Abstract

Predicting Adherence to Mammography Screening Practices Among African-American Women

by

Teresa L. Couts

MS, Indiana University-Purdue University Indianapolis, 2009

BA, Indiana University Southeast, 2005

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

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Abstract

African-American women are disproportionately dying from breast cancer at a higher rate than other ethnic groups. The study site was a diverse metropolitan city challenged with major health issues. The purpose of this study was to determine what constructs of the health belief model adapted by Champion predict that African-American women age 40 and over will obtain mammograms. The research design was a nonexperimental quantitative survey design using a convenience sample of 344 African-American women living in Louisville, Kentucky. Excluded from the study were women with a previous diagnosis of breast cancer. The variables from the health belief model survey were analyzed using descriptive statistics and logistic regression. The data indicated that perceived benefits, perceived barriers, and self-efficacy were significant ($p < .05$) predictors of women obtaining mammograms. The project developed from these results was a policy recommendation for the advancement of Digital Breast Tomosynthesis. With the continued increase of breast cancer rates in African-American women in Louisville, Kentucky, recommendations for future research should include ways to eliminate barriers to early diagnosis. The information gained about African-American women's perceptions and belief about mammography has implications for positive social change within this ethnic group. Perceiving early breast screening as a benefit could narrow the gap of delayed diagnosis and impact mortality rates helping African-American women to live longer.

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Dedication

I dedicate this work to my family and friends. A special thanks to my ex-husband who supported me unwaveringly in the early days of my educational journey. My children, Justin and Marisha, cheered for me to be all that I can be. When I needed a break, my grandchildren were always there to entertain me.

I dedicate this work to my mentor, Dr. Sharon Moore, and thank her for her guidance and encouragement. To my best friends, Kimula Jackson and Gina McDaniel, I am grateful for your prayers, support, and listening to me talk about my dissertation.

I also dedicate this study in remembrance of my son, Terry, who went home to be with the Lord on July 6, 2009, 2 months after I graduated with my Master's Degree. He was the official photographer at my graduation ceremony, and he'll be remembered fondly by the entire family for the blurry pictures. We treasure them!

Acknowledgments

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I say thank you to all the professors at Walden University who gave me advice, guidance, and support during my doctoral journey. I appreciate the word of Dr. Hollywood. “Onward” was such an encouragement for the 2 semesters I was in her class.

I say thank you to Christina Pinkston, the biostatistician from the University of Louisville, for her guidance during the analysis of my data.

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Section 1: The Problem

Introduction

Breast cancer is one of the most common cancers among women in the United States (Maly et al., 2011). It is the second leading cause of cancer deaths among women (CDC, 2012). Approximately one in eight women will be diagnosed with invasive breast cancer during her lifetime (Cronan et al., 2008). The American Cancer Society (2012) recommended that women age 40 and over should have a screening mammogram every year. Mammography screening is presently the most effective method for early detection of breast cancer. This screening is estimated to reduce breast cancer mortality by 15% detecting early stage disease when tumors are more treatable (Garcia et al., 2012).

Racial and ethnic minority women are less likely to utilize breast screening. As a result, cancer is diagnosed in later stages (Miranda, Tarraf, & Gonzalez, 2011). Of all racial and ethnic groups, African-American women have the highest breast cancer mortality rates. African-American women are 40% more likely to die of breast cancer than White women (CDC, 2012). Mammography screening adherence has been associated with African-American women's cultural beliefs. Their cultural beliefs included fear of discovery of cancer, fear that a cancer diagnosis leads to death, fear of treatment, beliefs that injury spreads cancer, beliefs that squeezing the breast causes cancer, and religious beliefs (Fair, Monahan, Russell, Zhao, & Champion, 2012).

The health belief model has been used to predict mammography screening by evaluating women's personal beliefs and perceptions about breast cancer. Understanding women's beliefs and perceptions can explain their health behaviors. The six constructs of the health belief model

used to predict health behaviors are perceived seriousness, perceived susceptibility, perceived benefits, perceived barriers, cues to action, and self-efficacy (Hayden, 2009). The constructs of this model can be used to predict if the barriers to African-American women obtaining mammography screening is related to personal, structural, and clinical barriers. Personal barriers may include a lack of knowledge and trust in the medical procedure; structural barriers may include a lack of nearby facilities, no regular provider, and lack of insurance; and clinical barriers may include lack of communication and patient education (Young, Schwartz, & Booza 2011).

This study uses the health belief model to predict adherence to mammography screening practices among African-Americans in Louisville, Kentucky. Specifically, the purpose of this study is to determine what constructs of the health belief model predict African-American women ages 40 and over, in Louisville, Kentucky, obtaining mammograms.

Definition of the Problem

Louisville, Kentucky is a metropolitan city challenged with major health issues. The primary chronic disease that plagues the city is cancer (all varieties). In 2009, this disease accounted for 23% of deaths in Louisville (Nesbitt, 2012). In comparing Louisville's cancer health data to Healthy People 2010 national health objectives (160/100,000 population) and the Commonwealth of Kentucky's rate (201/100,000 population), Louisville's age-adjusted death rate (256/100,000 population) is substantially higher (Nesbitt, 2012).

When focusing solely on the 2009 age-adjusted female breast cancer incidence rates per 100,000 population in Louisville, noninvasive cancer incidence rates are statistically higher for African-American women (37.24) than White women (35.65). At the same time, the age-

adjusted invasive female breast cancer incidence rates were similar in African-American women (179.61) and White women (179.73; "Kentucky Cancer Registry," 2012). African-American women are disproportionately dying from breast cancer at an age-adjusted death rate per population at 50/100,000, White women at 32/100,000, Commonwealth of Kentucky at 23/100,000, United States at 13/100,000 and the Healthy People 2010 goal was 22.3/100,000 ("Kentucky Cancer Registry," 2012). Figure 1 displays these data.

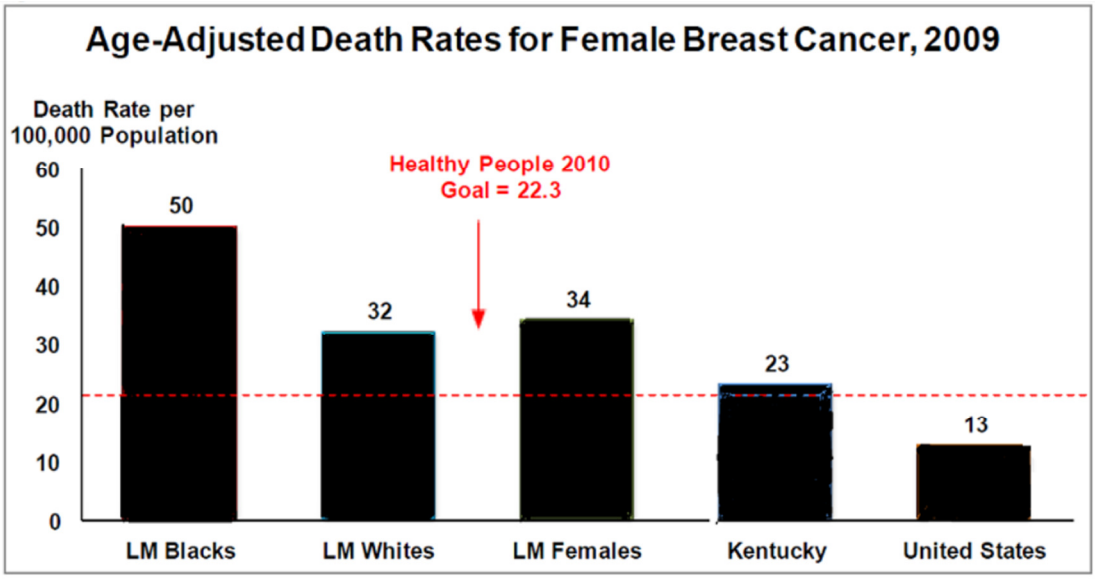

Figure 1. Age-adjusted death rates for female breast cancer 2009. Adapted from "2012 Louisville Metro Health Status Report," by L. Nesbitt, 2012, *LMPHW Office of Policy Planning and Evaulation,* p. 52.

Breast cancer is preventable or controllable with early detection and screenings. The local problem is that African-American women are not getting mammography screening for breast cancer.

On a wider scope, the Commonwealth of Kentucky is in the top rankings of the nation for incidence and mortality rates for many chronic health conditions, ranking first for cancer deaths ("America's Health Rankings," 2011). Predicting the behaviors of African-American women toward mammography screening is central to impacting incidence and mortality rates in Louisville.

Louisville is a metropolitan city with a population of 741,096. The race/ethnicity population is 70% White, 21% Black, 4% Hispanic, and 5% other. One-third of the households have median annual income under $25,000, 11% below the median annual income for the nation (www.census.gov). Challenges facing Louisville are high prevalence of obesity (64.9%), smoking, preventable hospitalizations, and cancer deaths ("America's Health Rankings," 2011).

The age-adjusted death rate per the 100,000 population for female breast cancer was 34.7 (32 for White females and 50 for African-American females). This rate is substantially higher than the Healthy People 2010 objective of 22.3 established by the U.S. Centers for Disease Control and Prevention (Nesbitt, 2012). Louisville has not made progress in reducing the present death rate. From 1996 to 2005, the rate was 34.7 (Commonwealth Fund, 2012).

The percentage of Louisville females adhering to breast cancer screening practices is 70%, below the 98% benchmark for the Louisville area. Women with commercial insurance (78%) versus women with Medicaid insurance (57%) utilized mammogram screenings in Louisville ("Kentuckiana Health Collaborative," 2012). According to the 2009 Behavioral Risk

Factor Surveillance Survey (BRFSS), 89% of Louisville residents reported having some health care coverage (Nesbitt, 2012).

The gap in practice is that research has not been conducted specifically targeting African-American women in Louisville, Kentucky to understand their perceptions and beliefs about breast cancer and preventive screening. African-American women are less likely than other women to receive a mammogram. This study will research African-American women's breast cancer screening behaviors in Louisville, Kentucky related to mammography as an early detection tool.

Minority women in Louisville, Kentucky have the same problem as African-American women across the nation. They are not taking advantage of early prevention breast cancer screening. Many African-American women in Louisville, Kentucky are not utilizing mammography screening resulting in breast cancer incidence being detected at late stages. Late stage detection of breast cancer incidence increases the mortality rates in African-American women.

The health belief model (HBM) originated in the 1950s. This conceptual framework is widely used for predicting health-related behaviors. The HBM has six constructs "that predict why people will take action to prevent, to screen for, or to control illness conditions" (Champion & Skinner, 2008, p. 46). The six constructs used to predict health-related behaviors are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. See Figure 2 for a display of the Health Belief Model components and linkages.

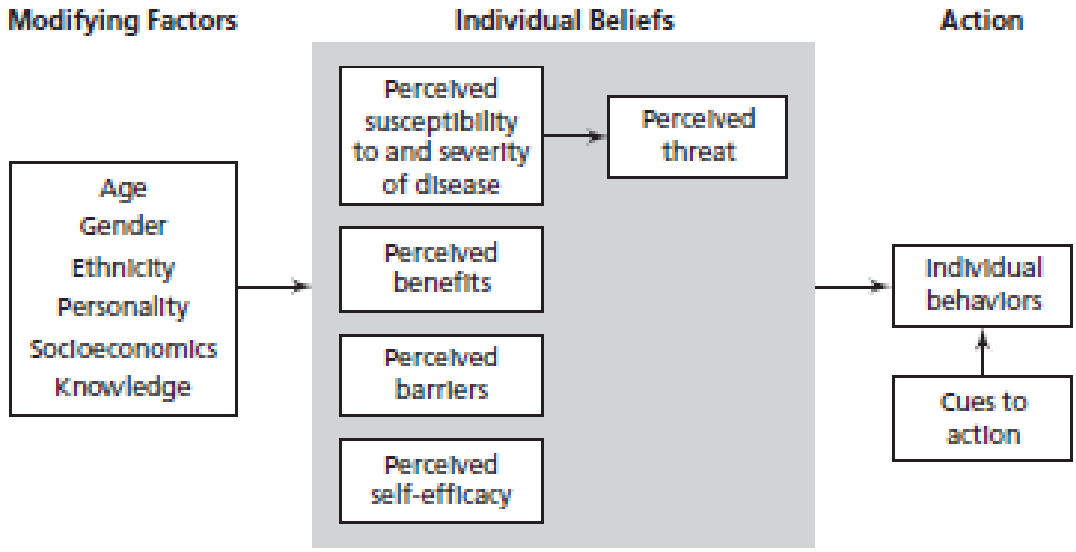

Figure 2. Health belief model components and linkages. Adapted from " Health Behavior and Health Education: Theory, Research, and Practice," by Champion & Skinner, 2008, p. 49. Copyright 2008 by Jossey-Bass.

Champion (1999) tailored the HBM to predict mammography specific behaviors in women. Using the HBM to explain and predict beliefs and attitudes of African-American women in Louisville, Kentucky will provide knowledge why mammography screening rates are low among this cultural group.

Rationale

The rationale for this study is that breast cancer mortality rates are higher among African-Americans women in Louisville than other ethnic groups. African-American women are less likely to procure routine breast cancer screenings and are more likely to die of the disease (Sadler et al., 2011). It is imperative to understand the beliefs contributing to the health behaviors of African-American women. The knowledge gained could close the gap of disparity in breast cancer mortality by identifying barriers to care. Addressing barriers could lead to timely breast screenings, follow-up treatment, and identifying available social and economic resources.

Overcoming barriers to mammography screening can improve the quality of life of African-American women.

Many local, state, and national organizations are dedicated to promoting women's breast health. Monitoring breast cancer incidence and mortality rates and promoting preventive breast screening can lead to women living longer healthier lives.

Evidence of the Problem at the Local Level

The Louisville Metro Public Health and Wellness (LMPHW) used the Behavioral Risk Factor Surveillance System (BRFSS) to track breast conditions and risk behaviors in Louisville, Kentucky. This tool enabled the LMPHW to collect data on breast cancer, which is one of three most prevalent cancers that affect residents in Louisville. Breast cancer prevention is important to the LMPHW because African-American women in Louisville are dying at a third higher rate than White women (Nesbitt, 2012).

The Kentucky Cabinet for Health and Family Services (CHFS) acknowledged that breast cancer is a leading public health concern and the second leading cause of cancer deaths among women in Kentucky. CHFS is committed to emphasizing the importance of awareness, regular screenings, and early detection (Hoskins et al., 2009). The CHFS operates the Kentucky Women's Cancer Screening Program (KWCSP) that provides breast screening services and referrals for treatment to underserved, low-income, and racial/ethnic minority women in Kentucky. In 2009, the program provided over 29,332 breast screenings. First Lady Jane Beshear (Kentucky) stated "the KWCSP is absolutely vital for improving the health status of women in Kentucky and assisting in the reduction of health disparities" (Hoskins et al., 2009, p. 5). Mrs.

