health status question showed that 2.3% of the participants characterized their current health status as poor (n = 7), in comparison with fair health (n = 52, 16.8%), good health (n =182, 58.9%), and excellent health (n = 68, 22.0%). The majority (53.1%) of the participants identified their risk of breast cancer as low (n = 164), in comparison with medium (n = 126, 40.8%) and high risk (n = 19, 6.1%). Of the participants who had any form of breast examination done, 83.5% of the participants had performed a breast self-examination in their life (n = 258), in comparison with 94.2% of the participants having ever had a clinical breast examination in their life (n = 291). Most participants had never had a mammogram (n = 124, 40.1%); however, several participants had a mammogram every year (n = 98, 31.7%). Table 10 presents the frequencies and percentages of the health characteristics.

Table 10

Frequencies and Percentages of Health Characteristics

Demographic	*n*	%
Family history of breast cancer		
Yes	55	17.8
No	245	79.3
I don't know	9	2.9
Current health status		
Poor health	7	2.3
Fair health	52	16.8
Good health	182	58.9
Excellent health	68	22.0
Perceived risk of breast cancer		
Low risk	164	53.1
Medium risk	126	40.8
High risk	19	6.1
Performed breast self-examination (ever/never)		
Yes	258	83.5
No	51	16.5
Received clinical breast examination (ever/never)		
Yes	291	94.2
No	18	5.8
Received mammogram screening in last two years?		
No, I have never had a mammogram	124	40.1
I have had a mammogram in the past but it was more than two years ago	35	11.3
I have had a mammogram within the past two years but do not have them annually	52	16.8
I have a mammogram every year	98	31.7

Note. All percentages may not sum to 100 due to rounding error.

Perceived Barriers toward Mammography

Three composite scores were generated from the PBTM instrument. Personal barriers were computed by a sum of four survey items. Economic barriers were computed by a sum of three survey items. Health systems barriers were computed by a sum of eight survey items. Personal barriers scores ranged from 0.00 to 4.00, with M = 0.72 and SD = 0.98. According to the average personal barriers scores, the participants in the pilot sample generally did not experience any personal barriers towards mammography screening. The economic barriers scores ranged from 0.00 to 3.00, with M = 0.40 and SD

= 0.64; therefore, the participants generally did not experience any economic barriers. With the health systems barriers scores, the scores ranged from 0.00 to 8.00, with M = 1.11 and SD = 1.56, which indicated that the participants generally had low amounts of health system barriers towards mammography screening. Means and standard deviations of the three scales are presented in Table 11.

Table 11

Means and Standard Deviations for Perceived Barriers to Mammography

Continuous Variables	*Min.*	*Max.*	*M*	*SD*
Personal barriers	0.00	4.00	0.72	0.98
Economic barriers	0.00	3.00	0.40	0.64
Health systems barriers	0.00	8.00	1.11	1.56

Reliability

To evaluate reliability for the scales, Cronbach's alpha tests of reliability and internal consistency were evaluated. The alpha values were assessed by applying an incremental criteria in which, ≥ .9 Excellent, ≥ .8 Good, ≥ .7 Acceptable, ≥ .6 Questionable, ≥ .5 Poor, < .5 Unacceptable (George & Mallery, 2016). Health systems barriers had an acceptable reliability (α = .706). Personal barriers (α = .537) and economic barriers (α = .316) had poor and unacceptable reliability statistics, respectively. However, low Cronbach's alpha statistics for scales can in part be attributed to the relatively low number of items in each scale (George & Mallery, 2016). In addition, the reliability statistics for the full study were greater than the coefficients calculated for the pilot study. Results of the reliability statistics are presented in Table 12.

Table 12

Cronbach's Alpha Reliability Statistics for Scales

Scales	*No. of Items.*	α
Personal barriers	4	.537
Economic barriers	3	.316
Health systems barriers	8	.706

Bivariate Analyses

In order to examine the bivariate relationships between the categorical variables, a series of chi-square tests were conducted. A chi-square is appropriate when examining the two-way association between nominally measured variables (Howell, 2013). Prior to analysis, several responses in the variables were collapsed to ensure there were a proper amount of frequencies in each category. A series of Spearman correlations were also used to examine the strength of association between demographic characteristics and the three barrier variables. A Spearman correlation is appropriate when assessing the strength of association between two variables when at least one of the variables is being measured on an ordinal scale (Pagano, 2010).

Chi-Square Test for Demographic Characteristics and Perceived Risk of Breast Cancer

Results of the chi-square test indicated that there was a significant relationship between race and perceived risk for breast cancer (χ^2 (4) = 14.51, p = .006). All races were approximately represented as expected in the high-risk category. No other significant relationships were found between the demographic characteristics and perceived risk of breast cancer. Table 13 presents the findings of the preliminary bivariate analyses on perceived risk of breast cancer

Table 13

Chi-Square Analyses for Demographic Characteristics and Perceived Risk of Breast Cancer

Demographic	Perceived risk of breast cancer				
	Low risk (n, %)	Medium risk (n, %)	High risk (n, %)	χ^2	*p*
Age					
31-40	63 (49.2%)	56 (43.8%)	9 (7.0%)	3.83	.429
41-50	33 (48.5%)	30 (44.1%)	5 (7.4%)		
51+	68 (60.2%)	40 (35.4%)	5 (4.4%)		
Race					
White	109 (47.0%)	107 (46.1%)	16 (6.9%)	14.51	.006
Black	28 (75.7%)	7 (18.9%)	2 (5.4%)		
Other	26 (66.7%)	12 (30.8%)	1 (2.6%)		
Education					
Up to high school graduate	25 (58.1%)	14 (32.6%)	4 (9.3%)	3.03	.805
Some college	38 (55.1%)	26 (37.7%)	5 (7.2%)		
College graduate	54 (50.5%)	48 (44.9%)	5 (4.7%)		
Graduate school	47 (52.2%)	38 (42.2%)	5 (5.6%)		
Household income					
$40,000-$59,999	72 (59.0%)	42 (34.4%)	8 (6.6%)	6.52	.163
$60,000-$79,999	30 (57.7%)	19 (36.5%)	3 (5.8%)		
$80,000	56 (44.8%)	62 (49.6%)	7 (5.5%)		
Marital status					
Married	90 (51.1%)	71 (40.3%)	15 (8.5%)	4.06	.132
Other	74 (55.6%)	55 (41.4%)	4 (3.0%)		
Health insurance coverage					
Through job	107 (50.7%)	88 (41.7%)	16 (7.6%)	3.34	.189
Other	57 (18.4%)	36 (11.7%)	3 (1.0%)		
Area of residence					
Rural	36 (51.4%)	29 (41.4%)	2 (2.9%)	2.82	.588
Urban	43 (50.0%)	35 (40.7%)	8 (9.3%)		
Suburban	84 (54.2%)	62 (40.0%)	9 (5.8%)		
Current health status					
Poor to fair health	29 (49.2%)	24 (40.7%)	6 (10.2%)	1.41	.354
Good health	101 (55.5%)	74 (40.7%)	7 (3.8%)		
Excellent health	34 (50.0%)	28 (41.2%)	6 (8.8%)		
Received mammogram screening in last two years?					
Have never had a mammogram	64 (51.6%)	54 (43.5%)	6 (4.8%)	4.39	.624
Had a mammogram in the past but it was more than two years ago	23 (65.7%)	11 (31.4%)	1 (2.9%)		
Had a mammogram within the past two years but do not have them annually	25 (48.1%)	23 (44.2%)	4 (7.7%)		
Have a mammogram every year	52 (53.1%)	38 (38.8%)	8 (8.2%)		

Note. All percentages may not sum to 100 due to rounding error.

Chi-Square Test for Demographic Characteristics and Receiving a Mammogram in Last Two Years

Results of the chi-square test indicated that there was a significant relationship between age and receiving a mammogram in the last two years ($\chi^2(2) = 125.78$, $p < .001$). As expected, most participants older than 51 years had received a mammogram in the last two years. Most participants in the youngest age grouping (31-40) had not received a mammogram in the last two years. Results of the chi-square test indicated that there was a significant relationship between race and receiving a mammogram in the last two years ($\chi^2(2) = 8.49$, $p = .014$). There was a significant relationship between household income and receiving a mammogram in the last two years as well ($\chi^2(2) = 6.96$, $p = .031$). No other significant relationships were found between the demographic characteristics and receiving a mammogram in the last two years. Table 14 presents the findings of the preliminary bivariate analyses on perceived risk of breast cancer.

Table 14

Chi-Square Analyses for Demographic Characteristics and Receiving Mammogram in Last Two Years

Demographic	Mammogram in last two years			
	Yes (n, %)	No (n, %)	χ^2	*p*
Age				
31-40	16 (12.5%)	112 (87.5%)	125.78	<.001
41-50	39 (57.4%)	29 (42.6%)		
51+	95 (84.1%)	18 (15.9%)		
Race				
White	123 (53.0%)	109 (47.0%)	8.49	.014
Black	14 (37.8%)	23 (62.2%)		
Other	12 (30.8%)	27 (69.2%)		
Education				
Up to high school graduate	24 (55.8%)	19 (44.2%)	1.17	.761
Some college	32 (46.4%)	37 (53,6%)		
College graduate	52 (48.6%)	55 (51.4%)		
Graduate school	42 (46.7%)	48 (53.3%)		
Household income				
$40,000-$59,999	50 (41.0%)	72 (59.0%)	6.96	.031
$60,000-$79,999	22 (42.3%)	30 (57.7%)		
$80,000	71 (56.8%)	54 (43.2%)		
Marital status				
Married	86 (48.9%)	90 (51.1%)	0.02	.897
Other	64 (48.1%)	69 (51.9%)		
Health insurance coverage				
Through job	100 (47.4%)	111 (52.6%)	0.35	.553
Other	49 (51.0%)	47 (49.0%)		
Area of residence				
Rural	34 (50.7%)	33 (49.3%)	0.17	.919
Urban	42 (48.8%)	44 (51.2%)		
Suburban	74 (47.7%)	81 (52.3%)		
Current health status				
Poor to fair health	29 (49.2%)	30 (50.8%)	2.04	.563
Good health	91 (50.0%)	91 (50.0%)		
Excellent health	30 (44.1%)	38 (55.9%)		

Note. All percentages may not sum to 100 due to rounding error.

Spearman Correlations for Demographic Characteristics and Barriers

Results of the Spearman correlations indicated that there was a significant inverse relationship between age and personal barriers (r_s = -.18, p = .002), economic barriers (r_s = -.15, p = .008), and health systems barriers (r_s = -.21, p < .001). This suggests that as age increased, the value of each barrier tended to decrease. There was also a significant

inverse relationship between income and personal barriers (r_s = -.16, p = .006) and health barriers (r_s = -.13, p = .031). This suggests that as income increased, the value of personal and health systems barriers tended to decrease. Personal barriers were inversely related to education (r_s = -.14, p = .018) and current health status (r_s = -.16, p = .006). Table 15 presents the results of the Spearman correlations. The results showed that as age, education, and level of income increased the participants experienced fewer barriers.

Table 15

Spearman Correlations between Demographic Characteristics and Barriers

	Barriers		
Demographic	Personal barriers	Economic barriers	Health system barriers
	rs	rs	rs
Age	-.18**	-.16**	-.20**
Race	.21**	.02	.17**
Education	-.13*	.02	-.04
Income	-.16**	-.01	-.12**
Marital status	.06	.04	.01
Insurance	-.04	.03	-.03
Location	-.04	-.04	-.05
Current health status	-.16**	-.08	-.10

Note: * denotes significance at .05 level; ** denotes significance at the .01 level.

Results of the chi-square tests indicated a significant relationship between race and perceived risk for breast cancer. Results of the chi-square tests also indicated a significant relationship between age, race, household income, and receiving a mammogram in the last two years. Several significant associations existed between demographic characteristics and the barriers variables. The research questions were addressed below through a series of regression analyses.

Detailed Analysis

RQ1: To what extent are self-reported health status and perceived risk for developing breast cancer related, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage?

$H_0$1: There is no relationship between self-reported health status, and perceived risk for developing breast cancer, as measured by self-report, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

H_a1: There is a relationship between self-reported health status, and perceived risk for developing breast cancer, as measured by self-report, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

To address research question one, an ordinal logistic regression was conducted to examine the relationship between self-reported health status and perceived risk for developing breast cancer. An ordinal logistic regression is appropriate when the dependent variable is measured on an ordinal scale (Tabachnick & Fidell, 2013). The outcome variable corresponded to the perceived risk for developing breast cancer (low risk, medium risk, high risk). The predictor variables in this analysis corresponded to self-reported health status, age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage. Due to the categorical nature of several of the predictor variables, the variables were dummy coded prior to inputting into the model.