Beshear developed another initiative entitled Horses & Hope to convey breast cancer awareness, education, and screening to uninsured Kentucky women working in the horse industry.

Susan G. Komen for the Cure Louisville is committed to saving lives from breast cancer. Jefferson County (Louisville) has the highest rates of breast cancer and the largest African-American population within their 15-county affiliate service area. Susan G. Komen for the Cure Louisville conducted a community survey of 167 women of various racial and ethnic origins of which 48% were African-American (Harris, Ndukum, Hasselback, & Yeager, 2011). Komen Louisville found that African-American women across their affiliate service area have the highest rates of mortality. From the questions associated with attitudes towards breast screening, 32% of women did not believe mammography screening was important. They stated it was unlikely in the next year that they would have a mammogram performed. Fifty-five percent of the women reported never having a mammogram. When women find an abnormality in their breast, 50% stated they delayed seeing a physician (Harris et al., 2011). Realizing and addressing the enormous need in Jefferson County to combat breast cancer, in 2010, Susan G. Komen for the Cure Louisville funded 14 of 18 grants in Jefferson County to hospitals to service local women. The services included mammograms, health education, and referrals (Harris et al., 2011).

The James Graham Brown Cancer Center (JGBCC) in Louisville has staged war against cancer. Cancer is a major problem in the Commonwealth of Kentucky. Through cancer research, creating detection and prevention programs and quality treatment plans, they are providing Kentucky citizens opportunities for health and wellness in their own state. The JGBCC, along with the Kentucky Cancer Program, sponsors many educational and breast screening events. To

directly impact the community and remove access barriers, JGBCC operates a mobile mammography unit ("James Graham Brown Cancer Center," 2011).

Evidence of the Problem From the Professional Literature

Smith, Cokkinides, and Brawley (2012) noted "breast cancer is the most common cancer and the second most common cause of death from cancer in U.S. women" (p. 130). Kentucky's estimated new cases for female breast cancer incidences in 2012 are 3,160, with estimated deaths of 570 (Siegel, Naishadham, & Jemal, 2012). The American Cancer Society guidelines recommend in average-risk women a combination of regular clinical breast examinations and counseling to raise awareness of breast symptoms beginning at age 20 years, and annual mammography beginning at age 40 years (Smith et al., 2012).

In the United States, minority women are disproportionately affected by breast cancer. They are more likely than white women to die from the disease. Once diagnosed, no matter the stage, the 5-year survival for African-American women with breast cancer is lower than White women (Siegel et al., 2012). The mortality differences are usually contributed to the difference in screening practices, late detection, and weak prognosis (Consedine, Magai, Spiller, Neugut, & Conway, 2004).

Adherence to recommended breast screening guidelines is reported to be lower in African-Americans, thus contributing to the disparity in cancer rates. Breast cancer incidences in the United States are lower among African-American women, 119.4 per 100,000 population, than White women, 141.1 per 100,000 population. However, the death rate remains higher for African-American women, at 34.7 per 100,000 population, versus White women, at 25.9 per 100,000 population (Sadler et al., 2007).

The purpose of this study is to determine which of the six constructs of the HBM (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy and cues to action) would predict African-American women ages 40 and over, in Louisville, Kentucky, obtaining mammograms. The six constructs have the ability to predict why women will or will not take action to prevent, to screen for, or to control illness condition (Champion & Skinner, 2008). When African-American women have an awareness of the benefits, challenges, and obstacles to having a mammogram, they will be able to take the appropriate personal action to reduce their risks.

Definitions

Age-adjusted death rate: Age-adjusted death rate refers to a statistical process using a weighted average applied to rates of death or disease to allow populations to compare different age groups (Hoskins et al., 2009).

Cues to action: These are the strategies or triggers that can influence action. Cues can include media releases, reminders from physician, promotions, and health information (Champion & Skinner, 2008; Hayden, 2009).

Health belief model (HBM): In the 1950s, the HBM was developed. It is a psychological model that attempts to predict and explain health behaviors. Using the model's six constructs, health behavior is determined by focusing on personal beliefs and attitudes of individuals. The constructs predict people's action to prevent, screen for, or control health conditions (Champion & Skinner, 2008; Hayden, 2009).

Incidence rate: This rate measures the number of new cases (women) of breast cancer in a given period, usually a year, per population (Anderson, Langemo, Hanson, Thompson, & Hunter, 2013).

Invasive breast cancer: Invasive breast cancer is cancer that spreads outside the breast membrane into the surrounding breast tissue. Depending on the extent and size of the spread, the cancer is classified as Stage I through IV (Moen & Keating, 2008).

Mortality rate: The mortality rate measures the number of deaths per 100,000 persons in the population, calculated per year (Jemal et al., 2011).

Perceived barriers: Perceived barriers are impediments or obstacles that a woman reasons that keep her from taking positive action to adhere to preventive health behaviors. Barriers could be time, expense, inconvenient, or fear of pain (Champion & Skinner, 2008; Hayden, 2009).

Perceived benefits: Perceived benefits are associated with a person's belief about the benefits of behavior change to reduce the disease threat of cancer. Using early detection methods for breast cancer is an effective behavior to reduce risks (Champion & Skinner, 2008; Hayden, 2009).

Perceived severity: A woman may have feelings or opinions of the seriousness of breast cancer and the consequences of not seeking treatment. The seriousness of breast cancer could be painful and lead to death. The consequences could be a strain on family and work (Champion & Skinner, 2008; Hayden, 2009).

Perceived susceptibility: Women may believe that they are at risk of getting a disease such as breast cancer. Women get a mammogram when they believe there is a possibility of getting breast cancer (Champion & Skinner, 2008; Hayden, 2009).

Screening mammography: Screening mammography is a standard two-view low-dose x-ray of a woman's breast tissue for the purpose of early detection of breast cancer (Khatib & Modjtabal, 2006; Giurescu, Hu, & Obembe, 2010).

Self-efficacy: Self-efficacy is a person's level of confidence or belief that she has the ability to achieve the desired outcome (Champion & Skinner, 2008; Hayden, 2009).

Significance

By researching this topic, information will be gained about African-American women's perceptions of the seriousness of breast cancer and the consequences associated with the disease. In order to impact African-American women's decisions to obtain a mammogram, understanding their perceived susceptibility of acquiring breast cancer and the perceived barriers that limit them from obtaining a mammography screening is significant. Realizing how African-American women view the perceived benefits of obtaining mammography screening, such as the reduced risk or seriousness of breast cancer, can be used to promote adherence to breast screening guidelines. Being aware of which type of cues is effective to cause African-American women to act on recommended breast cancer information is substantial. Self-efficacy can lead African-American women to take action against breast cancer.

With breast cancer being the most common malignancy among women, timely diagnosis and treatment are important, particularly for vulnerable groups like uninsured and low-income women. To ensure early detection of breast cancer in these vulnerable groups, improvement

efforts to increase mammography screening is necessary. When breast cancer is detected by mammography than by other means, women have a better estimated 10-year disease free survival (Thind, Diamant, Hoq, & Maly, 2009). Having a regular healthcare provider could assist these vulnerable groups on where to locate resources to acquire preventive services.

African-American women have breast cancer at younger ages, are more likely to have hormone negative tumors, are more likely to exist with advanced stage breast cancer, and have the highest breast cancer mortality rates of any racial/ethnic group in the United States (Clark et al., 2009). A lack of routine and consistent mammography screening and delayed follow-up of abnormal results contribute to racial disparities in breast cancer stage at diagnosis and outcomes. It is expedient that primary care locations encourage mammography screening, repeat use, and timely follow-up of abnormal results to African-American women (Clark et al., 2009).

The information gained about African-American women's perceptions and belief about mammography could lead to positive social change within this ethnic group. Identifying factors and overcoming barriers to preventive breast screening could narrow the gap of delayed diagnosis. Early screenings could impact mortality rates causing African-American women to live longer. The knowledge gained could be used to empower African-American women to take immediate action to healthy behaviors. In turn, they could pass this message to family members, neighbors, coworkers, and others, changing the health outcomes in the environments where they live, work, and socialize.

Guiding/Research Question

Breast cancer is a major affliction for women of all nationalities. African-American women are disproportionately dying from the disease. Locally, African-American women have

the highest mortality rates of any racial/ethnic group. The local problem is African-American women's low mammography screening utilization and getting delayed diagnosis when cancer is in later stages. These factors contribute to the high mortality rates.

There is a gap in research conducted specifically on African-American women in Louisville to understand their perspectives, needs, and concerns surrounding mammography screening and breast cancer. Using a survey based on the HBM will gather opinions, fears, barriers, and beliefs that African-American women in Louisville foster. Appropriate interventions can be promoted using the results from the survey to encourage African-American women to utilize early detection screening methods.

RQ: What constructs from the health belief model (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, and cues to action) predict African-American women ever having a mammogram?

H_0: Perceived susceptibility and severity of breast cancer, perceived barriers and benefits of mammography screening, cues to action, and self-efficacy do not predict African-American women in Louisville, Kentucky having a mammogram.

H_a: Perceived susceptibility and severity of breast cancer, perceived barriers and benefits of mammography screening, cues to action, and self-efficacy predict African-American women in Louisville, Kentucky having a mammogram.

Review of the Literature

Data sources displaying health statistics for Louisville, Kentucky were retrieved from the 2012 Louisville Metro Health Status Report, the Kentucky Cabinet for Health and Family Services, and the Kentucky Cancer Registry. Data were also retrieved from the American Cancer

Society, the Commonwealth Fund, Center for Disease Control, Kentucky Health Facts, and Susan G. Komen for the Cure Louisville. Keywords that I used to search for data were *breast cancer, screening mammography, health disparities, African-American breast cancer screening, mortality rates, health belief model,* and *Louisville cancer rates*.

In reviewing the literature, I have divided the discussion of the HBM into two parts. I begin by discussing the theoretical framework and relating it to the local problem. In the latter part of this section, I discuss how the HBM has been used in other studies to predict mammography screening in minorities.

Theoretical Framework-Health Belief Model

The theoretical base that informs this study is the HBM tailored by Champion (1999). This theory was constructed to address factors associated with performance of health behaviors. HBM premises that an individual's perceptions of six constructs can predict behavior. The HBM design is widely used to predict health-related behaviors (Sadler et al., 2007).

The HBM constructs provide a framework to understand the reason individuals fail to adopt a preventative health measure. This model has the capability to explain and predict a variety of behaviors associated with health outcomes. Champion (1999) adapted the original model to predict mammography screening in African-American women. The six constructs, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, and cues to action, represent the perceived threat and net benefits. In other words, the HBM predicates individuals will be incentivized to undertake healthy behaviors if they believe they are susceptible to negative health outcomes. If individuals believe a negative health outcome is unlikely to afflict them, they will not seek services. When individuals desperately perceive a

negative health outcome is severe, they will be motivated to act to avoid that outcome. In order for individuals to respond to preventive services, they must perceive a positive benefit. If individuals perceive too many barriers to overcome, they will not seek preventive services. Cues to act can be both internal and external. Internal cues can be a negative change in breast structure. External cues can be a postcard reminder or media campaign. Lastly, individuals must believe they are capable of overcoming situations that hinder them from taking action to get a mammogram (Carpenter, 2010).

Relating the HBM to mammography screening, women who do not believe they are in danger of developing breast cancer are unlikely to be screened. When women perceive a high risk of developing breast cancer and/or death, they are more likely to get a mammogram. For women to take the initiative to seek preventive services, they must perceive that getting a mammogram will accurately detect a health outcome. When women perceive barriers, such as a painful procedure, expense, or location of treatment facility, these situations can dissuade them from seeking a mammogram (Carpenter, 2010).

When using the HBM to predict mammography screening, the susceptibility construct addresses the likelihood of getting breast cancer within a designated timeframe. The severity construct refers to women's belief of the seriousness of contracting breast cancer and not receiving treatments for breast cancer. The benefit construct refers to beliefs that mammography could help locate breast cancer early. The barrier construct suggests that getting a mammogram exposes women to unnecessary radiation. The self-efficacy construct addresses beliefs that arranging schedules to accommodate mammography screening is frustrating. Lastly, the cue to

action construct refers to recommendations by your physician to obtain a mammogram (Champion et al., 2008; Champion & Skinner, 2008).

Breast Cancer

The most common cancer among women is breast cancer (Noroozi, Jomand, & Tahmasebi, 2011; Taymoori & Berry, 2009). Within 75% to 80% of breast cancers that occur in women are considered to be at average risk. Their only risk factors are female and aging (Giurescu, Hu, & Obembe, 2010). Media-Shepherd and Kleier (2012) asserted that "the American Cancer Society anticipates nearly 200,000 new cases of invasive breast cancer will be diagnosed each year, and of these more than 40,000 will be fatal" (p. 61).

Breast cancer is the second most common cause of cancer death for African-American women due to the likelihood that they are diagnosed with cancer in later stages (Darnell, Chang, & Calhoun, 2006). Fifty-two percent of African-American women are diagnosed with invasive breast cancer at a local stage (Fouad et al., 2010). Age is a risk factor of breast cancer, and women between the ages of 40 and 69 have the biggest risk (Nithya & Santhi, 2012).

Susan G. Komen for the Cure

The Louisville office of Susan G. Komen for the Cure promotes education programs and funding for research to find the causes and a cure for breast cancer. Within the next decade, they are speeding up research that will reduce breast cancer incidence and/or mortality rates while addressing disparities ("Susan G. Komen for the Cure," 2012). Susan G. Komen Louisville conducted a research study on women's breast cancer incidences and mortality. The study included women of all ethnic groups (48% African-American, 46% White, and 6% others) from six counties in Kentucky (Hardin, Jefferson, Shelby, and Oldham) and Indiana (Clark and

Floyd). The questions were on demographics, general health, health care utilization, and attitudes towards breast cancer detection, screening, and treatment (Harris et al., 2011). This research covered other cities besides Louisville and focused on multiethnic groups, not solely on African-American women's perceptions and beliefs concerning breast cancer or preventive screenings.

The results from this study showed that Jefferson County (Louisville) has the highest breast cancer rates in Kentucky, with African-American women having the highest breast cancer mortality rates. Outside of Jefferson County and in rural areas, women have limited access to diagnostic services, yet they have lower breast cancer rates. There is enormous disparity in the distribution of breast health services, even though Louisville has the greatest multitude of prevention, social support services, and treatment centers. This study suggested that even at risk women for breast cancer may not have a regular mammogram, and physicians may not be recommending breast screening to low-income women. This results in a late diagnosis of breast cancer, usually in Stage IV, delayed care, and higher mortality rates.

University of Louisville Breast Cancer Research

The University of Louisville has conducted and published research on breast cancer dealing with gamma probe detection of sentinel lymph nodes (Martin et al., 2000). The purpose of the study was to analyze whether harvesting slightly radioactive nodes with highly radioactive nodes improves the false-negative rate associated with sentinel lymph node (SLN). The results supported a combination of injections of a vital blue dye and radioactive colloid when surgeons conduct sentinel lymph node biopsy in breast cancer.

Gilliland et al. (1998) conducted a population-based, case-controlled breast cancer study examining breast cancer risk between Hispanic and Non-Hispanic White women. The study took

place in New Mexico. Newly diagnosed women ages 30 to 74 years with invasive or in situ breast cancer, residing in the state of New Mexico between the years 1992 and 1994, were eligible for the study. Breast cancer cases were three times higher in Hispanic women than Non-Hispanic White women. The results identified a number of reproductive risk factors associated with breast cancer. Factors included the number of pregnancies lasting 6 months or longer resulting in a single birth, multiple births, or a stillborn; a woman's age at first full-term birth; and the length of lactation. The University of Louisville noted that follow-up studies have been conducted in 2001, 2002, and 2008 on their research website.

Dr. Richard Kerber was awarded funding to research Genetic Characterization of Breast Cancer Risk in Families, a genome-wide association study of breast cancer susceptibility. The research focused on families at especially high risk for breast cancer and has the potential to discover rare genetic variants ("University of Louisville," n.d.).

The University of Louisville has committed to Black leaders to try to fill an Endowed Chair in Oncology position to lead efforts to reduce cancer rates among Blacks, but did not commit to a timeframe (Staff & News Wire Report, 2002). A search of their website revealed a filled endowed chair position in Oncology-Social Work, Psycho-Oncology, and Tobacco Harm. There was not evidence of work being performed specifically geared towards African-American women's perceptions and beliefs concerning breast cancer screening.

Mammography as a Screening Tool

Presently, the best screening tool to detect breast cancer is mammography. Clinical trials indicated regular screenings lower women's risk of dying from breast cancer (Yankaskas et al., 2010). Current estimates of mortality reduction range from 10 to 25% (Peipins et al., 2011).

Despite mammography's proven effectiveness in reducing morbidity and mortality, it is underutilized by minority populations (Arroyave, Penaranda, & Lewis, 2011). For women ages 40 to 75 years, mammograms can substantially improve their chance of cancer survival (Silk, Westerman, Strom, & Andrews, 2008). As dynamic as mammography is, research survey of women has shown that 81% incorrectly believe mammography reduces the incidence of breast cancer (Bowie, Wells, Juon, Sydnor, & Rodriguez, 2008).

It is recommended that women with a family history of breast cancer begin regular screenings at age 35 (Silk et al., 2008). A woman's survival rate can be predicted by the stage at which she is diagnosed with cancer. Early stage diagnosis is an important predictor of survival rate. Women diagnosed with breast cancer in the earliest stage have a 98% survival rate compared to 26% when cancer is diagnosed in the most advanced stage (Farmer, Reddick, D'Agostino, & Jackson, 2007). With adherence to mammography screening, African-American women could be diagnosed earlier improving their survival rate. Over the years, programs and campaigns have been created to increase mammography screening, but African-American women are still disproportionately burdened with breast cancer (Consedine et al., 2004). For African-American women, the 5-year relative survival rate is 77%, compared to 90% for White women (Fouad et al., 2010; Sadler et al., 2011).

Underutilization of Breast Screening

Contributing to the mortality disparities among African-American women compared with White women are speculations of underutilization and inconsistent breast cancer screening. In the United States, only 50% of African-American women 40 years and over reported adherence to recommended guidelines of having an annual mammogram (Champion et al., 2008; Sadler et

al., 2011). Recent self-reported surveys showed African-American and White women having equal mammography utilization matching the national goals. However, reviews of charts and medical records demonstrated inaccurate utilization due to overreporting. African-American and poor women overreport mammogram screening causing misleading measurements (Whitman, Ansell, Orsi, & Francois, 2011). This flawed reporting activity does not help to close the disparity gap.

Mammography use must be accurately recorded to ensure women at risk for under screening receive high-quality care to detect early breast cancer. When mammography self-reports and medical records differ, electronic medical records may improve documentation of screenings in ambulatory settings. Electronic medical records (EMR) is an improvement over paper records by providing legible, accessible, and organized information that can network with remote and onsite laboratories or radiology systems for effective data retrieval (Clark et al., 2009). Clark et al. (2009) conducted a study of six primary care sites in Boston, Massachusetts of their electronic medical records and chart records. Working with the Boston Racial and Ethnic Approaches to Community Health (REACH) Breast and Cervical Cancer Coalition Women's Health Demonstration Project (WHDP), 411 African-American women 40 to 75 years of age were recruited who had received irregular mammography care. The researchers compared self-report of mammography use to documentation in EMR and chart reviews. Clark et al. (2009) found primary care sites with EMR had positive value with self-report of 86% while sites without EMR had a positive value of 61%. Thus, EMR provided a more accurate account of mammography use and can be used as a tool to enhance communication about regular screening.

Contrasting Reports

Some reports have shown that racial disparity in screening mammography is disappearing. It is important to examine each state and city on an individual basis to not disguise screening disparities in other areas. Higher mortality and lower screening rates in women have been affiliated with late stage breast cancer. Reviewing the Missouri Cancer Registry using a Geographic Information System, Lian, Jeffe, and Schootman (2008) discovered a geographic cluster of heightened late stage breast cancer on initial diagnosis in the St. Louis, Missouri metropolitan area. Women 50 years and older in this region were more likely to double the diagnosis of other areas in Missouri. Lian et al. (2008) "examined racial differences in non-adherence to mammography screening guidelines in the City of St. Louis both within and outside the cluster of late-stage breast cancer" (p. 678). Using trained female interviewers, they telephoned women aged 40 and older living in the city limits of St. Louis over a 2-year period. The study excluded women with a prior history of breast cancer, those who did not speak English, and those individuals living outside of the city limits. During the interview process, women who had a mammogram for health related issues were excluded from the analysis. Included in the analysis were women who obtained a mammogram for their routine check-up. The analysis resulted in 985 participants, 556 White and 429 African-American women. The researchers' results showed overall city mammography use at 70.9%. The screening rate was lower among White women (68%) than African-American women (74.7%). In the cluster area of late-stage diagnosed breast cancer, the overall mammography use was 69.5%. Again, the screening rate was lower among White women (60.2%) than African-American women (73.7%). Outside the cluster area, the overall mammography use was 70.6%. Once more, White women mammography rates were lower (69.6%) than African-American women (75.8%). Even after

adjusting for individual and census-level factors, African-American women were more likely to have a mammogram than White women. The researchers could not explain the disparities in this study, and the reasons for the mammography screening rates were unclear.

Social Determinants

African-American women acquire breast cancer at younger ages. They are evaluated with advanced stage disease and are more likely to have hormone negative tumors that do not respond to customary therapies than any ethnic group in the United States (Clark et al., 2009). Many factors contribute to these conditions and outcomes. In this study of 437 African-American women ages 40 to 75 years, housing concerns and lacking a regular primary care provider predicted poor mammography adherence. High mortality rates among African-Americans were contributed to a lack of regular and consistent utilization of screening mammography and delayed follow-up of abnormal results (Clark et al., 2009). During semistructured interviews with African-American women of diverse backgrounds, they shared that their health behaviors toward cancer screening was hindered by social problems of domestic violence, drug abuse, and awful experiences with healthcare systems (Clark et al., 2009).

Women with a reported history of sexual violence victimization have been identified with lower adherence to screening mammography. In a study by Watson-Johnson, Townsend, Basile, and Richardson (2012), sexual violence was significantly associated with screening mammography in women. In an unadjusted design, sexual violence victimization was associated with not having a mammogram within 2 years at 68.5% versus 77.3% for nonvictims. Adjusting for demographic characteristics, screening mammography was significantly associated with sexual violence victimization at a rate of 74% for victims and 77.1% for nonvictims (Watson-

Johnson et al., 2012). Watson-Johnson et al. (2012) found other factors that contribute to sexual violence victims not adhering to mammography include low self-esteem and disfigured body image.

Dailey, Kasl, and Jones (2008) in a study of 1,229 African-American (40%) and White (60%) women ages 40 to 79 years who received a mammogram from one of five urban hospital locations in Connecticut found that gender discrimination can negatively influence adherence to mammography guidelines. Almost half of the women in the study were nonadherent to mammography guidelines. Not obtaining at least one mammogram within 2 years plus 2 months for women ages 40 to 49 years, and not obtaining at least two mammograms in 2 years plus 2 months for women 50 and over was defined as nonadherent. The 2 months allowed for scheduling appointment delays. Numerous women (80.7%) reported getting regular mammogram screenings. However, only 52.2% showed adherence to mammography guidelines in the 2 years following the initial screening. The researchers found that women with a household income of ≥ $50,000 showed a significant association with nonadherence to screening mammography guidelines. Possible reasons could be work related where these women have demands that cause them to neglect health screenings, and lower income women may have underreported these circumstances.

Risk Factors

First-degree relatives may be at increased risk of breast cancer when there is family history of the disease. Wilson, Quillin, Bodurtha, and McClish (2011) reported that 15 to 20% of breast cancer cases are related to family history. Women with average risk are recommended to get a screening mammography at age 40. Women with an increased risk due to a family history

of breast cancer could start screening mammography earlier. Wilson et al. (2011) noted "the National Comprehensive Cancer Network and Susan G. Komen for the Cure suggest starting mammography screening 5 to 10 years before the mother's age at breast cancer diagnosis" (p. 1203). However, high-risk women should consult with their health provider on when to begin screening mammography. Wilson et al. (2011) investigated whether women with a family history of breast cancer adhere to screening guidelines and practice healthy behaviors. Using data from the 2005 Behavioral Risk Factor Surveillance System (BRFSS) and the Daughters Study (DS), the researchers compared data on preventive health behaviors and mammography screening of women with a family history of breast cancer and women in the general population. In both groups, the age range was > 18 and < 70 years. The racial composition was non-Hispanic Whites and African-American women. Wilson et al. (2011) found that daughters of mothers with breast cancer were more likely to report getting a screening mammography.

Self-efficacy and Health Beliefs

For effective treatment of breast cancer and to decrease mortality rates, early detection of breast cancer is crucial. Health beliefs are critical factors that influence women's mammography decisions. Women's perceptions have a significant effect on their likelihood of obtaining screening mammography (Avci & Kurt, 2008).

The risk of breast cancer continues to increase as women age and is highest in women over the age of 70 (Jennings-Sanders, 2009). Jennings-Sanders (2009) conducted a 21-month trial to increase mammography screening in nonadherent African-American women at least 60 years of age. The Self-efficacy Scale for Mammography Questionnaire was administered to a convenience sample of 30 older African-American women recruited from three senior citizen

high-rise apartment buildings. The mean scores for each question were low, indicating the participants were not confident in their ability to get a mammogram. Women with nonadherence to screening guidelines perceive they are less susceptible to breast cancer and value mammography less. When obstacles are not present and getting mammography is easy, older African-American women have a high perceived self-efficacy for obtaining a mammogram. Older African-American women may believe that mammography is not relevant for older women and would not be predisposed to have a mammogram. Self-efficacy varies in strength. Examining self-efficacy by generality, strength, and level in relation to mammography screening is important to gain a better understanding of nonadherence to mammography guidelines in older African-American women (Jennings-Sanders, 2009).

Communication and Follow-up

The risk of late stage breast cancer has been reduced by 44% resulting from mammography (Fair et al., 2009). Survival rates can only be improved by mammography screening when further diagnostic tests follow initial inconclusive or abnormal mammograms for absolute determination of breast cancer status. It is imperative that women follow-up inconclusive and abnormal results as soon as possible. A meta-analysis showed when women delay 3 to 6 months between initial abnormal mammography findings and diagnostic resolution, there is a 7% lower 5-year survival rate than women who had shorter delays (Fair et al., 2009). Fair et al. (2009) performed a study of 76 (n=39 African-American; n=29 White; n=8 Hispanic/Latina/Middle Eastern) minority-medically underserved women to evaluate factors delaying an abnormal mammography follow-up. Eight constructs were examined for their association with an abnormal mammography follow-up using multivariate logistic regression.

The constructs were perceived susceptibility, perceived benefits, perceived barriers, self-efficacy, health temporal orientation, cancer fatalism, spiritual health locus of control, and multidimensional health locus of control. The study consisted of two groups, 41 patients with adequate follow-up and 35 patients with inadequate follow-up. The researchers discovered obese women were more likely to delay mammogram screenings and mammographic follow-up. The researchers surmised disparities of negative clinician attitudes and judgment, negative self-perception, poor body image, embarrassment about weight, and perception of pain could be associated with obese women delaying mammography and follow-up (Fair et al., 2009).

Uninsured women, women without a primary medical provider, low-income, and minority women have the lowest rates of reported mammography. Of women who get regular mammograms, approximately 8.5 to 15% require additional testing (Wujcik et al., 2009). Thirty to 50% of women who have a positive or incomplete test will not return for follow-up testing (Wujcik et al., 2009). Mammography screening results in a diagnosis of breast cancer in 4 to7.1% of women (Wujcik et al., 2009). Delayed follow-up and incomplete screening invalidate the possible benefits of pinpointing breast cancer early when it is most treatable. Delays in follow-up are associated with weak prognosis, advanced stage disease diagnosis, and increased tumor size. Using a dataset from the Tennessee Department of Health, 11,610 women who participated in a state-run mammography screening program were identified. However 4,036 women qualified for the study. Exceeding 60 days to complete testing after receiving abnormal or incomplete results defined a delay. Results were consistent with previous research. African-American and Hispanic ethnicities were associated with the delay. African-Americans were 45% more likely to experience delay than Hispanics (Wujcik et al., 2009). This study derived that

self-reported breast symptoms, ethnicity, and race at the time of examination are important predictors of delay, and marital status, age, and history of breast cancer were not (Wujcik et al., 2009).

African-American breast cancer patients may face obstacles that affect their care. Difficulties are communicating with physicians, perceived discrimination in medical settings, unsatisfactory visits with physicians of opposite races, shorter office visits, and limited health literacy are disparities that hinder African-American women's medical care (Royak-Schaler et al., 2008). African-American women who have limited health literacy may not understand their health condition and treatment, causing them to seldom ask relevant questions to their health care provider. Patient-physician communication is important for adherence to follow-up plans and prevention practices. For instance, weight management is a conversation that African-American women need to discuss with their physician. Weight is a risk factor associated with breast cancer recurrence, and high body mass index can increase the risk of mortality (Royak-Schaler et al., 2008). In this study, Royak-Schaler et al. (2008) investigated women's preventive health actions and their understanding and use of prevention information provided by their physicians. Using a qualitative design, 39 African-American women with a diagnosis of primary breast cancer ages 30 to 75 years were recruited from the Baltimore Washington Medical Center, University of Maryland Greenebaum Cancer Center, ACS Reach to Recovery Program, and the Sisters Network Baltimore Chapter. Excluded from the study were survivors who had experienced a recurrence. Using focus group sessions and questionnaires, the women shared their communication experiences from diagnosis of breast cancer to follow-up care. Gaps were noted from diagnosis through follow-up care. Approximately 38% of the women were unaware of their

stage of cancer at diagnosis, 5% did not know the type of surgery they had undergone, 31% claimed they never received chemotherapy or radiation, and only 50% of the women who reported side effects discussed the symptoms with their physicians. Oncologists provide behavior guidance to an estimated 20% of their patients (Royak-Schaler et al., 2008). African-American women cancer survivors struggling with obesity are at higher risk of recurrence. Patient-physician conversations with African-American women must provide guidance on weight management and physical activity to improve breast cancer outcomes.