The results of the overall model for the ordinal logistic regression were significant ($\chi^2(14) = 28.99$, $p = .010$), suggesting that self-reported health status, age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage collectively had a predictive relationship with perceived risk for developing breast cancer. As such, the individual predictors were examined further.

Age was a significant predictor in the model, suggesting that participants aged 51+ (Wald (1) = 7.12, $p = .008$) had less of a perceived risk for developing breast cancer in comparison to participants aged 31-40. Race was a significant predictor, suggesting that Black participants (Wald (1) = 12.62, $p < .001$), and participants who identified as other (Wald (1) = 9.27, $p = .002$) had less of a perceived risk for developing breast cancer in comparison to White participants. Although several demographic predictors were significant in the model, self-reported health status was not significantly related to perceived risk for breast cancer. Therefore, the null hypothesis for research question one ($H_0 1$) cannot be rejected. Table 16 presents the results of the ordinal logistic regression.

Table 16

Ordinal Logistic Regression for Self-reported Health Status and Demographic Characteristics Predicting Perceived Risk for Breast Cancer

Source	*B*	*SE*	Wald(1)	*P*
Self-reported health status	-0.24	0.19	1.49	.223
Age (reference: 31-40)				
41-50	-0.47	0.33	2.09	.148
51+	-0.78	0.29	7.12	.008
Race (reference: White)				
Black	-1.56	0.44	12.62	<.001
Other	-1.21	0.40	9.27	.002
Education (reference: up to high school graduate)				
Some college	-0.04	0.42	0.01	.918
College graduate	-0.10	0.41	0.06	.802
Graduate school	-0.14	0.42	0.11	.746
Household income (reference: 40,000-59,999)				
$60,000-79,999	0.06	0.37	0.02	.882
$80,000+	0.47	0.33	1.98	.159
Marital status (reference: married)	0.05	0.27	0.04	.844
Location (reference: rural)				
Urban	0.40	0.35	1.29	.257
Suburban	-0.04	0.32	0.01	.909
Health insurance (reference: insured through job)	-0.30	0.29	1.02	.312

Note. Overall model fit: $\chi^2(14) = 28.99$, $p = .010$

RQ2: To what extent are self-reported health status and having a mammogram within the past two years related, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage?

$H_0$2: There is no relationship between self-reported health status, and having received a mammogram within the past two years as measured by self-report, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

H_a2: There is a relationship between self-reported health status and having received a mammogram within the past two years as measured by self-report,

after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

To address research question two, a binary logistic regression was conducted to examine the relationship. The survey question associated with receiving a mammogram within the past two years originally had four potential options: 1 = No, I have never had a mammogram, 2 = I have had a mammogram within the past 2 years but do not have them annually, 3 = I have a mammogram every year, and 4 = I have had a mammogram in the past but it was more than 2 years ago. For the purposes of the research question, the variable was dichotomized into two categories, with options 1 and 4 representing the first category (No, I have not had a mammogram in the past two years) and options 2 and 3 representing the second category (Yes, I have had a mammogram in the past two years). The predictor variables in this analysis corresponded to self-reported health status, age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

The results of the overall model for the binary logistic regression were significant ($\chi^2(14) = 149.96$, $p < .001$), suggesting that self-reported health status, age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage collectively had a predictive relationship with having received a mammogram within the past two years.

Age was a significant predictor in the model, suggesting that participants aged 41-50 (Wald (1) = 31.23, $p < .001$) and 51+ (Wald (1) = 80.09, $p < .001$) were more likely to have had a mammogram in the last two years in comparison to participants aged 31-40. Women aged 51+ were more likely to have had a mammogram within the past two years (Wald (1) = 80.99, $p < .001$). In addition, education was a significant predictor in the model as well, suggesting that participants who had completed graduate school (Wald(1) = 4.45, $p = .035$) were less likely to have had a mammogram in the last two years in comparison to participants who were high school graduates. Although demographic predictors were significant in the model, self-reported health status was not significantly related to having a mammogram in the last two years. Therefore, the null hypothesis for research question two ($H_0 2$) cannot be rejected. Table 17 presents the results of the ordinal logistic regression.

Table 17

Binary Logistic Regression for Self-Reported Health Status and Demographic Characteristics Predicting Having a Mammogram in Last Two Years

Source	*B*	*SE*	Wald(1)	*p*	*OR*
Self-reported health status	-0.22	0.26	0.71	.399	0.80
Age (reference: 31-40)					
41-50	2.25	0.40	31.23	<.001	9.50
51+	3.96	0.44	80.09	<.001	52.46
Race (reference: White)					
Black	0.36	0.57	0.41	.524	1.44
Other	-0.05	0.50	0.01	.926	0.96
Education (reference: up to high school graduate)					
Some college	-0.66	0.56	1.39	.238	0.52
College graduate	-0.11	0.53	0.05	.832	0.89
Graduate school	-1.19	0.57	4.45	.035	0.30
Household income (reference: 40,000-59,999)					
60,000-79,999	0.20	0.47	0.84	.668	1.23
80,000+	0.72	0.44	2.76	.097	2.06
Marital status (reference: married)	-0.18	0.36	0.26	.611	0.84
Location (reference: rural)					
Urban	0.37	0.47	0.63	.428	1.45
Suburban	0.05	0.43	0.01	.917	1.05
Health insurance (reference: insured through job)	0.19	0.40	0.22	.637	1.21

Note. Overall model fit: $\chi^2(14) = 149.96$, $p < .001$

RQ3: To what extent are self-reported health status, and perceived personal, economic, and health barriers towards mammography screening related, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage?

$H_0$3: There is no relationship among self-reported health status, and perceived personal, economic, and health barriers towards mammography screening as measured by self-report, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

H_a3: There is a relationship among self-reported health status, and perceived personal, economic, and health barriers towards mammography screening as measured by self-report, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

To address research question three, three multiple linear regressions were conducted to examine the predictive relationship among self-reported health status, and perceived personal, economic, and health barriers towards mammography screening as measured by self-report, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage. Multiple linear regressions are appropriate when examining the predictive relationship between a series of independent variables and a continuous criterion variable (Tabachnick & Fidell, 2013). The continuous dependent variables corresponded to perceived personal, economic, and health barriers toward mammography. A separate linear regression was conducted on each dependent variable. For linear regressions there are three assumptions that must be assessed. The assumptions correspond to normality, homoscedasticity, and absence of multicollinearity assumption.

Linear Regression #1 – Personal Barriers

Normality assumption. A P-P scatterplot for residuals was visually examined to assess the normality assumption (see Figure 1). A P-P scatterplot compares the observed values and the expected values, and an approximately straight line suggests that the distribution is normally distributed (Pallant, 2013). A histogram was also utilized to plot the

standardized residuals of the regression model (see Figure 2). The data in both the P-P plot residuals and the histogram of the standardized residuals indicated that the data appeared to deviate from a normal distribution (Howell, 2013). In addition, a Shapiro-Wilk test of normality confirmed that the distribution of the residuals was significantly different from a normal distribution ($p < .001$). The central limit theorem states that distributions with sums of 50 or more individual observations approximate toward normality, even if the distribution visually appears to not meet the assumption (Stevens, 2009).

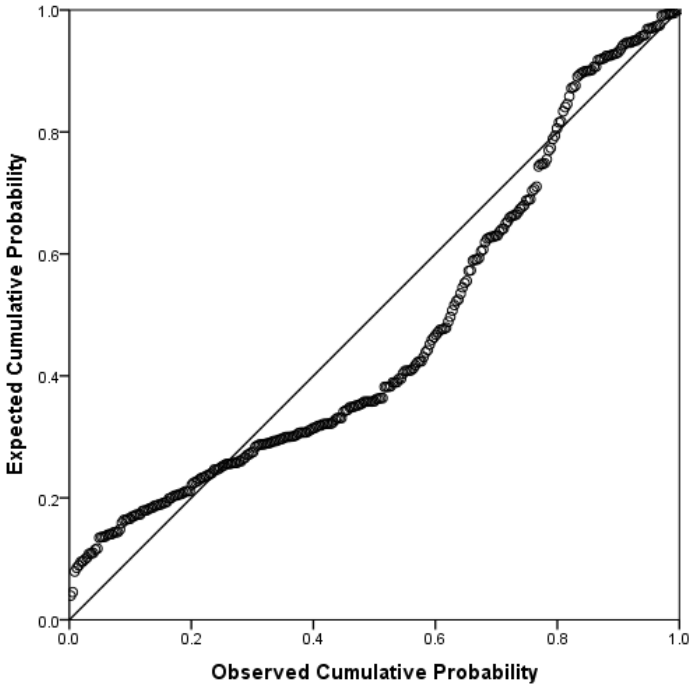

Figure 1. Normal P-P scatterplot to assess normality for regression of personal barriers on self-reported health status and demographic characteristics.

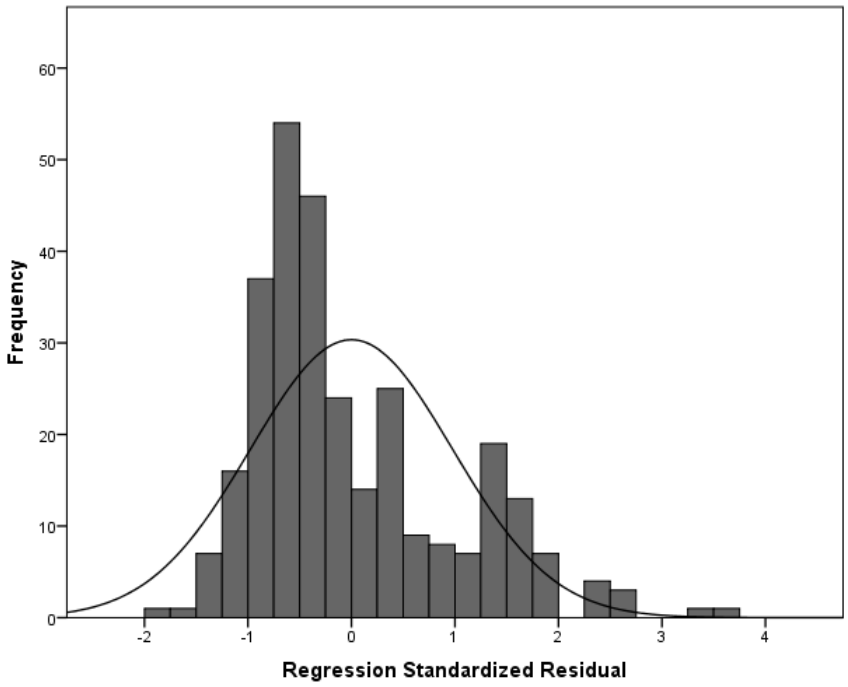

Figure 2. Histogram of the residuals to assess normality for regression of personal barriers on self-reported health status and demographic characteristics.

Homoscedasticity. A residuals scatterplot was visually examined to assess the homoscedasticity assumption (see Figure 3). Homoscedasticity verifies that the variability in scores is similar across all values of the dependent variable (Pallant, 2013). The data showed a rectangular distribution and there was not a continuous pattern in the data; thus, the homoscedasticity assumption was met (Stevens, 2009).

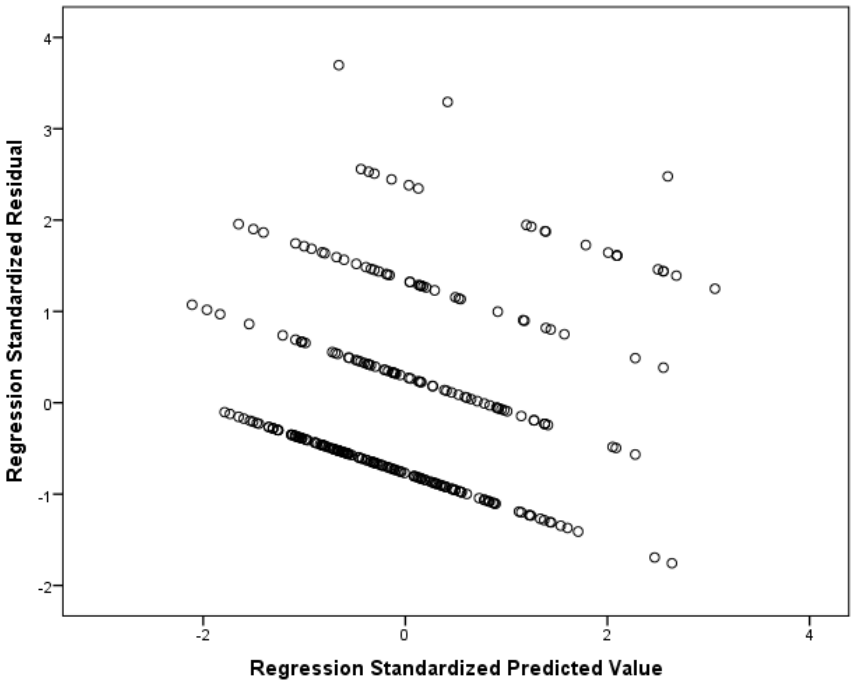

Figure 3. Residuals scatterplot for homoscedasticity for regression of personal barriers on self-reported health status and demographic characteristics.

Absence of multicollinearity assumption. The absence of multicollinearity assumption checks that there is not an association between the predictor variables. Variance inflation factors (VIFs) were applied to examine the assumption and values less than 10 indicated that the assumption was met. The VIF scores were all approximately 2 and thus the assumption was met (Stevens, 2009). Table 18 presents the VIF values for the regression model.

Results of multiple linear regression for personal barriers. The results of the multiple linear regression were significant, $F(14, 282) = 2.96$, $p < .001$, $R^2 = .36$, suggesting that a statistically significant relationship exists between the collective effect of the predictor variables and personal barriers. The coefficient of determination, R^2, suggested that the predictors could explain approximately 36% of the variance in

personal barriers. As significance was found in the overall model, the significant predictor variables were further examined.

Race was a significant predictor in the model. Black participants (t = 3.16, p = .002) scored 0.58 units higher on health barriers in comparison to White participants. Insurance was also a significant predictor of personal health barriers (t = -2.21, p = .028); those who had other types of insurance or no insurance scored 0.30 units lower on personal health barriers than those who were insured through their job. Age was also a significant predictor. Women aged 51+ (t = -2.05, p = .042) scored 0.28 units lower on personal health barriers than those aged 31-40. No other significant predictors were found in the model. Table 18 presents the results of the multiple linear regression.

Table 18

Linear Regression with Self-Reported Health Status, Demographic Characteristics, and Personal Barriers

Source	*B*	*SE*	β	*t*	*p*	VIF
Self-reported health status	-0.16	0.09	-.11	-1.81	.071	1.09
Age (reference: 31-40)						
41-50	-0.16	0.15	-.07	-1.15	.252	1.30
51+	-0.28	0.14	-.13	-2.05	.042	1.39
Race (reference: White)						
Black	0.58	0.18	.19	3.16	.002	1.21
Other	0.18	0.18	.06	1.02	.309	1.11
Education (reference: up to high school graduate)						
Some college	-0.26	0.19	-.11	-1.33	.186	2.18
College graduate	-0.29	0.19	-.14	-1.54	.124	2.70
Graduate school	-0.22	0.20	-.10	-1.14	.257	2.62
Household income (reference: 40,000-59,999)						
60,000-79,999	-0.10	0.17	-.04	-0.58	.563	1.67
80,000+	-0.25	0.15	-.13	-1.65	.101	1.91
Marital status (reference: married)	0.05	0.13	.02	0.38	.704	1.32
Location (reference: rural)						
Urban	-0.17	0.16	-.08	-1.04	.300	1.80
Suburban	-0.15	0.15	-.08	-1.01	.314	1.85
Health insurance (reference: insured through job)	-0.30	0.14	-.14	-2.21	.028	1.26

*Note: Overall model fit: $F(14, 282) = 2.96$, $p < .001$, $R^2 = .36$

Linear Regression #2 – Economic Barriers

Normality assumption. A P-P scatterplot and histogram for residuals were visually examined to assess the normality assumption (see Figure 4 and 5). The data in both the P-P plot residuals and the histogram of the standardized residuals indicated that the data appeared to deviate from a normal distribution (Howell, 2013). In addition, a Shapiro-Wilk test of normality confirmed that the distribution of the residuals was significantly different from a normal distribution ($p < .001$). The central limit theorem states that distributions with sums of 50 or more individual observations approximate toward normality, even if the distribution visually appears to not meet the assumption (Stevens, 2009).

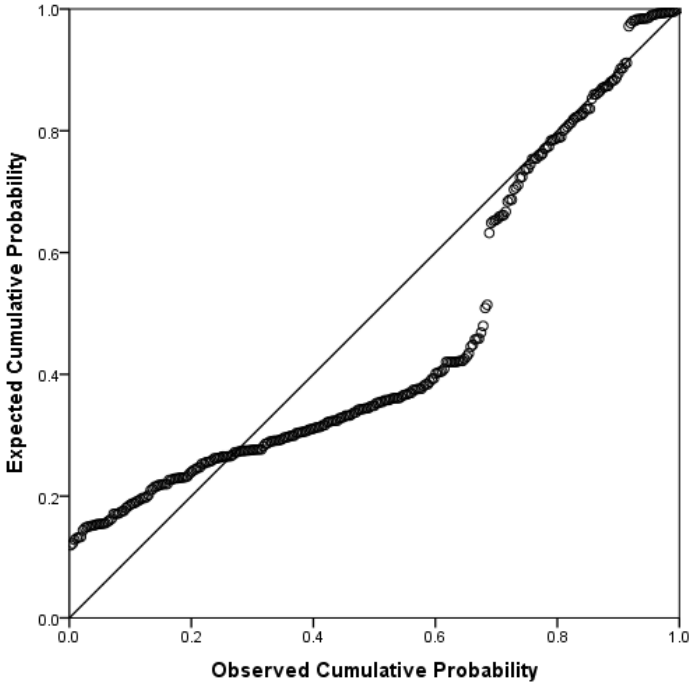

Figure 4. Normal P-P scatterplot to assess normality for regression of economic barriers on self-reported health status and demographic characteristics.

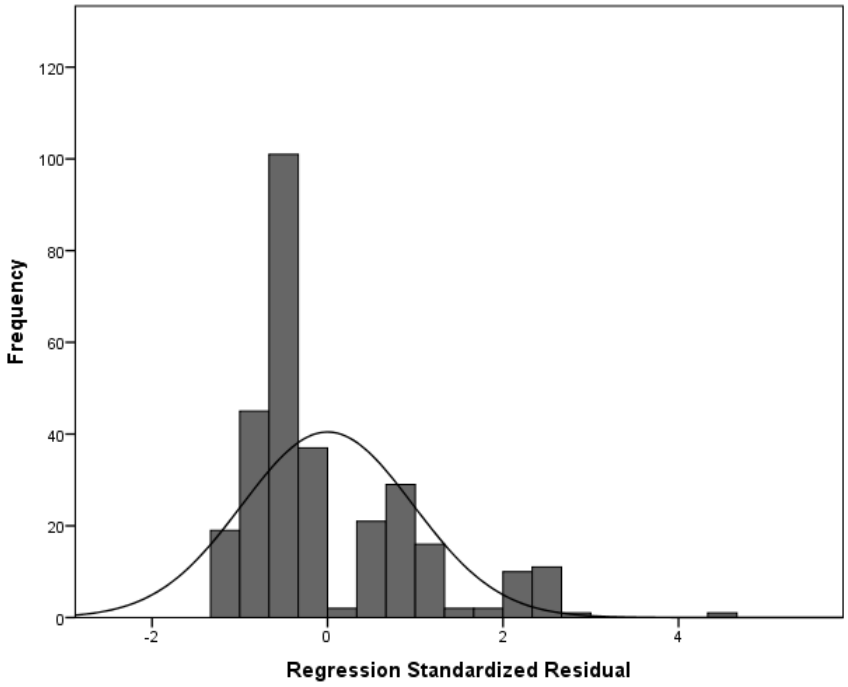

Figure 5. Histogram of the residuals to assess normality for regression of economic barriers on self-reported health status and demographic characteristics.

Homoscedasticity. A residuals scatterplot was examined to test the homoscedasticity assumption (see Figure 6). Homoscedasticity verifies that the variability in scores is similar across all values of the dependent variable (Pallant, 2013). The data showed a rectangular distribution and there was not a continuous pattern in the data; thus, the homoscedasticity assumption was met (Stevens, 2009).

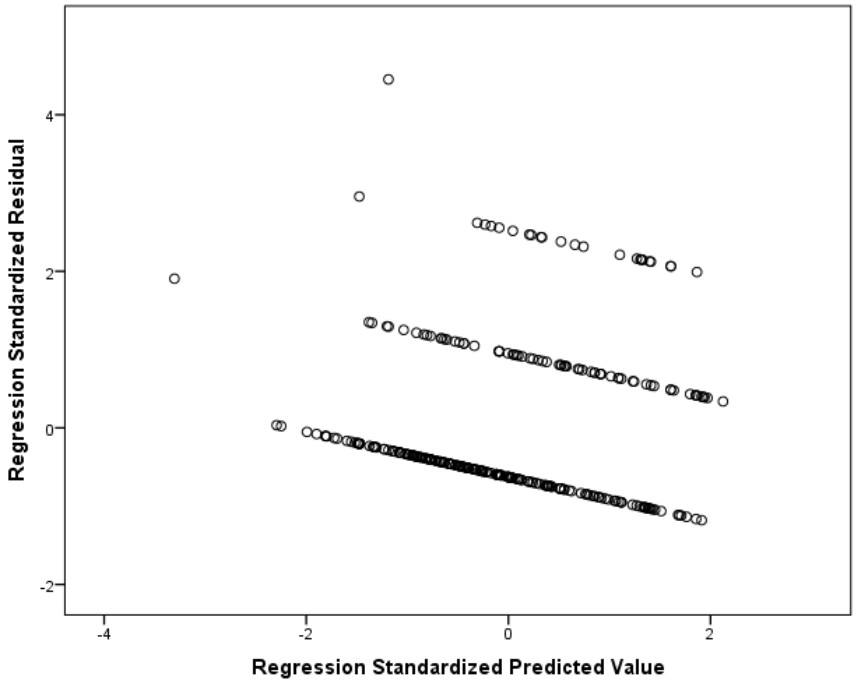

Figure 6. Residuals scatterplot for homoscedasticity for regression of economic barriers on self-reported health status and demographic characteristics.

Absence of multicollinearity assumption. The absence of multicollinearity assumption checks that there is not an association between the predictor variables. Variance inflation factors (VIFs) were applied to examine the assumption and values less than 10 indicated that the assumption was met (Stevens, 2009). The highest VIF value was 2.70 and the assumption was met (Stevens, 2009). Table 25 presents the VIF values for the regression model.

Results of multiple linear regression for economic barriers. The results of the multiple linear regression were significant, $F(14, 282) = 1.77$, $p = .044$, $R^2 = .08$, suggesting that a statistically significant relationship existed between the collective effect of the predictor variables and economic barriers. The coefficient of determination, R^2, suggested that the predictors could explain approximately 8% of the variance in economic barriers. Age was a significant predictor in the model, suggesting that participants aged 51+ ($t = -2.81$, $p = .005$) scored 0.25 units lower on economic barriers in comparison to participants who were aged 31-40. No other significant predictors were found in the model. Table 19 presents the results of the multiple linear regression.

Table 19

Linear Regression with Self-reported Health Status, Demographic Characteristics, and Economic Barriers

Source	*B*	*SE*	β	*t*	*p*	VIF
Self-reported health status	-0.10	0.06	-.09	-1.58	.115	1.09
Age (reference: 31-40)						
41-50	0.09	.10	.06	0.88	.381	1.30
51+	-0.25	0.09	-.19	-2.81	.005	1.39
Race (reference: White)						
Black	-0.11	.12	-.06	-0.92	.356	1.21
Other	0.15	0.12	.08	1.24	.217	1.11
Education (reference: up to high school graduate)						
Some college	-0.00	0.13	-.00	-0.02	.987	2.18
College graduate	-0.12	0.13	-.09	-0.96	.336	2.70
Graduate school	0.10	0.13	.07	0.76	.448	2.62
Household income (reference: 40,000-59,999)						
60,000-79,999	-0.08	0.11	-.05	-0.70	.482	1.39
80,000+	-0.08	0.11	-.05	0.68	.499	1.91
Marital status (reference: married)	0.06	0.09	.05	0.69	.492	1.32
Location (reference: rural)						
Urban	-0.06	0.11	-.05	-0.59	.558	1.80
Suburban	-0.3	0.10	-.02	-0.28	.779	1.85
Health insurance (reference: insured through job)	0.04	0.09	.03	0.49	.626	1.26

*Note: Overall model fit: $F(14, 282) = 1.77$, $p = .044$, $R^2 = .081$

Linear Regression #3 – Health Barriers

Normality assumption. A P-P scatterplot and histogram for residuals were visually examined to assess the normality assumption (see Figure 7 and 8). The data in both the P-P plot residuals and the histogram of the standardized residuals indicated that the data appeared to deviate from a normal distribution (Howell, 2013). In addition, a Shapiro-Wilk test of normality confirmed that the distribution of the residuals was significantly different from a normal distribution ($p < .001$). The central limit theorem states that distributions with sums of 50 or more individual observations approximate toward normality, even if the distribution visually appears to not meet the assumption (Stevens, 2009).