Studies Utilizing the Health Belief Model

Mammography compliance among Iranian women. Ahmadian, Samah, Emby, and Redzuan (2010) used the HBM to understand Iranian women, living in the city of Tehran, and their attitudes and barriers which determined their compliance with mammography. In Iran, cancer is the third leading cause of death. Iranian women have high mortality rates and acquire breast cancer at an earlier age than western women. Ahmadian et al. (2010) explored factors influencing breast cancer screening behaviors to provide valuable information to researchers, healthcare providers, and public health educators. The study focused on four constructs influencing Iranian women behavior: self-efficacy, belief, social influence, and barriers. The researchers surveyed 400 women aged 35 to 69 years using random sampling of female clients of maternity hospitals affiliated with Tehran University Medical Sciences. Excluded from the study were women who had been examined for breast cancer. Ahmadian et al. (2010) developed and used a questionnaire based on the previous questionnaire instruments developed by Montano, Thompson, Taylor, and Mahloch (1997) and Kim (2002). Reliability and validity were established by Cronbach's Alpha and test – retest methods. Questionnaire items ranged from .72

to .96 using Cronbach's Alpha values. Self-efficacy was found to be the most influencing factor that encouraged women to seek and participate in mammography screening.

Mammography utilization among working Muslim Iranian women. In another Iranian study of low-income working Muslim women, the HBM was used to explore factors influencing mammography screening behaviors. One-fourth of all female deaths in the Islamic Republic of Iran are due to breast cancer. Thirty-six percent of tumors happen in women less than 40 years of age and are detected at late stages (Hatefnia et al., 2010). The study included 320 women ages 35 years and older who worked in 12 factories in Tehran having no previous history of breast cancer. Hatefnia et al. (2010) used a revised questionnaire based on Champion's Health Belief Model Scale translated from English to Farsi/Persian. The translated instrument was test – retested on 30 individuals with a 2-week gap between tests. The test – retest reliability ranged from r = .85 - .94. The questionnaire included four sections with 55 items covering sociodemographic information, mammography screening behavior, breast cancer and mammography knowledge, and the HBM components. Data analyses used the multivariate logistic regression model. The results revealed 75% of participants reported hearing and reading about breast cancer. All participants had universal insurance which covered free cancer screening, yet only 28% of the participants had ever had a mammogram (Hatefnia et al., 2010). This study suggests that factors associated with mammography compliance among Islamic Iranian women are age, perceived benefits, religious beliefs, and barriers.

Spanish translation Champion's health belief model. Many ethnic minorities are less likely than Whites to engage in routine mammography screening. Hispanic women are no exception. Breast cancer is not rampant among Hispanic women. However, Hispanic women

experience higher levels of breast cancer comorbidities and mortality. Like African-Americans, Hispanic women are diagnosed with advanced stages of breast cancer (Medina-Shepherd & Kleier, 2010). Having valid and reliable instruments that are culturally appropriate and language-specific to measure women's beliefs about mammography is critical. Medina-Shepherd and Kleier (2010) translated the English version of the HBM adapted by Champion for mammography screening to Spanish. Included in the analysis was a sample of 200 Spanish-speaking Hispanic women aged 42 to 77 years from Southeast Florida with no history of breast cancer. The HBM Spanish version adapted by Champion demonstrated internal consistency values ranging from .69 to .83. Test – retest reliability for the constructs of susceptibility = .57, benefits = .63, and barriers = .83. Culturally appropriate HBM instruments are important to survey ethnic minorities' beliefs concerning mammography screening.

Low-income Hispanic women. According to Deavenport, Modeste, Marshak, and Neish (2010), Hispanic women have the lowest rate of mammography utilization compared to women of other races or ethnicities. In this mixed method study, Deavenport et al. (2010) used the HBM as a foundation to identify factors associated with mammogram usage. Focus groups in both English and Spanish were conducted to acquire the insights of women whose primary language is Spanish and to minimize language barriers. Twelve women between the ages of 43 and 73 years participated in the focus groups, seven in the Spanish-speaking group and five in the English speaking group. Open-ended questions were formulated using the HBM constructs as a guide. Findings suggest Hispanic women recognize the benefits of early detection. However, many of the women did not have a fundamental knowledge of breast cancer, mammogram

screening, and personal breast cancer risk. This study suggested cultural suitable education is necessary to reduce health disparities.

Relationship of perceived risk and benefits to mammography. In a cross-sectional study conducted by Fair, Monahan, Russell, Zhao, and Champion (2012), they used the HBM to test the interaction of perceived risk and benefits to mammography adherence in African-American women across Indiana. The sample included 299 African-American women who met the criteria of being 41 to 75 years of age, not had a mammogram in 18 months, and were living at 175% of the poverty line or lower. The study found African-American women with a high perceived risk and low perceived benefit had the lowest rate of mammography adherence. A limitation of this study was the findings are limited to the African-American women in this study and cannot be inferred to all African-American women.

Risk-tailored messages. Open public discussions about breast cancer do not inevitably equate to improved breast health practices. Interventions based on women's perspectives on the benefits and risks of mammography are necessary for them to make informed decisions. Bodurtha et al. (2009) discussed a study that referenced interventions tailored to promote mammography. The study suggested the strongest effects were a combination of tailored interventions that used the HBM along with a physician recommendation. In a study by Bodurtha et al. (2009), they evaluated tailored health promotion interventions for a racial and economic diverse group of 899 women based on the HBM. Recruiting women from health clinics within the Virginia Commonwealth University Health System, they randomly assigned 449 women to the intervention group and 450 women to the control group. The intervention group received information addressing constructs of the HBM concerning the seriousness of breast cancer,

barriers to mammography, benefits of yearly mammograms, individual risk for breast cancer, scheduling of a mammogram, and communication with health providers. The control group received general information on prevention methods that were not tailored to the HBM constructs. The interventions did not show a significant effect on mammography screening at 18 months. For the participants who worried about breast cancer, their mammogram rates were higher. The researchers concluded that worry and education status may impact interventions to improve prevention practices for breast cancer.

African-American cosmetologists program. A study conducted with African-American women about mammography screening using the HBM yielded various insights. Sadler et al. (2007) conducted a beauty salon based survey in San Diego, California on breast cancer attitudes, knowledge, and screening practices. African-American women often patronize salons and trust their stylist. The results revealed a low rate of adherence to recommended screening guidelines. The findings suggested African-American women are aware of breast cancer as a health concern and perceive it is a serious concern for African-American women (Sadler et al., 2007).

Faith-based breast cancer program. Reach Out, a faith and community-based partnership in Chicago, Illinois encourages African-American women to obtain mammograms. Reach Out's message is "early detection saves lives" (Darnell et al., 2006, p. 203). Using the HBM, findings showed knowledge by itself concerning mammography did not result in more utilization in this study. African-American women who heard a health promotion message four or more times by a trusted pastor, coupled with frequent messages seen in print (church bulletin) were 15 times more likely to get a mammogram (Darnell et al., 2006).

Difference in studies. Sadler et al. (2007) targeted clients of 20 African-American salons participating in The Black Cosmetologists Promoting Health Program in San Diego, California. The participants ranged in ages from 20 to 94 years. This study used four HBM constructs: perceived susceptibility, perceived benefits, cues to action, and self-efficacy.

Darnell et al. (2006) used the HBM to assess a church-based breast cancer education program. The participants were African-American and Latina women from nine African-American churches and eight Latino Roman Catholic churches in Chicago, Illinois. The women were 40 and over. Darnell et al. (2006) measured perceived susceptibility, perceived benefits, perceived barriers, self-efficacy, health motivation, modifying factors, and cues to action.

This proposed research study used six constructs of the HBM to predict mammogram screening behaviors in African-American women ages 40 and over in Louisville, Kentucky. The constructs were perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, and cues to action. The participants were selected from a cross-section of businesses, organizations, and events.

The relevance and relationship of the literature to this research study were to understand the perceptions and beliefs African-American women possessed concerning breast cancer screening. When researchers are knowledgeable about African-American women's perceived threats and benefits of mammography screening, then appropriate interventions can be proposed. African-Americans have a rich culture and proposing interventions that focus on that culture is imperative to adherence to mammography screening. Ethnicity can influence the differences in breast cancer survival and mortality rates. Cultural health beliefs, norms and values, along with cancer knowledge, contribute to ethnic differences in mammography screening rates (Kudadjie-

Gyamfi & Magai, 2008; Soskolne, Marie, & Manor, 2007). Cultural characteristics that have been related to the lack of mammography adherence among African-American women are a "fear of cancer discovery and treatment; a fatalistic view about the inevitability of death once diagnosed; injury spreading cancer; and cancer may be caused by squeezing and touching the breasts" (Fair et al., 2012, p. 53).

Implications

This study's anticipated findings could suggest directions for possible future research and practice. Cultural beliefs could be important predictors of mammography screening in African-American women. To prolong the lives and quality of life of African-American women, awareness and educational programs should be tailored to relay the message and benefits of using early detection methods.

Healthcare providers could use the findings effectively to communicate the benefits of regular mammography screenings. They could denounce myths that some women believe about mammography. Providers would know how to encourage and guide African-American women diagnosed with breast cancer through the treatment process if they understood these women's attitudes.

Knowing the barriers that African-American women must overcome in order to adhere to mammography screening could help organizations design appropriate programs. Possible barriers to mammography screening could be access, location, financial issues, insurance, or their perceptions. Empowering women to take control over their lives could lead to positive health behavior changes.

Educational programs placing emphasis on the benefits of prevention and early cancer detection methods are potential projects that may be designed from data obtained through researching African-American women's beliefs. With an understanding of African-American women's needs, a support program could be developed to assist women who are facing decision-making about breast cancer concerns and treatment. If data revealed a barrier to access to care, projects such as mobile mammography units could be scheduled in local neighborhoods, and partnerships could be formed with local bus transportation companies or cab services to offer free or reduced rates to women with appointments to mammography facilities. The data collected from the research will direct my selection of a project. There could be a number of projects and programs developed to reduce incidence and mortality rates in African-American women. After data collection, innovations will be displayed in the appendix.

Summary

Breast cancer is a major concern for women of all racial and ethnic groups. White women have higher breast cancer incidence rates than any other ethnic group; however, African-American women have the highest breast cancer mortality rates. The difference in these rates is due to screening practices. African-American women are diagnosed in later stages of breast cancer when treatment is more complex.

African-American women in Louisville, Kentucky are challenged with some of the highest breast cancer mortality rates in the country. Breast cancer is preventable or controllable with early detection and screenings. Understanding African-American women in Louisville beliefs concerning preventive breast screening will provide information to design interventions

to increase screening rates. The six constructs of the HBM will be utilized to predict breast screening behaviors in these women.

Identifying factors and overcoming barriers to preventive breast screening will lead to positive social change in the Louisville community. An increase in community awareness of early detection methods and programs could result in screening behavior changes. Early detection can lead to a reduction in breast cancer mortality rates. Breast cancer affects both the woman and her family. Education, treatment techniques, and communication can create a positive and supportive family unit improving the quality of life of a woman living with cancer. To promote and encourage early breast screening practice among African-American, women healthcare providers must communicate knowledgeably.

Using an effective methodology to capture the beliefs and opinions of African-American women in Louisville, Kentucky was imperative. A nonexperimental quantitative survey design was able to identify attitudes, opinions, behaviors, and characteristics of this group. A convenience sample of 344 African-American women ages 40 years and over was solicited in the Louisville area at various venues. The HBM tailored by Champion (1999) was the instrument used to capture the attitudes, opinions, behaviors, and characteristics of African-American women ages 40 and over in Louisville, Kentucky.

The next section provides the methodology used to research which of the six constructs from the HBM are predictive of African-American women in Louisville, Kentucky ever having a mammogram.

Section 2: The Methodology

Introduction

The Health Belief Model (HBM) has been used extensively to examine screening mammography behaviors worldwide. The model predicates that health beliefs influence the likelihood of individuals practicing preventive health behaviors (Othman, Kiviniemi, Wu, & Lally, 2012). African-American women have unique cultural differences from other ethnic groups, and understanding their needs and fears about mammography is essential. Understanding these factors will explain African-American women's health behaviors toward screening mammography guidelines.

Research Design and Approach

This study utilized a nonexperimental quantitative survey design. This design identifies trends in attitudes, opinions, behaviors, or characteristics of a large group of people (Creswell, 2012). Using this design captured the existing characteristics of participants without manipulating circumstances to influence participants' responses. Surveys are a popular data collection tool that can be very useful to answer questions about a problem that has been previously studied and is suitable for predictive studies. This research design functioned appropriately for predicting adherence to mammography screening. The study examined the current health behaviors and attitudes of African-American women about adherence to mammography screening. The survey helped them describe their fears and the barriers of obtaining mammograms. The survey concerning the issue of adherence to mammography screening guidelines obtained the responses of African-American women across different age groups and socioeconomic statuses within the metropolitan area.

Setting and Sample

The female population age 40 and over in Louisville, Kentucky is 381,250 (Harris et al., 2011). The African-American female population age 40 and over in Louisville, Kentucky is 19.8% or 75,487 (Harris et al., 2011).

Self-identified African-American women ages 40 years and over living in Louisville, Kentucky were solicited using convenience sampling. The sample consisted of 344 women. Excluded from the study were women with a previous diagnosis of breast cancer. The study included African-American women from all socioeconomic statuses from low-income to high-income levels. I solicited women who had health insurance and those who were uninsured for this study. Also, women who are well educated and women with limited education were encouraged to participate. Participants were solicited from local businesses, unions, community meetings, conferences, and other local gatherings in Louisville with large numbers of African-American women. Participants in this study were selected due to their availability and willingness to participate. Because of the utilization of convenience sampling, I was not able to confidently state that the women in this study are representative of the population. However, useful information can be gained to understand the perspectives of African-American women who live in Louisville, Kentucky.

In a quantitative research study, it is necessary to systematically calculate sample size. In survey research, a sampling error formula is often used. The sampling error formula lets a researcher choose the amount of sampling error that he or she will tolerate. Identified within the formula is a confidence interval. The confidence interval represents an estimate of the range of values of the unknown population. The confidence level for this sample is 95%. With the

African-American female population of women age 40 and over being 75,487, the sample size of 344 reflects a 6% sampling error. The sample mean will differ from the true population mean only 6% of the time. These figures are reflected in Fowler's Sample Size Table and depended on a simple random sample (Creswell, 2012).