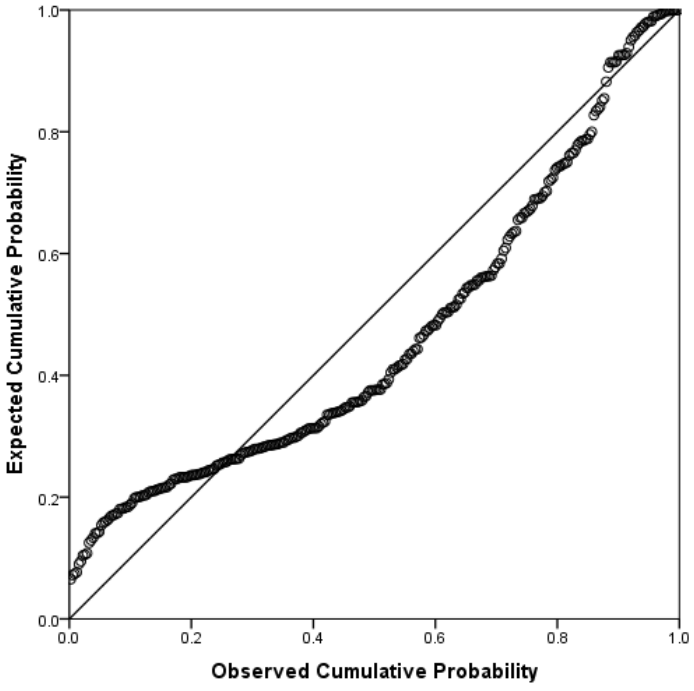

Figure 7. Normal P-P scatterplot to assess normality for regression of health barriers on self-reported health status and demographic characteristics.

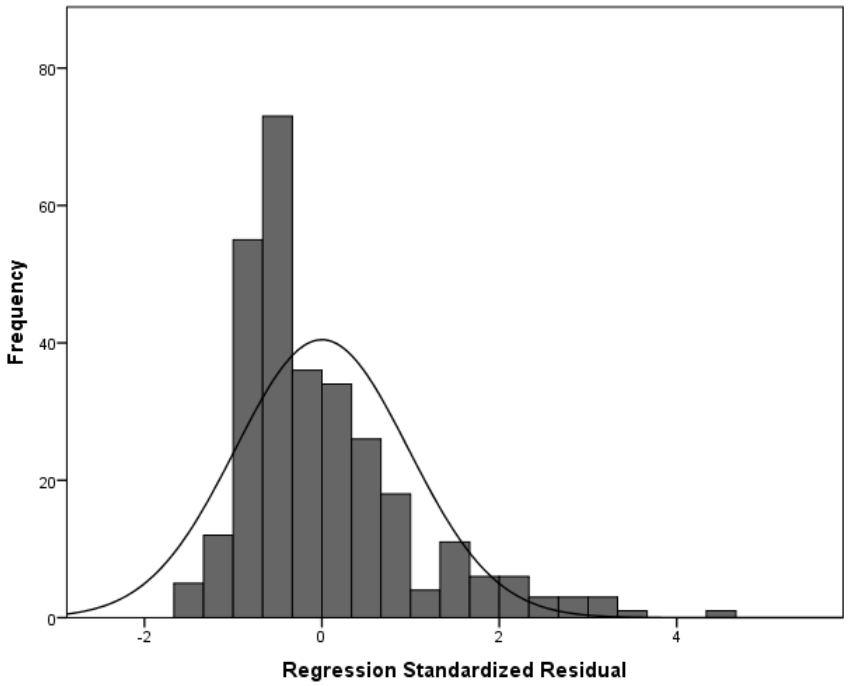

Figure 8. Histogram of the residuals to assess normality for regression of health barriers on self-reported health status and demographic characteristics.

Homoscedasticity. A residuals scatterplot was examined to test the homoscedasticity assumption (see Figure 9). Homoscedasticity verifies that the variability in scores is similar across all values of the dependent variable (Pallant, 2013). The data showed a rectangular distribution and there was not a continuous pattern in the data; thus, the homoscedasticity assumption was met (Stevens, 2009).

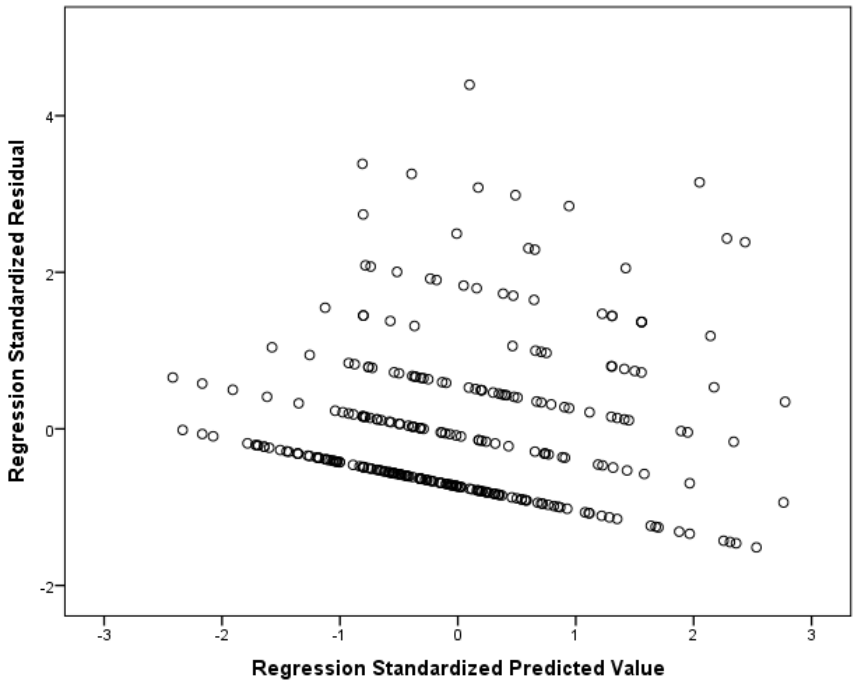

Figure 9. Residuals scatterplot for homoscedasticity for regression of health barriers on self-reported health status and demographic characteristics.

Absence of multicollinearity assumption. The absence of multicollinearity assumption checks that there is not an association between the predictor variables. Variance inflation factors (VIFs) were applied to examine the assumption and values less than 10 indicated that the assumption was met (Stevens, 2009). The highest VIF value was 2.70 and the assumption was met. Table 26 presents the VIF values for the regression model.

Results of multiple linear regression for health barriers. The results of the multiple linear regression were significant, $F(14, 282) = 2.01$, $p = .017$, $R^2 = .09$, suggesting that a statistically significant relationship existed between the collective effect of the predictor variables and health barriers. The coefficient of determination, R^2, suggested that the predictors could explain approximately 9% of the variance in health

barriers. As significance was found in the overall model, the coefficients were further examined.

Race was a significant predictor in the model. Participants who identified as other ($t = 2.38$, $p = .018$) scored 2.38 units higher on health barriers in comparison to White participants. Location was also a significant predictor in the model. Urban participants scored 0.55 units lower in comparison to rural participants. No other predictors were significant in the model.

Due to the non-significance of self-reported health status as a predictor in the three models, the null hypothesis for research question three ($H_0 3$) cannot be rejected. Table 20 presents the results of the multiple linear regression.

Table 20

Linear Regression with Self-Reported Health Status, Demographic Characteristics, and Health Barriers

Source	*B*	*SE*	β	*t*	*p*	VIF
Self-reported health status	-0.12	0.15	-.05	-0.81	.417	1.09
Age (reference: 31-40)						
41-50	-0.11	0.25	-.03	-0.43	.668	1.30
51+	-0.38	0.22	-.12	-1.72	.087	1.39
Race (reference: White)						
Black	0.51	0.30	.11	1.71	.088	1.21
Other	0.69	0.29	.14	2.38	.018	1.11
Education (reference: up to high school graduate)						
Some college	0.20	0.32	.03	0.36	.721	2.62
College graduate	0.26	0.31	.08	0.85	.399	2.70
Graduate school	0.12	0.32	.03	0.36	.721	2.62
Household income (reference: 40,000-59,999)						
60,000-79,999	-0.23	0.28	-.05	-0.81	.416	1.39
80,000+	-0.41	0.25	-.13	-1.63	.105	1.91
Marital status (reference: married)	0.08	0.21	.26	0.38	.704	1.32
Location (reference: rural)						
Urban	-0.55	0.27	0.16	-2.06	.040	1.80
Suburban	-0.21	0.25	-.07	-0.85	.395	1.85
Health insurance (reference: insured through job)	-0.24	0.22	0.07	-1.10	.272	1.26

*Note: Overall model fit: $F(14, 282) = 2.01$, $p = .017$, $R^2 = .09$

Summary

The purpose of this cross-sectional quantitative study was to assess the association between self-reported health status and perceived risk for developing breast cancer, as well as perceived barriers towards mammography screening and use. In this study I sought to address the gaps in the literature regarding identifying some of the different mechanisms that may drive a woman's self-report of her health status, risk for breast cancer, and non-adherence to mammography screening recommendations (Rowe et al., 2005). The results from this study showed important insights into a woman's experience with perceived barriers towards mammography screening that may delay, and/or prevent them from seeking services. In addition, this study examined sociodemographic differences in self-reported health status, perceived risk for developing breast cancer, as well as mammography screening use in order to see whether or not these variables played a role in women seeking breast cancer screening services.

A pilot study was first conducted to ensure that the questionnaire was easy to read and follow. Findings of the pilot study suggested that no modifications were necessary during the administration of the survey for the full data collection process. For the full sample, demographic data and health characteristics were presented first, followed by descriptive statistics of the continuously measured variables. A reliability analysis was conducted on the scales through use of Cronbach's alpha statistics. Results of ordinal logistic regression for research question one indicated that there was a collectively significant relationship between self-reported health status, demographic characteristics, and perceived risk for breast cancer. However, self-reported health status was not a

significant predictor in the model and the null hypothesis for research question one was not rejected. Results of the binary logistic regression for research question two indicated that there was a collectively significant relationship between self-reported health status, demographic characteristics, and receipt of a mammogram in the last two years. However, self-reported health status was not an individually significant predictor in the model and the null hypothesis for research question one was not rejected. Results of the linear regressions for research question three indicated that there were collectively significant relationships between self-reported health status, demographic characteristics, personal barriers, economic barriers, and health barriers. However, self-reported health status was again not a significant predictor in the model and the null hypothesis for research question three was not rejected.

In the next chapter, the findings of the statistical analyses will be further discussed. In addition, connections will be made back to existing literature and the theoretical framework selected for the study. I will also provide suggestions for future research.

Chapter 5: Discussion, Recommendations, and Conclusion

Introduction

The purpose of this research study was to assess the association between self-reported health status and perceived risk for developing breast cancer, as well as perceived barriers towards mammography screening and use. This study was conducted among 309 women who were 30 years and older in order to see how women perceived their health and the role this health perception played in perceived risk for developing breast cancer, mammography screening, and use. For this cross-sectional quantitative study, participants completed an online survey.

This chapter includes the interpretation of the study findings, a discussion of the limitations of the study, and recommendations for further study. Lastly, this chapter contains discussions of the implications for the social action theory, implications for social change, and the overall conclusions.

Summary and Interpretation of the Findings

An analysis was conducted on 309 participants, and three research questions were constructed for this research study:

RQ1: To what extent are self-reported health status and perceived risk for developing breast cancer related after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage?

RQ2: To what extent are self-reported health status and having a mammogram within the past 2 years related after controlling for age, race/ethnicity, education level,

household income range, marital status, area of residence, and type of insurance coverage?

RQ3: To what extent are self-reported health status, and perceived personal, economic, and health barriers towards mammography screening related after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage?

Self-Reported Health Status and Perceived Risk of Breast Cancer

In Research Question 1, I sought to assess the association between self-reported health status and perceived risk for developing breast cancer after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage. Using an ordinal logistic regression model, collectively, the variables were predictors of perceived risk for developing breast cancer. Individually, age and race/ethnicity were the only significant predictors for perceived risk of developing breast cancer. The alternate hypothesis was rejected (H_a1), the null hypothesis (H_01) was accepted that there was no significant relationship between self-reported health status and perceived risk for developing breast cancer as measured by self-report after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

Researchers have used self-reported health status to examine the health outcomes in groups with various conditions (Harding et al., 2012). However, different ideas of health have led to the completion of health measures in different ways (Chandola & Jenkinson, 2000), suggesting that self-reported health may not be the best way to

determine actual health outcomes. Consequently, the findings on self-related health status are mixed. For example, White et al. (2009) found that when older adults were satisfied with the emotional support made available to them, there was a better self-reported health status and that reporting having poor self-reported health status also reported being dissatisfied with emotional support available. Arnsberger et al. (2011) found that higher incomes and being employed full time were predictors of higher self-assessed health status. Harding et al. (2012) found that poorer health status was linked to decreased physical symptom burden and decreased treatment optimism in individuals living with HIV.

The findings of the present study add to the mixed nature of previous findings and indicate that self-reported health status is not connected to perceived risk for developing breast cancer. Therefore, self-reported health status may not be the best determinant of perceived risk for developing breast cancer, and objective measures may need to be used in conjunction with self-reported health assessments. Women may overestimate (leading to undue stress and worry) or underestimate (leading to avoidance of screening) their risk of developing breast cancer (Chung & Lee, 2013). Other factors can also influence women's perceptions of risk, accurately or inaccurately, including fate (Chung & Lee, 2013), breastfeeding (Shang, Beaver, & Campbell, 2015), and family history (Spector et al., 2009). Because of the number of factors involved in risk perceptions, the varying degrees of health education among women, and the largely unclear etiology of breast cancer, continued research into the mechanisms of how self-reported health status affects perceived risk of developing breast cancer is needed.

Age. Age can play a role in breast cancer screening, and my findings confirmed that age is a predictor of the perceived risk of developing breast cancer. For example, Freitas et al. (2011) found that 35.1% of women aged <50 years were adherent to mammography screening, while 21.1% of women in the age range of 50-55 were adherent to mammography screening, indicating that older women were less adherent to mammography screening in comparison with younger women. Like Freitas et al. Fehniger et al. (2016) showed that women 65 and older who were categorized as being at an average risk for breast cancer were less concerned (11.8%) about breast cancer compared to women aged 51-65 (24.2%). A plausible explanation for the contradictory findings concerning age and breast cancer screening may be due to the implementation of the Affordable Care Act (ACA) (CDC, 2016; Rosenbaum, 2012). With the implementation of the ACA, patients who were not initially able to obtain health insurance coverage can now register for coverage and take advantage of screening services (CDC, 2016; Rosenbaum, 2012). This may be an explanation as to why women over age 40 were more likely to be screened for breast cancer in comparison to the younger participants.

Age has also been linked to breast cancer risk perception. Haas et al. (2003) reported that younger women were more likely to accurately perceive that they were at high risk for developing breast cancer than older women were. Oleseke et al. (2007) confirmed the relationship between age and the perceived risk of breast cancer. Oleseke et al. found that women aged 30 – 39 were more likely to perceive a higher risk (25.8%) for breast cancer than women aged 40 – 49 (22.9%) and women aged 50 – 69 (20.1%). In

addition, Jones et al. (2011) also found a higher perceived risk of breast cancer among women of lower age.

Differences in risk perception between younger and older women may be due to factors that affect breast cancer risk. According to the ACS (2015), factors such as personal history of breast cancer, family history of breast cancer, genetic mutation that increases a women's risk for developing breast cancer, as well as women who have undergone radiation therapy to the chest area before the age of 30 are all characterized as being at a higher risk for breast cancer and therefore are recommended to be screened every year. Any combination or all of these factors affect a women's perceived risk for developing breast cancer. As a result of older women having a lower perceived risk of developing breast cancer, they do not receive yearly mammograms, which may cause an increase in the incidence rates for the disease among older women (ACS, 2016b). The same is seen with deaths due to the disease; older women are more likely to die from breast cancer in comparison with younger women (ACS, 2016b). More research is needed in order to understand how age is associated with the factors that categorize women as being at a higher risk for breast cancer. Like age, race/ethnicity also had a significant association with perceived risk for developing breast cancer.

Race/Ethnicity. Race/ethnicity can also play an important role in breast cancer screening, and my findings confirmed what has been found in previous research that race/ethnicity is an important predictor of the perceived risk of developing breast cancer as well as age. For example, Lepeak et al. (2011) found that African American women were most often diagnosed with later stage and more aggressive forms of breast cancer

when compared to White women. Orom (2013) also found that being Black was significantly associated with a lower perceived absolute risk for developing breast cancer. The issue of race/ethnicity and breast cancer screening, however, is complex and may involve the following factors: access to care, insurance status, lack of transportation, distance to cancer treatment, time off work or daycare issues, lack of information concerning cancer, as well as language and cultural barriers (Freeman & Chu, 2005). Foxall, Barron, & Houfek (2001) point out women that are from different ethnic backgrounds respond differently to breast and gynecologic cancer guidelines. This may be attributed to differences in culture, spirituality and interpersonal relationships (Foxall, et al., 2001). A lower perceived risk of developing breast cancer because of these factors may lead to missed opportunities to benefit from advances in breast cancer screening and early detection of a breast lump (Chung & Lee 2013; Lee & Ham 2010; and Katapodi et al., 2010). This may be a plausible explanation as to why African American women are most often diagnosed with a later stage of the disease.

Freeman and Chu (2005) argued that because of the interrelatedness of racial/ethnic factors and breast cancer screening more research was needed into the dynamics affecting the racial divide in health and disease outcomes. The findings of the present study also confirm that more research is needed on race/ethnicity and the factors related to breast cancer screening.

Self-Reported Health Status and Having a Mammogram

In Research Question 2, I sought to assess the association between self-reported health status and having a mammogram within the past two years, after controlling for

age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage. To address Research Question 2, a binary logistic regression was conducted. Collectively the variables were significant for having a mammogram within the past two years. Looking at each individual variable, age and education were significant predictors of having a mammogram within the past two years. My findings also showed that women aged 51+ were more likely to have had a mammogram within the past two years. Collectively the assessment did not confirm the alternate hypothesis. The null hypothesis was not rejected. There was no significant relationship between self-reported health status and having received a mammogram within the past two years as measured by self-report, after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage.

Researchers have shown that self-reported health status plays a role in health behaviors and the use of health care services, as well as disease treatment and outcome (Harding et al., 2012; Morris et al., 2013). For example, men living in Jamaica who reported their health as excellent or good underutilized clinical services (Morris et al., 2013). According to Morris et al. (2013), a misunderstanding of one's personal perceived health status in comparison to actual health status has led to the underutilization of health facilities. If women have a low perceived risk for developing breast cancer, they tend not to seek health preservation behaviors and may not consistently adhere to mammography screenings (Chung & Lee, 2013). Likewise, Lee and Ham (2012) found that women with either a higher optimistic bias or an underestimation of perceived risk for developing

breast cancer were less likely to follow up with screening recommendations. However, the findings of the present study supports findings that age can play an important role in having a mammography (Fehniger et al., 2016; Freitas et al., 2011). My findings suggest that as women age they gain a better sense of their health status in relation to the necessity of having a mammography, which lends some credence to self-reported health assessment in relation to age. However, further research is needed in order to understand what the different categories of health ratings (i.e. excellent health, good health, and poor health) mean to the individual, as well as to understand what internal/external factors affect their perceptions of health status, related to receiving a mammography.

Education. Although education has been linked to individuals seeking medical treatment in general (Healthy People 2020, 2011) and in increasing the odds of women having a mammogram (Wells & Horm, 1998) my findings show that women who have completed graduate school were less likely to receive a mammogram within the past two years. A plausible explanation for this may in part be due to some of the perceived benefits associated with higher education. Level of educational attainment is often associated with improvement in job status, which may create an opportunity for the attainment of higher income. Additionally, women with higher levels of education may know more about breast cancer and its risk factors than women with lower levels of education (Facione, 2002). For example, in comparison to women without a college education, women who were college educated demonstrated more knowledge about breast cancer symptoms as well as a lower risk perception for breast cancer than those that had no college education (Facione, 2002). Like age and breast cancer screening, another plausible explanation for

the contradictory results seen in education and breast cancer screening may be attributed to the implementation of the ACA. Although attaining a higher level of education may afford an individual favorable benefits, individuals with lower educational levels may not be afforded the same opportunities. With the ACA, patients who may not have been able to afford health insurance can now obtain coverage and gain access to screening facilities they ordinarily would not be able to afford without regular health insurance that are provided for by the provisions of the ACA (CDC, 2016, Rosenbaum, 2012). Similar to race/ethnicity, the relationship between education and women seeking a mammogram involve complex, interrelated factors. Further research is needed in order to understand the role of education on perceptions of breast cancer risk in conjunction with mammography screening at the individual level.

Self-Reported Health Status and Perceived Barriers

In Research Question 3, I sought to assess the association between self-reported health status and perceived personal, economic and health system barriers towards mammography screening. Using three multiple linear regression models for each barrier category, the assumptions for normality, homoscedasticity, and the absence of multicollinearity were met for the linear regression models. The findings from the linear regression with self-reported health status demographic characteristics and personal perceived barriers in the current research study showed Black people experienced more personal barriers in comparison with participants (p = .002). Health insurance was also a significant predictor. Participants who had other types of insurance coverage were less likely to experience personal barriers. Lastly, age was observed to be a significant

predictor of personal barriers. Participants aged 51+ less likely to experience personal barriers towards mammography screening. Unlike personal barriers towards mammography screening, age was the only significant predictor in the model (p =.005) for self-reported health status, demographic characteristics and economic barriers.

Women who were aged 51+ years of age were less likely to experience economic barriers towards mammography screening in comparison to women aged 41-50 years of age. In the third linear regression model for self-reported health status, demographic characteristics, and health barriers towards mammography, race as well as location were significant predictors in the model. Participants who identified as other were more likely to experience health barriers towards mammography screening. Participants who lived in urban areas were less likely to experience health barriers towards mammography screening. Since self-reported health status was not a significant predictor in the model, the null hypothesis ($H_0$3) was not rejected. There was no relationship among self-reported health status, and perceived personal, economic, and health barriers towards mammography screening.

Like perceived risk, the relationship between self-reported health status and perceived barriers towards mammography screening may vary from woman to woman, and may be unique to each woman, and/or racial/ethnic group. As seen in other studies, factors that have prevented women from receiving a mammogram have been poor access to care, no health insurance, lack of social support, language barriers, lack of a regular health care provider, and fear of treatment for the disease (Ahmed et al., 2009; Lopez et al., 2009; Schueler et al., 2008). Some of these barriers involved sociocultural factors.

For example, Jandorf et al. (2012) found that language barriers and lack of understanding pertinent health information were problems in seeking medical attention regarding cancer screening among Mexican immigrant women living in Arkansas. Northington et al. (2011) found that fear of cancer, being shy, no insurance, finances, and lack of knowledge about the disease and detection methods kept African American and Caucasian women in the southern United States from seeking out screening even when a lump/knot was found in their breasts.

Whether women assess their own health status accurately or not, barriers to breast cancer screening exist. Again, however, self-reported health may not be the best way to determine barriers toward mammography screening. Additionally, if women do not accurately assess their own health, they may not be able to determine whether they should receive a mammography screening. Although the results were not significant, examined individually my findings confirmed that barriers to mammography screening involved demographic characteristics of race, age, and health insurance collectively. These findings suggest that factors related to mammography screening are complex and interrelated, and perhaps best assessed through multidimensional frameworks and objective rather than self-report methods.

Limitations of the Study

There were several limitations in the current study. A convenience sampling approach was used to target participants who met the inclusion criteria for age and gender, which may have represented a limitation to the study. Because of the use of a non-probability sampling technique, the study findings may not generalize to other

populations. Random sampling helps findings generalize to other populations beyond the sample population (Hoffman et al., 2015). In addition, close-ended survey questions were used, and inherent limitations include response bias because of participants potentially answering questions untruthfully or providing responses that they believe to be favorable. Participants may have answered the question about their health status positively to cast themselves in a favorable light, possibly leading to inaccurate results about self-reported health status. In addition, the variable of self-reported health status may have been a limitation because I measured the variable with one item. Measuring self-reported health status with one item may have affected validity, and a series of questions may be needed to better measure how healthy individuals believe themselves to be.

A pilot study was conducted in order to ensure the survey instrument could be used to achieve the overall goals of the research study. The reliability of the pilot study was assessed using Cronbach's alpha. Although the reliability of all three scales (personal barriers, economic barriers, and health system barriers) were below the acceptable threshold of .7, this might have been attributed to the low number of items in the personal barriers (4 items) and economic barriers (3 items) scales. With a low number of items comprising a scale, there is a higher chance for random error in the responses (George & Mallery, 2010).