Instrumentation and Materials

The instrument used was the HBM tailored by Champion (1999) [Appendix B]. This instrument is a survey that has six constructs: perceived susceptibility to breast cancer consists of five items; perceived severity consists of seven items; perceived barriers consist of 19 items; perceived benefits consist of seven items; self-efficacy consists of 11 items, and cues to action consist of five items. The health beliefs and health behaviors of African-American women toward mammography screening were the concepts measured by the HBM instrument. The instrument is scored using a 5-point Likert scale ranging from 1 - *strongly disagree* to 5 - *strongly agree*. Equal positive and negative responses around a neutral option balance the scale. The score for each variable represented the respondent's level of agreement to the presented statement concerning mammography. For research criteria, a demographic profile section with eight questions was included. This descriptive data provided a snapshot of the sample being surveyed. An analysis of the descriptive data can help summarize, describe, and show data in a meaningful way that may produce patterns from the data. Two questions were included to determine mammography utilization: (a) Have you ever had a mammogram? (b) What is the recency of a mammogram? (Medina-Shepherd & Kleier, 2012).

Champion et al. (2008) assessed the HBM variables when used to measure breast cancer beliefs and mammography in African-American women. Internal consistency reliability was

supported for all variables using Cronbach's alpha: susceptibility = .79, severity = .94, barriers = .89, benefits = .73, and self-efficacy = .88. Using exploratory factor analysis and assessing theoretical relationships on all scale items demonstrated construct validity. With a value of 0.4 or greater, items factored on their respective scales. Correlations of not less than 0.20 demonstrated convergent validity. The construct, cues to action, is a significant intervention that has not been systemically studied for its impact on predicting behavior (Champion & Skinner, 2008; Strecher, Champion, & Rosenstock, 1997).

African-American women ages 40 and over from a cross-section of Louisville neighborhoods and diverse socioeconomic levels were solicited to participate in the mammography study. Throughout the city of Louisville, Recruitment flyers (Appendix C) were distributed. I explained the mammography study to interested African-American women and asked them to participate. Women volunteering to participate in the mammography study were asked to read the consent form (Appendix D). All participants completed the 5 to 10 minute survey consisting of the six HBM constructs and a demographic profile after reading the consent form. Completed surveys were returned to me. Mean and standard deviation data from this study are displayed in tables within the body of this paper and are also available in the appendices.

Data Collection and Analysis

I received approval from the Walden University IRB, number 08-07-13-0247835, before beginning this research project or collecting data. I obtained Letters of Cooperation from business owners, churches, community leaders, and event organizers to approach women about participating in the study (Appendices E, F, G, H, and I). Located in Appendix J, K, and L is an explanation of the data used to measure three of the HBM constructs.

I explained the study to women who fit the criteria of the study, those who self-identified as being African-American, being 40 years of age and over, never had a diagnosis of cancer, and was a resident of Louisville, Kentucky. A consent form and survey were given to women who agreed to participate in the study. In order to protect their privacy, signatures were not collected, and completion of the survey indicated their consent to participate. Participants completed the survey at the onsite location. Upon completion, participants returned the survey to me. I placed each survey in a secure lockbox.

Hard copies of the surveys were secured in a locked file cabinet in my home office to protect the data. I stored electronic data on my personal computer which is protected by security safeguards of password protection, firewall, antivirus controls, automatic back-up system, and encryption.

The variables of the HBM used an interval scale. Creswell (2012) noted that "interval scales provide "continuous" response options to questions with assumed equal distances between options" (p.167). The 5-point Likert scale used for this study corresponds to this criterion. The scale demonstrates theoretically equal intervals among responses (Creswell, 2012). Interval scales require parametric statistical tests.

Each item on the HBM has a response structure established on a 5-point Likert scale from 1 – *strongly disagree* to 5 – *strongly agree*. Responses from each of the six subscales (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy) were analyzed, summed, and the mean calculated to provide scores for each construct (Medina-Shepherd & Kleier, 2010).

I analyzed the variables from the HBM using descriptive statistics and logistic regression conducted using SPSS version 21. Demographic data were analyzed using descriptive statistics. Descriptive analysis presented quantitative data that described the responses to each demographic question. This analysis described similarities, differences, and trends of the African-American women who participated in the study. Demographic information was used to confirm participants met the inclusion criteria for the research study and summarized the participants overall characteristics.

The mean scores from the predictor variables of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy were analyzed using logistic regression. These variables represented an interval level of measurement. Logistic regression was an appropriate statistical analysis for analyzing the variables of the HBM. The statistical program used for prediction of dichotomous outcome variables is logistic regression (Newsom, 2012). Dichotomous outcome variables are categorical and have only two possible answers: had a mammogram or have not had a mammogram. Logistic regression was used to analyze the research question of what constructs from the HBM predict African-American women ever having a mammogram. The analysis was performed to determine support of the hypothesis of perceived susceptibility and severity of breast cancer, perceived barriers and benefits of mammography screening, cues to action, and self-efficacy are predictive of African-American women in Louisville, Kentucky having a mammogram.

Research Results

The analyses of the findings and results from the HBM survey are presented using narration and tables from survey responses. A descriptive analysis of the demographic profile

data provided the characteristics of participants in the research study. Discussion of the HBM included a comprehensive analysis of the six constructs of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. The findings were evaluated in relation to the research question of "What constructs from the HBM predict African-American women ever having a mammogram?" Inferential statistical analysis included logistic regression, frequencies, and independent-samples *t* test.

Demographics of the Sample

A total of 349 women participated in the study. Of these, five did not meet race inclusion criteria and were omitted. The data provided by the remaining 344 African-American women underwent demographic analyses.

In the demographic profile section two questions were asked: (a) Have you ever had a mammogram? (b) What is the recency of the mammogram? The data showed that 93.6% (Table 1) of the women in the sample had a mammogram. Of these, 62.2% (Table 2) had received a mammogram within less than 1 year.

Table 1

Percentage of Women Had a Mammogram

	Frequency	Percent	Valid percent
No	22	6.4	6.4
Yes	322	93.6	93.6
Total	344	100.0	100.0

Table 2

Recency of Mammogram

	Frequency	Percent	Valid percent
Less than 1 year	214	62.2	66.9
1 - 2 years	89	25.9	27.8
2+ years	17	4.9	5.3
Total	320	93.0	100.0
Missing system	24	7.0	
Total	344	100.0	

Table 3 shows the age categories from the 344 participants with the range between 50 and 59 years (33.7%) having the highest representation. The majority of women in the study were married (44.8%), and the largest percentage of women had a household income of $75,000 plus (22.7%). Tables 4 and 5 respectively display marital status and household income distributions. Thirty-three percent of the women had some college (Table 6), while 91% of the women had health insurance (Table 7), and 82% had a regular doctor (Table 8).

Of the 344 participants, not included in the logistic regression analysis was 36 (n = 10.5%) incomplete surveys missing data from the six construct sections resulting in 308 (n = 89.5%) cases used in the data analysis (Table 9). All subsequent data analysis for this study uses n=308.

Table 3

Age Range of Women Participants

	Frequency	Percent	Valid percent
Age 40 – 49	94	27.3	27.7
Age 50 – 59	116	33.7	34.2
Age 60 – 69	95	27.6	28.0
Age 70+	34	9.9	10.0
Total	339	98.5	100.0
Missing data	5	1.5	
Total	344	100.0	

Table 4

Marital Status of Participants

	Frequency	Percent	Valid percent	Cumulative percent
	1	.3	.3	.3
Married	154	44.8	44.8	45.1
Divorced	68	19.8	19.8	64.8
Separated	7	2.0	2.0	66.9
Widowed	27	7.8	7.8	74.7
Single	86	25.0	25.0	99.7
S	1	.3	.3	100.0
Total	344	100.0	100.0	

Table 5

Household Income of Participants

	Frequency	Percent	Valid percent
Less than $15,000	39	11.3	13.7
$15,000 - $35,000	62	18.0	21.8
$35,001 - $55,000	58	16.9	20.4
$55,001 - $75,000	48	14.0	16.8
$75,000+	78	22.7	27.4
Total	285	82.8	100.0
Missing data	59	17.2	
Total	344	100.0	

Table 6

Education Levels Completed by Participants

	Frequency	Valid percent
Less than high school	20	5.8
GED/High school graduate	63	18.3
Some college	116	33.7
College graduate	71	20.6
Graduate degree	74	21.5
Total	344	100.0

Table 7

Percentage of Participants With Health Insurance

	Frequency	Percent	Valid percent	Cumulative percent
No	26	7.6	7.7	7.7
Yes	313	91.0	92.3	100.0
Total	339	98.5	100.0	
Missing data	5	1.5		
Total	344	100.0		

Table 8

Participants That Have a Regular Doctor

	Frequency	Percent	Valid percent	Cumulative percent
No	10	2.9	3.4	3.4
Yes	282	82.0	96.6	100.0
Total	292	84.9	100.0	
Missing data	52	15.1		
Total	344	100.0		

Table 9

Data Analysis of Case Processing Summary

	N	%
Included in analysis	308	89.5
Missing cases incomplete	36	10.5
Total	344	100.0

Theoretical Analysis

The research question for this study is "What constructs from the Health Belief Model (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, and cues to action) predict African-American women ever having a mammogram?

Table 10 displays the scores for each of the theoretical constructs taken from data provided by the 308 participants who fully completed the survey. Based on a scale from 1 -

strongly disagree to 5 - *strongly agree*, the scores show that the participants disagreed they were susceptible to the chance of getting breast cancer. They have a neutral perception of the severity of breast cancer. The participants agreed that mammography is beneficial to reduce the risk and seriousness of breast cancer. The participants disagreed that they cannot overcome barriers to getting a mammogram. They agreed strategies (cues to action) to remind them to get a mammogram is helpful. The participants strongly agreed they have self-efficacy or confidence in their ability to schedule and get a mammogram.

Table 10

Descriptive Statistics for the Health Belief Model Constructs Based on the Sample

Variables	*M*	*SD*	*N*
Susceptibility	2.37	0.94	308
Severity	2.75	0.84	308
Benefits	3.87	0.72	308
Barriers	1.52	0.52	308
Cues to action	3.54	0.96	308
Self-efficacy	4.39	0.61	308

Independent-samples *t* test of the mean scores of each construct for women who had a mammogram and women who did not have a mammogram resulted in a significant difference between the means of the two groups for benefits (t (306) = 2.23, $p < .05$), barriers (t (306) = -3.07, $p <.01$), and self-efficacy (t (306) = 2.43, $p < .05$). The means of benefits (M = 3.90, SD = .702) and self-efficacy (M = 4.41, SD = .581) constructs for the group who had a mammogram were significantly higher than the means of the constructs for the group who did not have a mammogram (M = 3.53, SD = .859) (M = 4.07, SD = .930). As shown in Table 11, the mean of the barriers construct for the group who had a mammogram was significantly lower (M = 1.50, SD = .483) than the mean of the construct for the group who did not have a mammogram (M = 1.86, SD = .796).

Table 11

Descriptive and t test Statistics of Health Belief Model Constructs Based on Ever Had a Mammogram

	Had a Mammogram			Never Had a Mammogram				
Variables	M	SD	n	M	SD	n	*t*	*p*
Susceptibility	2.38	.929	288	2.31	1.134	20	.304	.761
Severity	2.74	.819	288	2.94	1.139	20	-1.056	.292
Benefits	3.90	.702	288	3.53	.859	20	2.226	.027*
Barriers	1.50	.483	288	1.86	.796	20	-3.073	.002**
Cues of Action	3.56	.948	288	3.20	1.080	20	1.620	.106
Self-efficacy	4.41	.581	288	4.07	.930	20	2.427	.016*

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

In a Logistic Regression model, there is an assumption of collinearity among predictor variables. Collinearity (multicollinearity) is “the correlation of predictor variables with each other that can distort findings from some statistical analyses” (Zientek & Thompson, 2010, p. 1). When measured, if independent variables are too highly related, multicollinearity exists. Predictor variable correlations that are close to zero are of little concern. However, when the correlation between predictor variables increases, multicollinearity might impact interpretation of multiple regression results (Zientek & Thompson, 2010). If the variable tolerance is less than 0.1, or the variance inflation factor (VIF) value is greater than 10, then there is concern of multicollinearity (Strang, 2011). The mammography predictor variables tested for multicollinearity were perceived susceptibility, perceived severity, perceived benefits, perceived

barriers, cues to action, and self-efficacy. Computing the bivariate correlation for all measured variables is a practice to check for multicollinearity. When the correlation coefficient between two variables is higher than r = 0.85, there is the probability of collinearity (Teo, 2010). The predictor variables of perceived susceptibility, perceived severity, perceived barriers, cues to action and perceived self-efficacy were significant at $p < .01$. The predictor variable of perceived benefits was significant at $p < .05$. As shown in Table 12, the predictor variables each represented an independent measure of the model showing no concern of multicollinearity.

Table 12

Correlation Coefficients (r) for the Independent Variables

Measures	**1**	**2**	**3**	**4**	**5**	**6**
Perceived susceptibility	----	.52**	-.03	.15**	.25**	.05
Perceived severity		-----	.10	.26**	.28**	.08
Perceived benefits			-----	-.16**	.14*	.43**
Perceived barriers				-----	.005	-.40**
Cues to action					-----	.33**
Self-efficacy						-----

Note. Correlation is significant at the 0.01 level (2-tailed) **p < .01. Correlation is significant at the 0.05 level (2-tailed) **p* < .05.

Hypothesis Testing

Prior to hypothesis testing, the Hosmer-Lemeshow goodness-of-fit test was performed to determine the model fit to the data. The results, $\chi^2 = 9.25$ (6), $p = .16$, revealed the computed chi-square statistics comparing observed frequencies with expected frequencies were nonsignificant, indicating the model is a good fit and predictive of the data.

The hypothesis is perceived susceptibility and severity of breast cancer, perceived barriers and benefits of mammography screening, cues to action, and self-efficacy predict African-American women in Louisville, Kentucky having a mammogram. The null hypothesis is perceived susceptibility and severity of breast cancer, perceived barriers and benefits of mammography screening, cues to action, and self-efficacy do not predict African-American women in Louisville, Kentucky having a mammogram. The hypothesis was tested using logistic regression on all subscale items to determine what constructs of the HBM adapted by Champion

predict African-American women ever having a mammogram. As shown in Table 13, the inferential logistical analysis examined the statistical significance of individual regression coefficients. Each participant's responses to the items from the subscales were scored by calculating the mean for the six construct variables. Using the mean scale score as a predictor and mammogram (Have you ever had a mammogram?) as the criterion revealed that Benefits ($p = .029$), Barriers ($p = .004$), and Self-efficacy ($p = .021$) were statistically significant variables to predict the outcome of having a mammogram. The odds ratio Exp(B) for Benefits (1.855) and Self-efficacy (1.925) predicts that as benefits and self-efficacy toward mammography increases one unit, the odds of having a mammogram increases by 1.9 times. The odds ratio for Barriers (.377) predicts that as barriers increase one unit, the odds of having a mammogram decrease by 0.4. The constructs of Benefits, Barriers, and Self-efficacy were significant predictors of having a mammogram ($p < .05$) resulting in partial rejection of the null hypothesis. The dependent variable of "ever had a mammogram" was coded "0" = No and "1" = Yes. Located in Appendix I, J, and K are raw data showing question and responses from the three subscales of Benefits, Barriers, and Self-efficacy.

Table 13

Logistic Regression Analysis of Health Belief Model Constructs Based on Having a Mammogram

Variables	B	S.E.	Wald	*df*	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Susceptibility	.075	.247	.093	1	.760	1.078	.665	1.749
Severity	-.292	.277	1.115	1	.291	.747	.434	1.284
Benefits	.618	.284	4.748	1	.029*	1.855	1.064	3.234
Barriers	-.977	.342	8.150	1	.004**	.377	.193	.736
Cues to action	.364	.227	2.569	1	.109	1.439	.922	2.247
Self-efficacy	.655	.284	5.321	1	.021*	1.925	1.104	3.359

Test	χ^2	*df*	*p*
Goodness-of-fit test (Hosmer-Lemeshow)	9.25	6	.16

Note. The dependent variable in this analysis is ever had a mammogram coded 0 = no and 1 = yes. *$p < .05$, **$p < .01$.

Assumptions, Limitations, Scope and Delimitations

Assumptions

Assumptions were that African-American women in Louisville, Kentucky had a lower rate of adherence to mammography screening than other ethnic groups. Additional assumptions

were that African-American women are diagnosed with cancer in later stages when it is more difficult to treat. Lastly, African-American women had the highest mortality rates compared to other ethnic groups.

Limitations

Potential limitations of this study were that the findings may be representative of the African-American women in Louisville, Kentucky, but are not generalizable to all African-American women ages 40 and over. This study relied on a self-report survey about health behaviors and beliefs. There may be the potential for some women to overreport their behavior.

Scope

The scope of this study was to gather information about the health beliefs and behaviors of African-American women in order to predict their adherence to mammography screening guidelines. The study used the six constructs of the HBM, perceived susceptibility, perceived severity, perceived barriers, perceived benefits, self-efficacy, and cues to action.

Delimitations

The delimitations of this study were the exclusion of women under the age of 40 and women who declared their race something other than African-American. This study did not focus on breast self-examination or clinical breast examination. Creating interventions to increase mammography screening was outside of the boundaries of this study.

Measures for the Protection of Human Subjects

Personal information was not handled by anyone other than me to protect the privacy and confidentiality of individuals who participated in the study, nor was personal information included in reports. Participants were asked to seal their surveys in brown envelopes so personal

information or data would not be viewable. The self-administered surveys were de-identified, containing no names or addresses, to ensure that I handled the data with anonymity. Also, I did not divulge any information to other sources without the participants' permission. The survey contained a consent letter explaining the purpose of the study that subject participation was voluntary, and that by completing the survey the women acknowledged their understanding of the research and their consent to participate. Adults were able to withdraw from the study at any time without consequences.

Conclusion

Predicting African-American women's adherence to mammography screening guidelines was important to decreasing the mortality rates in Louisville, Kentucky. Nesbitt (2014) reported that breast cancer incidence rates among African-American women younger than 45 years of age were higher compared to other ethnic groups. She noted racial and ethnic disparities still persist in Louisville. From 2006 to 2010, breast cancer rates for White women decreased by 13%. During the same time, rates for African-American women increased by 17%.

A summary of the results from this study suggested that perceived benefits, perceived barriers, and self-efficacy significantly ($p < .05$) predicted mammography screening behaviors in African-American women in Louisville, Kentucky. The constructs of perceived susceptibility, perceived severity, and cues to action were not significant ($p > .05$) predictors of African-American women having mammography screening. These women disagreed they were susceptible to breast cancer and neutral about how the severity of breast cancer would affect their life. Cues to action, such as a reminder card, advertisements, and promotions were good visual aids but were not major motivating factor to change mammography behaviors in these women.

Medina-Shepherd and Kleier (2012) tested the constructs of perceived susceptibility, perceived benefits, and perceived barriers using Champion's HBM scales with Hispanic women and found only perceived barriers were predictive of having had a mammogram. Fair et al. (2012) tested the interaction of perceived risk and benefits in relation to predicting mammography adherence in African-American women. They found high perceived risk and low perceived benefits impacted mammography screening.

Developing mammography interventions with benefits, barriers, and self-efficacy in mind could lead to significant social change in Louisville. Closing the gap on racial and ethnic disparities can strengthen the City of Louisville making it a better place to live, work, and enjoy life.

With the continued increase of breast cancer rates in African-American women in Louisville, Kentucky, recommendations for future research should include ways to eliminate barriers to early diagnosis. Research should include techniques to train physicians how to be culturally sensitive to African-American women to provide them with quality treatment when diagnosed with cancer. Future research on how to educate African-American women of the benefits of access to timely care is critical.

For my project study, I wrote a policy recommendation with the promotion of a new screening technology called tomosynthesis. The benefits of this technology are earlier detection of cancer, clearer diagnosis, and fewer false positives. This project is an outcome of my research study where 93.6% of the women had a mammogram, and 66.9% had their mammogram in less than 1 year. These statistics are in line with new evidence that screening among African-

American women has increased, but African-American women in Louisville are still dying at a higher rate than other ethnic groups at an increase of 17% (Nesbitt, 2014).

The women in this study realized the benefit of mammography. One perceived benefit item "Having a mammogram will help find a lump before it can be felt by myself or a health professional" was significant (p = .02) as displayed in Appendix J.

Women in this study believed that they were able to overcome obstacles to get a mammogram. The results revealed barriers these women had to overcome were fear of finding an abnormality and exposure to radiation. Items on the barrier subscale that were significant are "I am afraid to have a mammogram because I might find out something is wrong" (p = .02) and "Having a mammogram exposes me to unnecessary radiation" (p = .03) displayed in Appendix K. These fears could be overcome with tomosynthesis where a more detailed image could decrease the need to repeat test and use a low dose of radiation.

The women in this study also had high self-efficacy. Three subscale items were significant, "I can talk to people at the mammogram center if I have a problem" (p = .009), "I can find a way to pay for a mammogram" (p =.005), and "I feel confident that mammography will detect any abnormalities in my breast" (p = .03) displayed in Appendix L. Ninety-one percent of the women in this study had health insurance. If their insurance carrier does not cover tomosynthesis, these women have the fortitude to find a way to pay for a more accurate preventive screening. Advocating with local insurance carriers about their policy to cover the cost of this new technology would eliminate any additional barriers to better care.

Aligning interventions promoting the benefits of mammography and helping women overcome barriers to mammography could improve the health status of the community.

Empowering women to have a positive attitude or self-efficacy could change how they perceive and respond to situations in their lives. My project of promotion of tomosynthesis could detect abnormalities in African-American women in Louisville at an early stage while treatment is still beneficial.

Section 3: The Project

Introduction

The majority (93%) of the African-American women who participated in this study had a standard mammogram with 62% having the screening within less than 1 year. The mortality rate from breast cancer for African-American women in Louisville continues to increase while mortality rates for Caucasian women are declining. My project consists of a policy recommendation and position paper with the promotion of an educational brochure on the latest technology in mammography to reduce the high mortality rate of breast cancer in African-American women in Louisville.

This innovation is Breast Tomosynthesis that uses high-powered computing to build a three dimensional mammogram. Multiple breast images can be taken in seconds, allowing a computer to stack thin layers of breast tissue to create a 3D image. The tissue can be examined by a radiologist in millimeter layers making fine details clearly visible to distinguish between calcifications, cancer masses, and breast abnormalities. The advantages of 3D mammography are earlier detection, clearer diagnosis, and fewer false positives.

Description and Goals

The project consists of a policy recommendation and position paper (Appendix A). The goals are to get digital breast tomosynthesis covered by local health plans and request funding from state government to cover the cost for minority women to have the new screening procedure. An educational brochure describes the new technology and outlines questions African-American women should discuss with their physician concerning breast screening and treatment of abnormalities when discovered in the breast. The brochure will be placed in

prominent areas patronized by African-American women, such as churches, hair and nail salons, community centers, businesses, and physician offices.

In Section 1, the problem was identified that African-American women are less likely to utilize breast screening. As a result, cancer is diagnosed in later stages, and they are 40% more likely to die of breast cancer than White women. This project addresses using new technology to detect breast abnormalities that might not be discovered by a regular 2D mammogram. Tomosynthesis can help to improve breast screening by individualizing diagnostic evaluation and treatment and may improve specificity of breast abnormalities (Holloway et al., 2010). With the breast cancer mortality rates for African-American women in Louisville still increasing while mortality rates are decreasing for White women, the need for accurate and thorough breast assessment is monumental.

The goals of the project are public awareness of alternative methods for breast screening. Education can be used to empower African-American women to be knowledgeable about breast screening techniques and treatment plans. Since digital breast tomosynthesis is a new technique, the goal is to advocate local health plans to encourage them to cover the breast screening and diagnosis cost of this new technology.

Rationale

I chose this particular project to address the problem since 93% of the African-American women who participated in the research study had a mammogram, yet Nesbitt (2014) reported that African-American breast cancer mortality rates in Louisville had increased by 17%. Women are getting mammography screening; however, improved screening methods and education are vital to impact the rising breast cancer mortality rates. The standard 2D mammogram limits the

breast view to a fixed flat image. Educating women to talk to their physician about their personal risk and screening options could have a positive impact on breast cancer mortality rates.

The results of the study showed that perceived benefits, perceived barriers, and self-efficacy were predictive of African-American women obtaining mammograms. Aligning with this data analysis, my project was formalized. The women in this study realized the benefits of having a mammogram as a preventive measure for breast cancer. Promotion of an advanced method that can detect and isolate abnormalities in the breast more efficiently would benefit African-American women. The women in this study perceived they could overcome barriers associated with mammograms. The question "having a mammogram exposes me to unnecessary radiation" was found to be statistically significant. Breast tomosynthesis uses a lower dose of radiation than standard mammography. The women in this study had self-efficacy which is the extent or strength of their belief in their own ability to complete tasks associated with mammography. The self-efficacy that these women possess could give them the ability to try a new technology that may improve their mammography experience.

I chose a policy recommendation and position paper project genre because the majority of the women who participated in my research project were adhering to mammography screening guidelines. Exploring advances in mammography screening technology compared to the present standard two dimensional techniques could improve the detection of abnormalities of the breast. By compiling research on tomosynthesis and presenting the evidence to insurance health plans and local government, I can be an advocate to advance women's breast screening cause. Creating an educational brochure to educate women about alternatives to the standard mammography screening will give them choices about their breast health care.

I will address the problem of increasing breast cancer mortality rates among African-American women in Louisville, Kentucky in this project by presenting scholarly reviews of breast screening methods compared to tomosynthesis. I will also use a theoretical framework that will disseminate how advances in technology can be promoted to impact social change within the Louisville community. I see this project as a potential solution to this problem because tomosynthesis is not just a screening mechanism, but also a diagnostic tool. Fine details are more clearly visible by stacking breast images to create three dimensional pictures.

Review of the Literature

In preparation for this literature review, I searched the Health Services Databases on the Walden University Library site. I retrieved journal articles using the CINAHL & MEDLINE simultaneous search feature. The keywords used during the search were *tomosynthesis, breast tomosynthesis, digital breast tomosynthesis, policy recommendation,* and *position paper*. The literature review is organized by outlining the aspects of a policy recommendation and position paper, presenting the theory that informs the development of my project, providing the history of approval and development of breast imaging technology in the United States, and discussing the various research studies conducted on digital breast tomosynthesis.

Based on the analysis of my research, choosing the genre of policy recommendation in the form of a position paper with an educational breast screening brochure is appropriate to address the problem of high breast cancer mortality rates in Louisville. This position paper allows me to present my belief and build a case for promoting new mammography technology that provides a digital three dimensional image. The policy recommendation and position paper

expresses my opinion about digital breast tomosynthesis and promotes the use of this technology as a screening and diagnosis tool.

Doyle (2013) noted that policy recommendation is prepared written advice for a group that has the authority to make decisions about a policy issue. The document provides both an in-depth analysis of the options and policy recommendation. The policy recommendation is accepted as advice or declined in favor of another option depending on how well the issue and the argument justifying the recommended action are presented by the author. Doyle (2013) outlined the structure of a policy recommendation as always having three points: the issue, analysis, and a recommendation. The document can either have a direct or indirect structure. In a direct structure, the issue is introduced followed by the recommendation. The analysis or discussion follows the recommendation. The analysis covers the background of the issue, factors contributing to the recommendation, options, and other information used to arrive at a recommendation. The direct structure allows the reader to obtain important information first. In an indirect structure, the issue is introduced, followed by the analysis, and then a recommendation is provided. Few policy documents follow this structure (Doyle, 2013). The characteristics of a well written policy recommendation are conciseness, readability, and accuracy. The writer must keep the document focused and concise, so the reader spends minimum time gathering the required information. The writer must also make the language plain, clear, and readable. The most recent, accurate, and complete information available must be included in the policy recommendation. Finally, the document should reflect the qualities of effective argumentation (Doyle, 2013).

Herman (2010) expressed that white papers offering authoritative perspectives or solutions to the problem are the design of most policy recommendation papers. Additionally, the policy recommendation paper may take the form of a briefing paper, giving an overview of the issue or problem, targeted analysis, and actionable recommendation. Herman (2010) outlined the core components that structure the analysis and argument for a policy recommendation paper. Core components consist of defining the problem, analyzing the data, summarizing the findings or stating recommendations, generating criteria for evaluating data, developing a theory of change, analyzing the options and assessing the feasibility, addressing counter arguments to your recommendation, suggesting next steps and implications of your recommendation, and concluding with the overall goal.

Johnson-Sheehan and Paine (2010) stated that "the purpose of a position paper is to explain both sides of the controversy and then argue for one side over the other" (p. 221). The authors noted there are two basic organizations for a position paper. The first paper would describe the opponents' position up front with its limitations, along with an explanation of your position with its strengths. The components of the paper would be the introduction, summary of opponents' position, limitations of opponents' position, your understanding of the issue, reasons why your understanding is better than your opponents' understanding, and the conclusion. The second paper makes a point-by-point comparison, explaining why your position is better than your opponents. The components of this paper are the introduction, major point of difference (opponents' position, your position), reasons why your understanding is better than your opponents' understanding, and the conclusion. The authors asserted that these are suggested organizations that should be altered to fit your topic, angle, purpose, readers, and context.