Recommendations

In the current research study, I sought to assess the relationship between self-reported health status and perceived risk for developing breast cancer, having a mammogram within the past two years as well as barriers towards mammography

screening. Self-reported health status has become increasingly important in measuring disease, treatment, and care outcomes (Harding et al., 2012, Healthy People 2020, 2014), especially concerning different interpretations of the notion of health (Chandola & Jenkinson, 2000). However, researchers have not focused extensively on the relationship between self-reported health status and breast cancer risk and screening. In light of the findings of non-significance of the present study, further research is recommended on the connections between self-reported health status and breast cancer risk and screening to confirm or refute findings. Additionally, future research might focus on comparing self-reported health status and objective health assessments as they relate to perceptions of breast cancer risk and screening. Comparative studies might yield information to better assess the usefulness and accuracy of using self-reported health status involving breast cancer risk and screening.

Although there were no significant relationships between self-reported health status and the variables, some of the covariates had a significant association with perceived risk for developing breast cancer, mammography screening, as well as perceived barriers towards screening. More research may be needed to further analyze self-reported health status in relation to the covariates. Research has shown that age, education, race/ethnicity, household income, health insurance, and marital status have played a role in breast cancer screening. In order to better understand how self-reported health status plays a role in breast cancer it is recommended that future research is needed in order to assess the significance among these variables with perceived risk of breast cancer, mammography screening, and perceived barriers towards breast cancer screening.

More specifically, the factors of age, race/ethnicity, and education continue to play roles in mammography screening and perceived barriers towards breast cancer screening. Consequently, it seems that not only more research is needed on how and why these factors continue to affect mammography screening but on effective interventions and educational approaches to help older women in populations with minimal education see the importance of and gain access to mammography screening. Additionally, researchers might also continue to test and develop multidimensional frameworks for understanding the complex and interrelated factors associated with mammography screening. Researchers might also conduct exploratory qualitative studies to identify specific social factors of self-reported heath status breast cancer risk and screening.

Implications for Social Action Theory

The results were interpreted with the theoretical framework in mind. The theoretical foundation for this study was the social action theory. The theoretical basis for the social action theory is that it can be used to identify factors that may impact an individual's assessment and belief in health promoting behaviors (Traube et al., 2012). Self-reported health status is a factor that may impact an individual's assessment and belief in health promoting behaviors. The social action theory also focuses on the effects of social contextual factors on psychological processes in order to help predict health-protective behaviors and outcome (Ewart, 1991; Institute of Medicine, 2001). In the social action theory, individuals are viewed as being influenced by their environmental, biological, and social contexts (Institute of Medicine, 2001). The underlying goal of the

social action theory is the identification of key characteristics, behaviors, and/or health habits that sustain debilitating habits (Ewart, 2009; Lightfoot et al., 2005).

Findings of the present study partially supported the theory. Although other researchers (Harding et al., 2012; Healthy People 2020, 2014; Chandola and Jenkinson, 2000; Campbell, 2008; Sorkin et al., 2008; Prokhorov et al., 2003; Hoffman-Goetz et al., 2009; White et al., 2009) have shown that self-reported health status may be a predictor of health and disease outcome, findings of the present study showed that in many of the regression models there was a collective significance but the individual predictors in many cases were not significant. My findings confirmed that there are connections between self-reported health, breast cancer risk and screening, and some sociodemographic factors. However, my findings also indicate that social-contextual frameworks specific to breast cancer risk and screening may need to be developed and used to reduce and target specific social variables. In combination, many of the predictor variables had an effect on the dependent variable of interest, but individually they did not have a strong effect. Due to the fact that the null hypothesis could not be rejected, the social action theory could not be entirely supported. Although the findings did not entirely support the social action theory there are still implications for practice.

Implications for Practice

Breast cancer affects women of all races and ethnicities, and is a significant public health issue in the United States. Among all other cancers, breast cancer is the most common cancer found in women (Hines, 2010). Although self-reported health status was not significantly associated with perceived risk for breast cancer, mammography

screening and perceived barriers; it has been used as a predictor in studies concerning measuring disease, treatment and care outcome (Harding et al., 2012; Healthy People 2020, 2014). This study has implications for doctors, nurses, and technicians because it showed that the important factors for practice were age, race, and level of education. With these factors this study further confirms that a multidimensional approach is needed regarding breast cancer. No one variable can predict risk, screening use and disease outcome. In the future it will be important to assess all variables and their interrelatedness with breast cancer.

Implications for Social Change

In this research study I sought to promote positive social change by aiding in the identification of women who may be at risk for breast cancer by not receiving a regular mammography, and help them to understand the importance of getting screened regularly. This study shows that no one variable can answer the question as to why some women do not get screened for breast cancer. Consequently, interrelated, and perhaps interdisciplinary, educational and intervention approaches are needed to address the challenges of women receiving regular mammograms, which may lead to early detection of breast cancer. In addition, multidimensional frameworks and models that allow practitioners to assess and understand the interrelated variables of age, race/ethnicity, and educational level might also help older women with low education levels of diverse populations receive needed screening and treatment. All variables studied and understood can help improve public health initiatives in reaching clusters of populations who would not ordinarily be screened for breast cancer. Some of these target populations include illegal immigrants, older populations of women, women with minimal education, those that cannot afford the cost of being screened due to lack of insurance, women that do not know or understand the risk factors for breast cancer, as well as women who do not get yearly physicals.

Conclusion

In the current research study the effects of self-reported health status on perceived risk for developing breast cancer, mammography screening and perceived barriers were assessed after controlling for age, race/ethnicity, education level, household income range, marital status, area of residence, and type of insurance coverage. The findings from the current research study showed that self-reported health status was not a significant predictor for perceived risk of developing breast cancer, mammography screening, or perceived barriers towards mammography screening. Using self-reported health status as the only key variable limited what was found. Although age was a covariate, there were significant results with age and perceived barriers towards mammography screening.

One reason for there being no significant findings on self-reported health status might have been because one item was used to measure self-reported health status; a range of questions may be required to better assess how individuals perceive how healthy they are. Additionally, self-reported health measures have been important in measuring various disease, treatment, and care outcomes (Harding et al., 2012, Healthy People 2020, 2014). However, objective health measures may serve as better indicators of the risk of developing breast cancer than self-reported health measures because of the number of factors involved in risk perceptions, the varying degrees of health education among women, and the still largely unclear etiology of breast cancer

The overarching goal has been to improve screening rates in order to improve early detection of breast cancer (ACS, 2016). Although self-reported health status was

not significant, some of the covariates, such as age, race/ethnicity, and educational level had significant results in perceived risk and mammography screening. Findings confirmed connections between self-reported health, breast cancer risk and screening, and some sociodemographic factors. Findings also partially supporting social action theory and suggested that social-contextual frameworks specific to breast cancer risk and screening may need to be developed to target specific social variables.

References

Ahmed, N. U., Fort, J. G, Fair, A. M., Semenya, K., & Haber, G. (2009). Breast cancer knowledge and barriers to mammography in a low income managed care population. *Journal of Cancer Education*, *24*, 261–266, doi:10.1080/08858190902973077

Agresti, A. (2002). *Categorical data* (2,d ed.).Hoboken, NJ: Wiley.

Akinyemiju, T. F., Soliman, A. S., Yassine, M., Banerjee, M., Schwartz, K., & Merajver, S. (2012). Healthcare access and mammography screening in Michigan: a multilevel cross-sectional study. *International Journal for Equity in Health*, *11*, 16. http://doi.org/10.1186/1475-9276-11-16

American Cancer Society. (2016). Breast cancer. Retrieved October 18, 2016, from http://www.cancer.org/Cancer/BreastCancer/DetailedGuide/breast-cancer-what-is-breast-cancer

American Cancer Society. (2016). Breast cancer facts and figures 2016. Retrieved October, 18, 2016, from http://www.cancer.org/acs/groups/content/@research/documents/document/acspc-047079.pdf

American Cancer Society. (year). Mammograms and other breast imaging tests. Retrieved October 18, 2016, from http://www.cancer.org/healthy/findcancerearly/examandtestdescriptions/mammogramsandotherbreastimagingprocedures/mammograms-and-other-breast-imaging-procedures-toc

American Cancer Society. (2015). American Cancer Society recommendations for early breast cancer detection in women without breast symptoms. Retrieved September 28, 2015, from, http://www.cancer.org/cancer/breastcancer/moreinformation/breastcancerearlydetection/breast-cancer-early-detection-acs-recs

Armstrong, K., Rose, A., Peters, N., Long, J. A., McMurphy, S., & Shea, J. A. (2006). Distrust of the Health Care System and Self-Reported Health in the United States. *Journal of General Internal Medicine*, *21*(4), 292–297. http://doi.org/10.1111/j.1525-1497.2006.00396.x

Arnsberger, P., Lynch, U., & Li, F. (2012). The effects of caregiving on women's self-assessed health status: An international comparison. *Health Care for Women International*, *33*, 878-895. doi: 10.1080/07399332.2011.645966

Avis-Williams, A., Khoury, A., Lisovicz, N., & Graham-Kresge, S. (2009). Knowledge, attitudes, and practices of underserved women in the rural South toward breast cancer prevention and detection. *Family Community Health*, *32*, 238–246. doi: 10.1097/FCH.0b013e3181ab3bbb

Baker, T. L. (1994), *Doing social research (2*nd ed.). New York, NY: McGraw-Hill Inc.

Barton, M. B., Harris, R. H., & Fletcher, S. W. (2011). Does this patient have breast cancer? The screening clinical breast examination: Should it be done? How? *The Journal of the American Medical Association*, *282*(13), 1270-1280. doi:10.1001/jama.282.13.1270

Berkman, L. F., & Kawachi, I. (2000). *Social epidemiology*. New York, NY: Oxford University Press.

Brace, N., Kemp, R., & Snelgar, R. (2012). *SPSS for psychologists* (5th ed.). New York, NY: Palgrave MacMillan.

Bourne, A. P. (2009). Dichotomizing poor self-reported health status: Using secondary cross-sectional survey data for Jamaica. *North American Journal of Medical Sciences*, *1*, 295-302. doi: 10.4297/najms.2009.6295

Campbell, K. H., Stocking, C. B., Hougham, G. W., Whitehouse, P. J., Danner, D. D., & Sachs, G. A. (2008). Dementia, diagnostic disclosure, and self-reported health status. *Journal of American Geriatric Society*, *56*(2), 296-300. doi: 10.1111/j.1532-5412.2007.01551.x

Centers for Disease Control and Prevention. (2014). Morbidity and Mortality Weekly Report: Cancer screening-United States, 2010. Retrieved March, 2014, from http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6103a1.htm

Centers for Disease control and Prevention. (2016). National breast and cervical cancer early detection program (NBCCEDP). Retrieved December, 2016, from, http://www.cdc.gov/cancer/nbccedp/about.htm

Champion, V. L., & Springston, J. (1999). Mammography adherence and beliefs in a sample of low-income African American women. *International Journal of Behavioral Medicine*, *6*(3), 228-240. doi: 10.1207/s15327558ijbm0603_2

Chandola, T., & Jenkinson, C. (2000). Validating self-rated health in different ethnic groups. *Ethnic Health*, *5*(2), 151-159. doi:10.1080/713667451

Chung, C., & Lee, S. J. (2013). Estimated risks and optimistic self-perception of breast cancer risk in Korean women. *Applied Nursing Research*, *26*(4), 180-185. doi: 10.1016/j.apnr.2013.06.001

Creswell, J. (2003). *Research design* (2nd ed.). Thousand Oaks, CA: Sage Publications. I

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (*2nd* ed.). St. Paul, MN: West Publishing Company.