Rodin and Champion (2012) shared that a position paper should consist of relevant information about the problem and conclude with a recommendation. They stated that the format of a position paper should consist of the problem history (background, current status), the problem definition (statement of the problem, identifications of parties involved, impact and importance of the problem to the organization affected), a recommendation (description and rationale recommendations, options for implementations), and end material (references).

I used statistics from research studies conducted on digital breast tomosynthesis, position papers written on digital breast tomosynthesis by major health plans, and policy recommendation guidelines by professional health organizations as evidence. The outline of my policy recommendation and position paper introduces digital breast tomosynthesis. The paper contains my thesis sentence that digital breast tomosynthesis has the potential to change how screening and diagnostic mammography is performed. It outlines opposing views to my position and acknowledges their concerns, explains why my position is preeminent, and ends with a summary of my argument and position.

I created an educational brochure to outline the benefits of digital breast tomosynthesis because women do not widely know this technology. Many females in Louisville fall within the recommended age for mammography screening. To impact the high breast cancer mortality rates in African-American women in Louisville, there is an increased need for accurate breast screening. Tomosynthesis breast imaging could improve outcomes for these women. The criteria used to guide development of my project are the health beliefs and behaviors of the women that participated in this research study. Giving women in Louisville an additional option in mammography screening innovation could improve benefit outcomes.

Diffusion of innovations theory (Rogers, 2003) informed the content of my project as this theory communicates an innovation product among members of a social system to persuade them to adopt an innovation. Rogers (2003) contended that an innovation occurs in four stages of invention, diffusion, time, and consequences with the information flowing through networks. Individuals can use the innovation-decision process (Figure 3), as an information seeking and processing procedure. The process can motivate an individual to diminish concerns about the advantages and disadvantages of the innovation product. When a culture adopts or rejects an innovation, social change occurs.

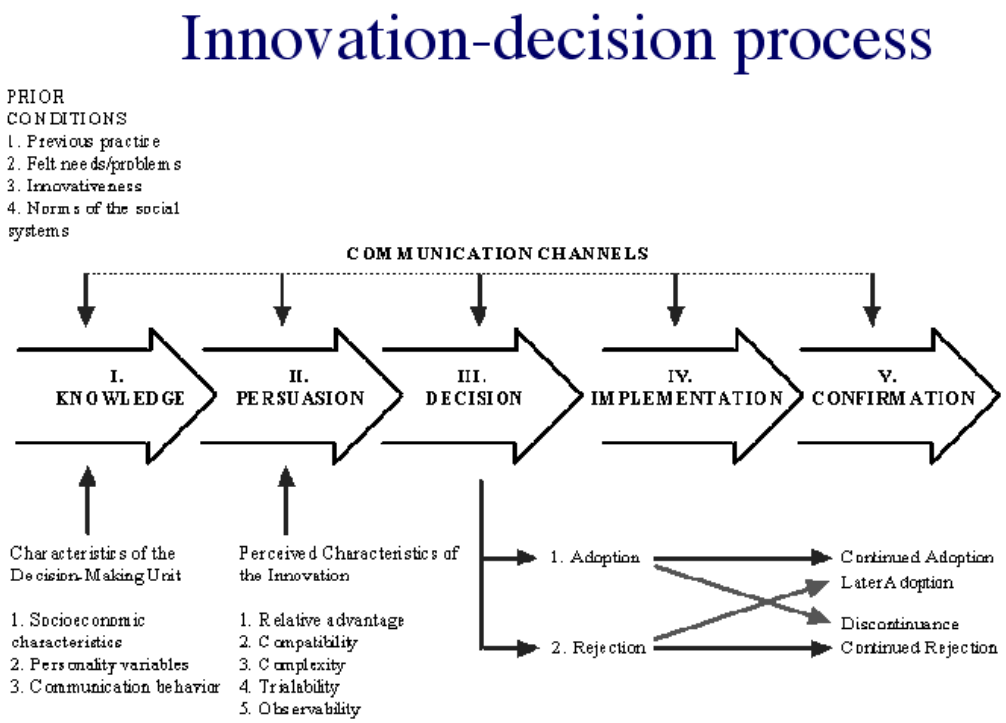

Figure 3. Five stage model of the innovation-decision process. Adapted from "Diffusion of Innovations, 5th Edition," by E. M. Rogers, 2003, p. 172. Copyright 2003 by Free Press.

Innovations tend to diffuse at a slow rate and at different times among members of a social system. Innovativeness is the criterion for adopter classification. Rogers (2003) classified adopters of innovation into five categories: innovators, early adopters, early majority, late majority, and laggards. Innovators are venturous and eager to experience new ideas. Early adopters tend to be leaders or role models who endorse new ideas by adopting it and decreasing uncertainty surrounding the product. The early majorities are not leaders in their community but have good relationships with their peers. These networks are important because early majority adopters are deliberate about their decision to adopt an innovation. The late majority wait until others have adopted the innovation due to their skepticism. Peer pressure and economic necessity may lead them to adopt the product. Laggards are the most skeptical members of a social system and want to make sure an innovation works before adopting it. They tend to look at past generations for answers, and by the time they adopt an innovation, it may be obsolete.

In the diffusion of innovation curve below (Figure 4), the black line represents the group percentage for adoption of new technology. The gray line is the market share.

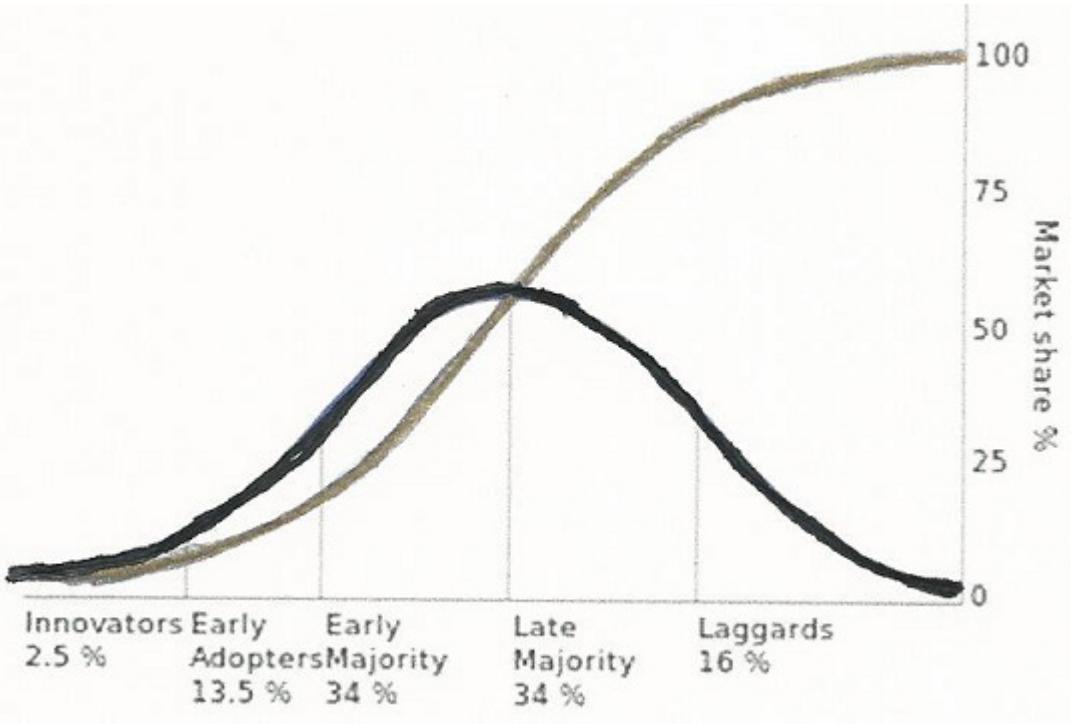

Figure 4. Diffusion of innovations curve. Adapted from "Diffusion of Innovations, 5th Edition," by E. M. Rogers, 2003, p. 22. Copyright 2003 by Free Press.

Two dimensional digital mammography is an important imaging tool that has been used for decades to detect breast abnormalities. Despite its importance, two dimensional mammography limits the breast view to a flat fixed image. New technology has advanced imaging to three dimensional mammography for breast cancer screening and diagnosis. In several studies conducted using digital breast tomosynthesis, the imaging device has shown improvement in the accuracy of breast cancer detection and diagnosis (Reynolds, 2013; Shah, Ng, & Shaw de Paredes, 2014). Many research studies outlining the benefits of tomosynthesis guided my project of promoting and communicating this breast screening and diagnostic tool to the Louisville community. Rogers (2003) expressed that a change agent is needed to advocate and spread the word for adoption of innovations to benefit the surrounding community. This project will help me be the change agent for the adoption of tomosynthesis in my community.

U. S. Food and Drug Administration (FDA) Approval

The FDA approved the first digital breast tomosynthesis system in the United States in February 2011 for use in breast cancer screening and diagnosis. The FDA approved Hologic Inc.'s Selenia Dimensions 3-D system based on two studies that recorded gains in specificity, improved lesion and margin visibility, and an increased ability to localize structures in the breast accurately (Reynolds, 2013). Radiologists evaluated the use of two dimensional and three dimensional x-ray imaging compared with conventional two dimensional screening mammography. The results revealed radiologists improved their ability to differentiate between noncancerous and cancerous cases by 7% using the three dimensional images compared with the two dimensional screening mammography. Using a combination of two and three dimensional imaging revealed improvements in recall rates, decreasing the rates by 40%. Recall is the reassessment of women who received questionable breast results from a mammogram (Reynolds, 2013).

Developments in Breast Imaging Technology

Before advances in technology exploring other parts of the body, techniques have been pioneered in the latest advances in breast screening technology. The breast is conveniently accessible for intervention and imaging and breast disease is extensive. Technological advances in breast screening have included breast CT, elastography, MRI, breast PET, 3D sonography, digital mammography, computer assisted detection and diagnosis, tomosynthesis, and stereotactic biopsy (Dershaw, 2013). The path for the development of tomosynthesis was blazed by digital mammography. Tomosynthesis removes overlying breast density to reveal cancers that may not be detected by other screening methods. Tomosynthesis' screening and diagnosis

benefits are uncertain due to small trials being conducted. Research studies including sizable populations of women need to be conducted and published to realize the major benefits of tomosynthesis (Dershaw, 2013).

Disparities in Screening Mammography Services

African-American women presently have similar mammography use as White women, yet African-American women continue to be diagnosed with breast cancer at a later stage. Rauscher, Allgood, Whitman, and Conant (2012) believe African-American women's late stage diagnosis is at least partly responsible for their increased breast cancer mortality rates compared to Whites.

In Chicago, Illinois, as well as in Louisville, Kentucky, the racial disparity in breast cancer mortality is wide among African-American women (Chicago 43.2/100,000; Louisville 30.9/100,000) compared to White women (Chicago 21.8/100,000; Louisville 20.2/100,00) and continues to increase (Nesbitt, 2014; Rauscher et al., 2012). African-American women have not benefited from technologic advancements made in breast imaging, diagnosis, and treatment as much as White women (Rauscher et al., 2012). Risk factors that may contribute to the disparity are differences in mammography effectiveness to detect early breast cancer, radiologists' level of mammogram interpretation, advantages of an academic medical center, and quality of imaging (Rauscher et al., 2012).

Rauscher et al. (2012) concluded that private academic medical settings tend to have more advanced mammography technology and radiologist specialists. White women were more likely than African-American women to have their mammograms performed at academic centers. African-American women were less likely to visit academic medical centers, more likely to

patronize facilities that had general radiologist, and these facilities were less likely to have digital mammography. In Chicago, Rauscher's et al. (2012) research suggested that African-American women's access to quality mammogram screening was not the same as White women. This disparity in access to quality mammography care may be the difference in breast cancer mortality rates.

Digital Breast Tomosynthesis (DBT)

Digital breast tomosynthesis (DBT) is a technique where images of the compressed breast are taken from multiple angles creating three dimensional digital mammographic images. The individual images are reconstructed into a series of thin, high-resolution slices to create a three dimensional image of the breast (Bolan, 2011; Reynolds, 2013). The slices can be displayed in a cine mode or viewed one at a time. To allow anatomical structures to be seen in depth, DBT slices are taken at different angles. The system uses an x-ray tube that moves around the breast in an arc capturing approximately 11 images in seven seconds (Reynolds, 2013). Tomosynthesis reduces or eliminates problems of tissue overlap improving cancer detection, enabling better classification of cancer cases, and reducing recall rates (Bolan, 2011). Figure 5 displays a comparison of a 2-D conventional mammography image and a 3-D digital breast tomosynthesis image.

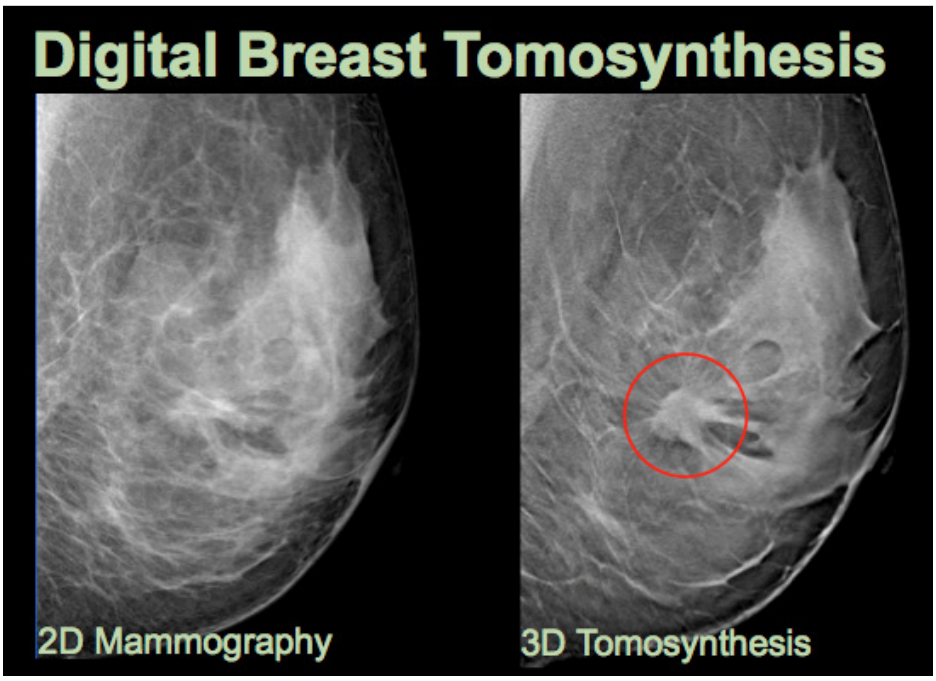

Figure 5. Digital breast tomosynthesis showing a 2-D mammography image compared to a 3-D tomosynthesis image.