Desantis, C., Jemal, A., & Ward, E. (2010). Disparities in breast cancer prognostic factors by race, insurance status, and education. *Cancer Causes and Control*, *21*(9), 1445-1450. doi: 10.1007/s10552-010-9572-z

Elmore, J. G., Armstrong, K., Lehman, C. D., & Fletcher, S. W. (2005). Screening for breast cancer. *The Journal of the American Medical Association, 293*(10), 1245-1256. doi:10.1001/jama.293.10.1245

Engelman, K. K., Hawley, D. B., Gazaway, R., Mosier, M. C., Ahluwalia, J. S., & Ellerbeck, E. F. (2002). Impact of geographic barriers on the utilization of mammograms by older rural women. *The American Geriatrics Society*, *50*(1), 62-68. doi: 10.1046/j.1532-5415.2002.50009.x

Ewart, C., K. (1991). Social action theory for a public health psychology. *American Psychologist*, *46*(9) 931-946

Ewart, CK. (2009). *Changing our unhealthy ways: Emerging perspectives from Social Action Theory*. In: DiClemente , R,; Crosby, R,; Kegler, M., editors. (359-391). San Francisco, CA: Jossey-Bass

Facione, N. C., Giancarlo, C., & Chan, L. (2000). Perceived risk and help-seeking

behavior for breast cancer: A Chinese-American perspective. *Cancer Nursing*, *23*(4), 258-267

Facione, N. C. (2002). Perceived risk of breast cancer. *Cancer Practice*, *10*(5), 256-262. doi:10.1046/j.1523-5394.2002.105005.x

Fedele, D, A., Molzon, E. S., Eddington, A. R., Hullmann, S. E., Mullins, L. L., & Gillapsy, S. G.(2014). Perceived Barriers to care in a pediatric medical home: the moderating role of caregiver minority status. *Clinical Pediatrics*, *53*(4), 351-355. doi: 10.1177/0009922813507994

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2008). G*Power Version 3.1.2 [computer software]. Uiversität Kiel, Germany. Retrieved from, http://www.psycho.uni-duesseldorf.de/abteilungen/aap/gpower3/download-and-register

Fehniger, J., Livaudais-Toman, J., Karliner, L., Kerlikowske, K., Tice, J. A., Quinn, J., Ozanne, E., & Kaplan, C. P. (2014). Perceived versus objective breast cancer, breast cancer risk in diverse women. *Journal of Women's Health*, *23*(5), 420-427. doi: 10.1089/jwh.2013.4516

Field, A. P. (2005). Discovering statistics using SPSS (*2nd* ed.). London: Sage.

Foxall, M. J., Barron, C. R., & Houfek, J. F. (2001). Ethnic Influences on body awareness, trait anxiety, perceived risk, and breast and gynecologic cancer screening practices. *Oncology Nursing Forum*, *28*(4), 727-738

Frankfort-Nachmias, C., & Nachmias, D. (2008). *Research Methods in the Social Sciences*. *7th* ed.: New York, NY: Worth Publishers

Freitas, C., Tura, L. F., Costa, N., & Duarte, J. (2011). A population-based breast cancer screening programme: conducting a comprehensive survey to explore adherence determinants. *European Journal of Cancer Care*, *21*(3), 349-359. doi: 10.1111/j.1365-2354.2011.01305.x

Freeman, H. P., & Chu, K. C. (2005). Determinants of cancer disparities: Barriers to cancer screening, diagnosis, and treatment. *Surgical Oncology Clinics of North America*, *14*(4), 655-669. doi: 10.1016/j.soc.2005.06.002

Gallagher, J. E., Wilkie, A. A., Cordner, A., Hudgens, E. E., Ghio, A. J., Birch, R. J., & Wade, T. J. (2016). Factors associated with self-reported health: implications for screening level community-based health and environmental studies. *BioMed Central Public Health*, *16*, 1-15. doi: 10.1186/s12889-016-3321-5

George, D. & Mallery, P. (2010). SPSS for Windows step by step: a simple guide and reference, 18.0 update (*11th* ed.). Boston, MA: Allyn and Bacon.

Gerend, M. A., & Pai, M. (2008). Social determinates of Black-White disparities in breast cancer mortality: A review. *Cancer Epidemiology, Biomarkers and Prevention*, *17,* 2913-2923. doi:10.1158/1055-9965.EPI-07-0633

Haas, J. S., Kaplan, C P., Des Jarlais, G., Gildengoin, V., Pérez-Stable, E. J., & Kerlikowskey, K. (2005). Perceived risk of breast cancer among women at average and increased risk. *Journal of Women's Health*, *14*(9), 845-851. doi: 10.1089/jwh.2005.14.845

Harding, R., Clucas, C., Lampe, F. C., Date, H. L., Fisher, M., Johnson, M., … Sherr, L. (2012). What factors are associated with patient self-reported health status among HIV outpatients? A multi-center UK study of biomedical and psychosocial factors. *Aids Care*, *24*(8), 963-971. doi:10.1080/09540121.2012.668175

Healthy People 2020. (2016). General Health Status. Retrieved October 18, 2016a, from, https://www.healthypeople.gov/2020/about/foundation-health-measures/General-Health-Status#selfAssessed

Healthy People 2020. (2016) Cancer. Retrieved October 18, 2016b, from, https://www.healthypeople.gov/2020/topics-objectives/topic/cancer

Hines, L. M., Risendal, B., Slattery, M. L., Baumgartner, K. B., Giuliano, A. R., Sweeny, C., … Byers, T. (2010). Comparative analysis of breast cancer risk factors among Hispanic and Non-Hispanic White Women. *Cancer, 116*(13), 3215-3223. doi:10.1002/cncr.25154

Hoffman, R. M., Koyama, T., Albertsen, P. C., Barry, M. J., Daskivich, T. J., Goodman, M., … Penson, D. F. (2015). Self-Reported health status predicts other-cause mortality in men with localized prostate cancer: Results from the prostate cancer outcomes study. *Journal of General Internal Medicine*, *30*(7), 924-934. DOI:1007/s11606-01403171-8

Hoffman-Goetz L., Meissner H. I., & Thomas MSC. (2009). Literacy and Cancer anxiety as predictors of Health Status: An Exploratory Study. *Journal of Cancer Education*, *24*(3), 218-224. doi: 10.1080/08858190902910871

Hosmer, D. W. & Lemeshow, S. (2000). *Applied logistic regression* (*2nd* ed.)..New York, NY: John Wiley & Sons

Howell, D. C. (2010). *Statistical methods for psychology* (*7th* ed.). Belmont CA: Wadsworth Cengage Learning.

Hubbard, R. A., O'Meara, E. S., Henderson, L M., Hill, D., Braithwaite, D., Haas, J. S., … Onega, T. (2016). Multilevel factors associated with long-term adherence to screening mammography in older women in the U.S. *Preventive Medicine*, *89*,169-177. doi: 10.1016/j.ypmed.2016.05.034

Institute of medicine. (2001). *Health and behavior*. Washington, DC: National Academy Press.

Issel, M.L. (2009). *Health program planning and evaluation: a practical, systematic approach for community health* (*2nd*, ed.). Sudbury, MA: Jones and Bartlett Publishers.

Jandorf, L., Ellison, J., Shelton, R., Thélémaque, L., Castillo, A., Iris, E., … Erwin, D., O. (2012). Esperanza y Vida: A culturally and linguistically customized breast and cervical education program for diverse Latinas at three different United States sites. *Journal of Health Communication*, *17*, 160-176. doi: 10.1080/10810730.2011.585695

Jones, S. C., Magee, C. A., Barrie, L. R., Iverson, D. C., Gregory, P., Hanks, E. L., …Zorbas, H. M. (2011). Australian women's perceptions of breast caner risk factors and the risk of developing breast cancer. *Women's Health Issues*, *21*(5), 353-360, doi: 10.1016/j.whi.2011.02.004

Kandula, N. R., Lauderdale, S. D., & Baker, W. D. (2006). Differences in self-reported health among Asians, Latinos, and Non-Hispanic Whites: The role of language and nativity. *Annals in Epidemiology*, *17*(3), 191-198. doi: 10.1016/j.annepidem.2006.10.005

Katapodi, M. C., Dodd, M. J., Lee, K. A., & Facione, N. C. (2009). Underestimation of breast cancer risk: Influence on screening behavior. *Oncology Nursing Forum*, *36*(3), 306-314. doi: 10.1188/09.ONF.306-314

Katapodi, M. C., Dodd, M. J., Facione, N. C., Humphreys, J. C., & Lee, K. A. (2010). Why some women have optimistic or a pessimistic bias about their breast cancer risk: Experiences, heuristics, and knowledge of risk factors. *Cancer Nursing*, *33*(1), 64-73. doi: 10.1097/NCC.0b013e3181b430f9

Kim, J. I., Oh, K. O., Li, C. Y., Min, H. S., Chang, E. S., & Song, R. (2011). Breast cancer screening practice and health promoting behaviors among Chinese women. *Asian Nursing Research*, *5*, 157-163. doi:10.1016/j.anr.2011.09.005

Kwok, C., & White, K. (2011). Cultural and linguistic isolation: the breast cancer experience of Chinese-Australian women – A qualitative study. *Contemporary Nurse*, *39*(1), 85-84. doi: 10.5172/conu.2011.39.1.85

Lannin, D. R., Mathews, H. F., Mitchell, J., Swanson, M. S., & Edwards, M. S. (1998). Influence of socioeconomic and cultural factors on racial differences in late-stage breast presentation of breast cancer. *Journal of the American Medical Association*, *279*(22), 1801-1807. doi: 10.1001/jama.279.22.1801

Lantz, P. M., Mujahid, M., Schwartz, K., Janz, N. K., Fagerlin, A., Salem, B., …Katz, S, J. (2006). The influence of race, ethnicity, and individual socioeconomic factors on breast cancer stage at diagnosis. *American Journal of Public Health*, *96*(12), 2173-2178. doi: 10.2105/AJPH.2005.072132

Lee, S. H., & Ham, E. M. (2010). The relationship between the optimistic bias about cancer and cancer preventive behavior of the Korean, Chinese, American, and Japanese adult residing in Korea. *Journal of Korean Academy of Nursing*, *40*(1), 52-59. doi: 10.4040/jkan.2010.40.1.52

Lepeak, L., Tevaarwerk, A., Jones, N., Williamson, A., Cetnar, J., & LoConte, N. (2011). Persistence in breast cancer disparities between African Americans and Whites in Wisconsin. *Wisconsin Medical Journal*, *110*(1), 21-25

Lightfoot, M., Rotheram-Borus, M. J., Milburn, N. G., & Swendeman, D. (2005). Prevention for HIV-seropositive persons. *Behavior Modification*, *29*(2), 227-255. doi: 10.1177/145445504272599

Lopez, E. D., Khoury, A. J., Dailey, A. B., Hall, A. G., & Chisholm, L. R. (2009). Screening mammography a cross-sectional study to compare characteristics of women aged 40 and older from the deep south who are current, overdue, and never screeners. *Women's Health Issues*, *19*, 434-445. doi:10.1016/jwhi.2009.07.008

Lipsey, M. W., and Wilson, D. B. (2001). *Practical Meta-Analysis*. Thousand Oaks, CA: SAGE Publications Inc.

Lu, Z. J. (1995). Variables associated with breast self-examination among Chinese women. *Cancer Nursing*, *18*(1), 29–34.

Mandelblatt, J., Andrews, H., Kemer, J., Zauber, A., & Burnett, W. (1991). Determinants of late stage diagnosis of breast and cervical cancer: the impact of age, race, social class, and hospital type. *American Journal of Public Health*, *81*(5), 648-649

Markossian, T. W., & Hines, R. B. (2012). Disparities in late stage diagnosis, treatment, and breast cancer-related death by race, age, and rural residence among women in Georgia. *Women & Health*, *52*, 317-335. doi: 10.1080/03630242.2012.674091

McHugh, M. L. (2013). The Chi-square test of independence. *Biochemia medica*, *23*(2), 143-149.

Mont, J. D., and Forte, T. (2016). Perceived discrimination and self rated health in Canada: and exploratory study. *BioMed Central Public Health*, *16*(742), 1-9. doi 10.1186/s12889-016-3344-y

Morris, C., James, K., Holder-Nevins, D., & Eldemire-Shearer, D. (2013). Insights from a developing country: Self-reported health status of elderly men (60 years and over) in Jamaica. *International Journal of Men's Health*, *12*(2), 106-120. doi: 10.3149/jmh.1202.106

Munro, B. H. (2005). *Statistical methods for health care research* (*5th* ed.). Chestnut Hill, MA. Lippincott Williams & Wilkins.

National Cancer Institute. (2012). Surveillance epidemiology, and end results program: Fast stats. Retrieved July 12, 2016, from, http://seer.cancer.gov/faststats/selections.php?#Output

Nelson, H. D., Tyne, K., Naik, A., Bougatsos, C., Chan, B. K., & Humphrey, L. (2009). Screening for breast cancer: systematic evidence review update for the U.S. Preventive Services Task Force. *Annals of Internal Medicine, 151*(10), 727-W242. doi: 10.1059/0003-4819-151-10-2009-11170-00009.

Northington, L., Martin, T., Walker, J. T., Williams, P. R., Lofton, S. P., Cooper, J. R., …Keller, S. D. (2011). Integrated community education model: breast health awareness to impact late-stage breast cancer. *Clinical Journal of Oncology Nursing*, *15*(4), 387-392. doi: 10.1188/11.CJON.387-392

Oleske, D. M., Galvez, A., Cobleigh, M. A., Ganschow, P., & Ayala, L. D. (2007). Are tri-ethnic low income women with breast cancer effective teachers of the importance of breast cancer screening to their first-degree relatives? Results from a randomized clinical trial. *The Breast Journal*, *13*(1), 19-27. doi: 10.1111/j.1524-4741.2006.00358.x

O'Malley, M. S., Earp, J. S., Hawley, S. T., Schell, M. J., Mathews, H. F., & Mitchell, J. (2001). The association of race/ethnicity, socioeconomic status, and physician recommendation for mammography: Who gets the message about breast cancer screening? *American Journal of Public Health*, *91*(1), 49-54

Orom, H., Kiviniemi, M. T., Shavers, V. L., Ross, L., & Underwood, W. (2013). Perceived risk for breast cancer and its relationship to mammography in Blacks, Hispanics, and Whites. *Journal of Behavioral Medicine, 36*, 466-476. doi: 10.1007/s10865-012-9443-z

Pagano, R. R. (2010). *Understanding statistics in the behavioral sciences* (*9th* ed.). Belmont CA: Wadsworth Cengage Learning.

Paisley, J., Brown, C. M., & Greenberg, M. (2008). Information needs of women at risk of breast cancer. *Canadian Journal of Dietetic Practice and Research*, *69*(2), 59-64. doi: 10.3148/69.2.2008.59

Pallant, J. (2013). *SPSS Survival Manual* (*5th* ed.). New York, New York: McGraw-Hill

Qureshi, M., Thacker, H. L., Litaker, D. G., & Kippes, C. (2001). Differences in breast cancer screening rates: an issue of ethnicity or socioeconomics? *Journal of Women's Health & Gender-Based Medicine*, *9*(9), 1025-1031. doi: 10.1089/15246090050200060

Prokhorov, A. V., Warneke, C., de Moor, C., Emmons, K. M., Mullin Jones, M., Rosenblum, C., …Gritz, E. R. (2003). Self-reported health status, health vulnerability, and smoking behavior in college students: implications for intervention. *Nicotine and Tabacco Research*, *5*(4), 545-552. doi: 10.1080/1462220031000118649

Reynolds, E. K., Magidson, J. F., Bomovalova, M. A., Gwadz, M., Ewart, C. K., Daughters, S. B., & Lejuez, C. Z. (2010). Application of the social action theory to understand factors associated with risky sexual behaviors among individuals in residential substance abuse treatment. *Psychology of Addictive Behaviors*, *24*(2), 311-321. doi: 10.1037/a0018929

Rohlfs, I., Borrell, C., Pasarín, I. M., & Plasència, A. (1999). The role of sociodemographic factors in preventive practices: the case of cervical and breast cancer. *European Journal of Public Health*, *9*(4), 278-284

Rosenbaum, S. (2012). Law and the public's health. *Public Health Reports*, *127*, 340-344.

Rowe, J. L., Montgomery, G. H., Duberstein, P. R., & Bovbjerg, D. H. (2005). Health Locus of control and perceived risk for breast cancer in healthy women. *Behavioral Medicine*, *31*, 33-40. doi: 10.3200/BMED.31.1.33-42

Selvin, E., & Brett, K. M. (2003). Breast and cervical cancer screening: sociodemographic predictors among white, black, and Hispanic women. *American Journal of Public Health*, *93*(4), 618-623

Sentell, T., Zhang, W., Davis, J., Baker, K. K., & Braun, K. L. (2014). The influence of community and individual health literacy on self-reported health status. *Journal of Internal Medicine*, *29*(2), 298-304. doi: 10.1007/s11606-013-2638-3

Schueler, K.M., Chu, P.W., & Smith-Bindman, R. (2008). Factors associated with mammography utilization: A systematic quantitative review of the literature. *Journal of Women's Health*, *17*, 1477–1498. doi:10.1089/jwh.2007.0603

Shang, C., Beaver, K., & Campbell, M. (2015). Social cultural influences on breast cancer views and breast health practices among Chinese women in the United Kingdom. *Cancer Nursing*, *38*(5), 343-350. doi: 10.1097/NCC.0000000000000195

Skrivanek, S. (2009). The use of dummy variables in regression analysis. More Steam, LLC.

Spector, D., Mishel, M., Skinner, C. S., Deroo, L. A., Vanriper, M., & Sandler, D. P. (2009). Breast cancer risk perception and lifestyle behaviors among white and black women with a family history. *Cancer Nursing*, *32*(4), 299-308. doi:10.1097/NCC.0b013e31819deab0.

Sorkin, D., Tan, A. L., Hays, R. D., Mangione, C. M., & Ngo-Metzger, Q. (2008). Self-reported health status of Vietnamese and non-Hispanic White older adults in California. *The American Geriatrics Society*, *56*(8), 1543-1548. doi: 10.1111/j.1532-5415.2008.01805.x

Stevens, J. P. (2009). *Applied multivariate statistics for social sciences* (*5th* ed.). Mahwah, NJ: Routledge Academic

SurveyMonkey. (2016). Everything you wanted to know but were afraid to ask. Retrieved June 25, 2016a, from, https://www.surveymonkey.com/mp/aboutus/

Tabachnick, B. G., & Fidell, L. S. (2013). *Using Multivariate Statistics* (*6th* ed.). Boston, MA: Allyn and Bacon.

Taplin, S. H., Ichikawa, L., Yood, M. U., Manos, M. M., Geiger, A. M., Weinmann, S., Gilbert, J., …Barlow, W. E. (2004). Reasons for late-stage breast cancer: Absence of screening or detection, or breakdown in follow-up? *Journal of the National Cancer Institute*, *96*(2), 1518-1527. doi: 10.1093/jnci/djh284

Traube, D. E., Holloway, I. W., Schrager, S. M., & Kipke, M. D. (2012). Utilizing social action theory as a framework to determine correlates of illicit drug use among

young men who have sex with men. *Psychology of Addictive Behaviors*, *2*(1), 78-88. doi: 10.1037/a0024191.

Trochim, W. M. K., & Donnelly, J. P. (2008). The Research Methods Knowledge Base. (*3rd* ed.). Mason, OH: Cengage Learning

U.S. Department of Health and Human Services. National guideline clearing house. (2012). Retrieved August 11, 2012, from, http://www.guidelines.gov/syntheses/synthesis.aspx?id=35284&search=breast+cancer+screening

U.S. Preventive Service Task Force. (2009). Screening for breast cancer: U.S. Preventative Services Task Force recommendation statement. *Annals of Internal Medicine, 151*(10), 716-726. doi: 10.7326/0003-4819-151-10-200911170-00008

U.S. Preventative Task Force (2014). Recommendation summary. Retrieved January 27, 2015, from, http://www.uspreventiveservicestaskforce.org/uspstf/uspsbrca.htm

United States Census Bureau. (2015a). Educational attainment. Retrieved, June 27, 2015, from, http://www.census.gov/hhes/socdemo/education/

United States Census Byreay. (2015b). Race. Retrieved, June 28, 2015, from, https://www.census.gov/topics/population/race/about.html

United States Census Bureau. (2015c). Health Insurance in the United States: 2013 – Tables and Figures. Retrieved June 27, 2015, from, http://www.census.gov/hhes/www/hlthins/data/incpovhlth/2013/tables.html

Vahabi, M. (2003). Breast Cancer Screening Methods: A Review of the Evidence. *Health Care for Women International*, *24*, 773-793. doi: 10.1080/07399330390229957

Venables, W. N. & Ripley, B. D. (2002) Modern Applied Statistics with S (*4th* ed.). New York, NY: Springer.

Virnig, B. A., Baxter, N. N., Habermann, E. B., Feldman, R. D., & Bradley, C. J. (2009). A matter of race: early-versus late-stage cancer diagnosis. *Cancer*, *28*(1), 160-168, doi: 10.1377/hlthaff.28.1.160

Walter, L. C. & Covinsky, K. E. (2001). Cancer screening in elderly patients: a framework for individualized decision making. *The Journal of the American Medical Association*, *285*(21): 2750-2756. doi: 10.1001/jama.285.21.2750.

Wells, B.L., & Horm, J. W. (1998). Targeting the underserved for breast and cervical cancer screening: the utility of ecological analysis using the national health interview survey. *American Journal of Public Health*, *88*(10). 1484-1489

White, A. M., Philogene, G. S., Fine, L., & Sinha, S. (2009). Social support and self-reported health status of older adults in the United States. *American Journal of Public Health*, *99*(10). 1872-1878. doi: 10.2105/AJPH.2008.146894

Zhao, D. H., Zhang, Z. R., & Rao, K. Q. (2011). Health insurance and household income associated with mammography utilization among American Women, 2000-2008. *Chinese Medical Journal*, *124*(20), 3320-3326.

Appendix A: Study Survey Questions

The following questions are multiple choice and require the selection of one answer per question. For questions# 7, 8, 9 please select the choices that apply for you.

Questions for health status, and perceived risk for developing breast cancer

1) Do you have a family history of breast cancer (first degree relative, i.e., mother or sister who has had the disease)?
   1- Yes
   2- No
   3- I don't know
2) What is your current health status?
   1- Excellent Health
   2- Good Health
   3- Fair Health
   4- Poor Health
3) What do you think is the possibility that you will get breast cancer in your life?
   1- Low Risk
   2- Medium Risk
   3- High Risk
4) Do you currently perform, or have you in the past ever performed a breast self-examination (a breast exam that you perform on yourself)?
   1- Yes
   2- No

5) Have you ever received a clinical breast examination (a breast exam performed in a doctors office by a doctor)?

   1- Yes

   2- No

   3- Can't remember

6) Have you ever received mammography screening in the past 2 years?

   1- No, I have never had a mammogram

   2- I have had a mammogram within the past 2 years but do not have them annually

   3- I have a mammogram every year

   4- I have had a mammogram in the past but it was more than 2 years ago

Questions about perceived barriers towards mammography screening (please select all that apply to you)

7) Which of the following personal belief statements are reasons you have used for not getting a mammogram, or have experienced while trying to get a mammogram?

   Not much can be done to avoid cancer

   a) Yes

   b) No

   Cancer treatment is not worth going through

   a) Yes

   b) No

   The fear of finding something wrong prevents me from getting a mammogram

   a) Yes

b) No

When I'm sick, I delay seeing doctors

a) Yes

b) No

8) Which of the following economic statements are reasons you have used for not getting a mammogram, or have experienced while trying to get a mammogram?

I have a problem finding transportation to the mammography clinic

a) Yes

b) No

I have difficulty taking time off from work for an appointment

a) Yes

c) No

The cost of medical care prevents me from going to the doctor

a) Yes

b) No

9) Which of the following health system statements are reasons you have used for not getting a mammogram, or have experienced while trying to get a mammogram?

Lack of trust in doctor's capability

a) Yes

b) No

Made to feel uncomfortable by doctors

a) Yes

b) No

Medical procedure not explained adequately by doctors

a) Yes

b) No

Fear of pain associated with medical visits

a) Yes

b) No

Worried about radiation exposure during mammography

a) Yes

b) No

Unwilling to have a mammogram unless doctor recommends

a) Yes

b) No

It takes too long to get a doctor's appointment

a) Yes

b) No

Unaware of health services available in the community

a) Yes

b) No

Demographic Questions

10) What is your current age in years?

1- 30-40

2- 41-50

3- 51-60

4- 61+

11) What race/ethnicity would you say best describes you (please select one)?

1- White not Hispanic or Latino

2- Black or African American alone

3- Asian alone

4- Native Hawaiian and other pacific islander alone

5- Two or more races

6- Hispanic or Latino

12) What is the highest level of education you have completed?

1- < High School

2- High School Grad

3- Some College

4- College Graduate

5- Graduate School

13) What is your current annual household income range?

1- $40,000 -$49,999

2- $50,000-$59,999

3- $60,000-$69,999

4- $70,000-$79,999

5- $80,000+

14) What is your current marital status?

    1- Married

    2- Divorced

    3- Single

    4- Widowed

    5- Cohabitation

    6- Other

15) Which of the following statements are true about your current health insurance coverage?

    1- I have health insurance coverage through my job

    2- I have health insurance coverage through direct purchase

    3- I have health insurance coverage through Medicare

    4- I have health insurance coverage through Medicaid

    5- I have health insurance coverage through the military

    6- I am currently uninsured

16) In what type of area do you currently reside in?

    1- Rural

    2- Urban

    3- Suburban

For pilot study purposes: Please answer the following questions

17) Were the instructions easy to read and understand?

18) Were the questions easy to read and understand?

19) If any changes need to be made what suggestions do you have?

Note to study participants:

Please contact me at idara.mcpartling@waldenu.edu if you would like to receive the results from this study.

If at any time during the survey you have experienced any emotional stress please contact the counselors at The Samaritans at 1(212) 673-3000. Thank you for your participation.