Breast tomosynthesis as a triage to assessment in screening. Providers are still evaluating the role of three dimensional breast tomosynthesis as a screening tool. Early studies of breast tomosynthesis have suggested improvement in specificity (Barton, 2013; Reynolds, 2013; Sechopoulos, 2013). A burden for many women is receiving a false-positive result from a mammogram resulting in a recall visit. False-positives may lead to unnecessary recalls and cost. Bernardi et al. (2012) explored integrating three dimensional mammography as a triage to assess recalls. They found tomosynthesis reduced recall rates while eliminating false-negatives suggesting mammography triage using three dimensional tomosynthesis might improve screening specificity. Bernardi et al. (2012) stated that further research is needed to determine if three dimensional breast tomosynthesis is a potential replacement for two dimensional mammography.

Digital breast tomosynthesis as tool to improve breast cancer detection rates. Breast tissue can conceal cancer or make normal tissue appear abnormal limiting the detection ability of standard two dimensional mammography. DBT technology reconstructs a three dimensional pseudo image of the breast using radiographs. Daniel Kopans, MD, invented DBT. Dr. Kopans compares standard film screen and digital mammography to a book with clear pages. He explained when you hold a book up to the light seeing all the words; they are overlapped making them hard to read. DBT allows a radiologist to look at each page individually (Barton, 2013). A population-based breast cancer screening study, the Screening with Tomosynthesis OR standard Mammography (STORM), was conducted from August 2011 to June 2012 consisting of 7,292 women from Trento and Verona, Italy (Barton, 2013). The study compared standard digital two dimensional mammography with integrated digital two dimensional and DBT with three dimensional images. A radiologist interpreted the screening test first looking at the two dimensional image and issuing a report, then reviewed the two dimensional and three dimensional integrated images and issued another report. The radiologist had to make a decision on whether to recall a patient or not after reading the tests. With the integrated reading, cancer was detected significantly more often with 5.3/1000 found with two dimensional screens compared to 8.1/1000 with integrated two dimensional and three dimensional screens representing a 33.9% increase in cancer detection with fewer false-positive readings (Barton, 2013). Women with low and high density breast tissue had similar increases in detection rates. Dr. Kopans has stated “mammography has been shown in randomized, controlled trials to reduce the death rate from breast cancer. Digital breast tomosynthesis is a better mammogram. It simply makes sense to find more cancers early while decreasing the recall rate” (Barton, 2013, p. 292).

The effects of breast density on mammography. An independent risk factor for breast cancer is breast density. Women with high breast density have a greater risk of breast cancer than women with low density breast. Women with high breast density have a risk factor 4 to 6 times higher of getting breast cancer (Tagliafico et al., 2012). Tagliafico et al. (2012) used DBT and full-field digital mammography (FFDM) with fully automated software to assess breast density in the same women. Three trained technologists administered DBT using the Hologic Selenia Dimensions System with filters that produced excellent x-ray spectra based on breast composition, thickness, and imaging modes. The assessment revealed breast density evaluated by DBT was lower than the evaluation by FFDM. Tagliafico et al. (2012) results were different than previously published studies where DBT was significantly greater in assessing breast density than digital mammography. The difference could have been due to breast compression, positioning, dose of radiation, or not using automatic assessment software. Tagliafico et al. (2012) determined that a potential advantage of DBT is the entire breast volume is considered when assessing breast density.

Calcification breast clarity with digital breast tomosynthesis. Mammography is essentially a screening test used to seek changes in the breast that might indicate cancer. Several studies have shown that DBT can improve the conspicuousness of lesions and improve the distinction of malignant from benign lesions. Kopans, Gavenonis, Halpern, and Moore (2011) tested whether identified calcifications are better seen with DBT or conventional mammography. They examined the cases of 3,000 women comparing the clarity of conventional mammography to digital breast mammography. Two trained radiologists with 5 to 35 years' experience found in 92% of the cases DBT was equal to or better than conventional mammography in evaluating

calcification. In almost half of the cases, the clarity on DBT was judged to be better than for conventional mammography. Calcifications are tiny deposits of calcium within the breast tissue (Kopans et al., 2011). Clarity is the contrast, sharpness, and diagnostic quality of calcifications as seen against the breast background (Kopans et al., 2011).

Accuracy of tumor measurement with breast tomosynthesis. As a prognostic index and in preoperative planning, it is important to predict the accurate size of an invasive breast cancer. To be able to use noninvasive technology accurately to determine maximum tumor size is crucial. Imaging technology commonly used to measure preoperative tumor size is mammography and ultrasonography. Ultrasonography has been known to underestimate tumor size in women with dense breasts (Fornvik et al., 2010). Using standard imaging techniques can create problems with underlying and overlying breast tissue that may obscure the tumor outline, the inability to capture the tumor growth patterns, the tumor extent may be influenced by the compression of the breast, and the distance between the detector and the tumor may cause variations (Fornvik et al., 2010). When imaging with 2D mammography, two important reasons that tumors are difficult to outline or not seen are due to anatomical noise or dense breast and the growth pattern of the tumor. Breast tomosynthesis impacts several of the major problems by reducing the obscuring effect of underlying and overlying breast tissues, anatomical noise, and growth pattern. In a patient population of 62 women with 73 malignant breast tumors, breast tomosynthesis detected more cases of invasive lobular cancers and accurately measured the tumor size than digital mammography. Breast tomosynthesis is an essential technology to detect breast cancer for preoperative planning (Fornvik et al., 2010).

Digital breast tomosynthesis in clinical settings. In a clinical study conducted by Gennaro et al. (2010), they compared the clinical performance of FFDM with DBT. The study enrolled 200 women who had at least one breast lesion that was discovered by ultrasound or mammography. Grassa et al. (2010) classified the identified lesions as suspicious, doubtful, or malignant. For imaging, all participants encountered standard digital mammography in two views, craniocaudal and mediolateral oblique, and tomosynthesis in one view, mediolateral oblique, in both breasts. The radiation dose for tomosynthesis was similar to the dose for standard digital mammography. Six radiologists with 5 to 30 years' experience in breast imaging performed mammography readings. To instill confidence and set standards of evaluation in reading DBT images, the radiologists underwent training. Each participant's breast was counted singularly with 24 breasts being excluded for technical reasons and scarring from previous surgery, resulting in 376 breasts included in the dataset, of which 63 were cancerous, 177 had benign lesions, and 136 had no lesions. FFDM in two views and DBT in one view were not significantly different. This finding is positive for women due to reductions in imaging views, breast compression, and radiation dose using DBT. The researchers concluded that the clinical performance of DBT is not inferior to standard digital mammography. Gennaro et al. (2010) stated "non-inferiority demonstration is the first step in accepting a new technique, but superior clinical performance or a reduced dose would be necessary to ground the expected benefits of breast tomosynthesis compared with digital mammography" (p. 1551).

Research is limited, and guidelines lacking on using tomosynthesis in daily clinical practice. Teertstra et al. (2010) assessed the value of tomosynthesis in women with clinical symptoms, abnormal screening mammograms, or referred by a hospital for a second opinion.

Five hundred thirteen women were screened using both tomosynthesis and mammography. The sample included 134 women with microcalcifications or breast density, 227 women that had pain, an obvious mass, or other clinical symptoms, and 152 women referred for a second opinion. Using the equipment by Hologic with a high-resolution detector, two dedicated trained technologists conducted breast tomosynthesis screenings. Seven breast radiologists with 6 to 24 years of experience viewed the screening results. With breast tomosynthesis, masses were inherently more visible than with standard mammography. Teertstra et al. (2010) recommended that tomosynthesis be used as an additional technique to standard mammography in women with clinical symptoms or abnormal mammogram screenings. Teertstra et al. (2010) concluded the role of breast tomosynthesis has not yet been established in clinical settings.

Skaane et al. (2012) acknowledged DBT as a promising new technology that needs evaluation in clinical and screening settings. It is not clear whether DBT will be implemented in mammography screening or diagnostic imaging or in both settings. Skaane et al. (2012) expressed several conditions must be met for DBT to improve cancer detection rates. First, the cancer conspicuity must be higher for malignancies identifiable on imaging techniques and tomosynthesis must detect overlooked or missed cancers on standard FFDM. The Skaane et al. (2012) study included 129 women with three conditions. Due to suspicious mammogram findings, 54 women were recalled for having an obvious lump, 30 women were referred to the study, and 45 women from previous surgery were included for follow-up. Three radiologists trained in the evaluation and use of tomosynthesis read the screening images. Preliminary results from the Skaane et al. (2012) study indicated that DBT satisfied the main expectations for implementation in mammography screening. In the mammography screening field DBT can

detect a higher rate of malignant cancers, detect cancers overlooked or missed by FFDM, perform superior in measurement of breast cancer size, eliminate or reduce overlapping breast tissue, reduce the number of false-positive mammogram findings, and reduce recall rates.

Anthem Health Plan Medical Policy

In talking with Dr. Divya Cantor (personal communication, April 1, 2014), Anthem's Kentucky Medical Director, she forwarded me Anthem's Policy (# RAD.00060) on DBT. Anthem's position is that DBT is considered investigational and not medically necessary. At this present time, DBT is not covered under their insurance plans. Anthem's rationale for not covering this procedure is a lack of comparative data demonstrating that DBT is better than or equal to other breast imaging technology with regards to accuracy, specificity, sensitivity, and recall rates. Published studies also have not given clear direction if DBT should be used for screening, diagnostic, or surveillance purposes. It is unclear if DBT should be used in conjunction with or in lieu of other imaging technologies. Other concerns that Anthem has are the level of radiation exposure and the learning curve for radiologists to accurately interpret the DBT results.

Humana, Inc. Health Plan

Through email correspondence with Cindy Hobbs (personal communication, April 1, 2014), Humana Kentucky Market Resource Nurse, she provided me with their Breast Imaging Medical Coverage Policy (# CLPD-0374-006). She stated at this point Humana does not cover DBT. They are continuing to watch research and look at statements from professional organizations like the American Cancer Society and others. Humana's rationale for not covering DBT is that the technology is considered investigational and for the proposed uses reported in

nationally recognized peer-reviewed medical literature, DBT is not identified as widely used and accepted.

Implementation

The next step after completing my project is to schedule a meeting with local cancer organizations, such as the James Graham Brown Cancer Center, the Norton Cancer Institute, and the Louisville Chapter of the Susan G. Komen for the Cure to present my case for the use of DBT. If I can get these organizations to collaborate with me, then we could advocate the health plans to consider covering the procedure under their medical policy.

I would implement my project by asking the health plans to consider coverage of DBT for their fully insured clients and I would talk to local employers who are self-insured. Many self-insured employers in Louisville use Anthem and Humana as their Third Party Administrator (TPA). If employers would be willing to pay for this service, they can make it part of their benefit package that they negotiate with the health plans. There are several employer coalitions in Louisville where I can present to multiple employers at one setting.

Potential Resources and Existing Supports

As the Director of the UAW-Ford Community Healthcare Initiative, I have access to many resources to implement my project. I have a personal relationship with the Kentucky Medical Directors at Anthem and Humana health plans. Knowing the President of Humana Kentucky and my involvement with many health-related organizations will provide me the support to advance DBT. As the Executive Director of the Kentuckiana Health Collaborative, I have existing support from employers, unions, health systems, health plans, the medical society,

academia, state and local public health departments, federally qualified health centers, and other nonprofit organizations.

Potential Barriers

Potential barriers to the implementation of DBT in Louisville are the following:

- The newness of the technology,
- The lack of large clinical research studies to validate the role of digital breast tomosynthesis,
- Training technicians on how to administer the new technology,
- Training radiologist how to read and interpret the results,
- The cost of the procedure since insurance is not covering the expense,
- The investment cost for imaging centers to purchase the equipment, and
- Cost of storing 3D image records.

The potential solutions to these barriers are the University of Louisville or the Louisville Susan G. Komen for the Cure organization conducting local research. Local research demonstrating improvement over standard 2D mammography and impacting the high breast cancer mortality rates in Louisville, especially among African-American women, would speak volumes for advancing the technology.

Proposal for Implementation and Timetable

I would like to see Louisville implement DBT in the 10 federally qualified health centers and also at one of the major health systems, most likely the University of Louisville Hospital since it is a teaching facility. The timetable for implementation of this project is:

September 2014	meet with health-related organizations and employers for collaborations on advancing DBT
November 2014	collaborative members meet with health plans for coverage of the procedure and payment plans
January 2015	changes in policy for coverage of the procedure by health plans
February 2015	begin talks with federally qualified health centers and UL Hospital to pilot DBT at their locations
June 2015	health-related organization purchase DBT equipment
July 2015	train technicians how to properly administer the examination and train radiologist how to read and interpret the results
September 2015	start administering DBT at local health centers and UL Hospital

Roles and Responsibilities of Student and Others

My roles and responsibilities are convening organizations to help me advocate the technology of DBT, scheduling meetings with the health plans concerning medical coverage of the procedure, locating facilities willing to invest in the technology and conduct pilots, and overseeing the timetable to keep everyone on track. The roles and responsibilities of others are to support the project implementation process, purchase the DBT equipment, conduct the training of technicians and radiologists on DBT, keep accurate research data, and display the results.

Project Evaluation

I will know what worked and did not work in my project by reviewing the timetable to verify that tasks were or were not implemented successfully, by reviewing the data generated

from DBT for imaging results, and by comparing the results with previous data from patients to establish improvements, declines, or no change compared to other technology.

I will let the data determine the next steps to be taken for continued evaluation of the project. For the evaluation design and approach, I will conduct an outcomes-based evaluation of my project. An outcomes-based evaluation is a systematic way to assess the extent to which the program has achieved its intended results. This evaluation focuses on what individuals do to make things happen for their target population (McNeil, 2011).

The justification for using this type of evaluation is to clarify the outcomes of the project. By outlining tasks that need to be done and assigning someone to complete the task will keep all parties involved in the project focused on the goals. An outcomes-based evaluation will stimulate discussion of the issue of getting the new technology of DBT into mainstream screening and diagnosis services. This evaluation method will help keep the implementation on track, identify when objectives are met, and alert me if changes need to be made to the project. An outcomes-based evaluation will provide empirical evidence that what I intended to accomplish I am doing. This method will identify if my project is effective and gauge accountability (McNeil, 2011).

Displayed in Table 14 are the outcomes and performance measures utilized as indicators for the outcomes-based evaluation.

Table 14

Outcomes and Performance Evaluation Measures

Outcomes	**Performance Measures**
The number of health-related organizations that will advance DBT.	To have at least one health system, one health plan, one federally qualified health center to collaborate on the project by September 2014.
The number of employers that will advance	To have agreements from five employers in

DBT by adding to their benefit plan.	Louisville to change their benefit plan by December 2014.
The number of health plans that will have DBT covered under their plans.	Get Anthem, Humana, and one managed care organization to provide coverage by November 2014.
Train technologists and radiologists on how to administer and interpret DBT imaging.	Have five technicians and five radiologists trained by December 2014.
Have a pilot in Louisville using DBT.	Have a pilot up and running by January 2015 in three locations in Louisville.
Collect data on the performance of DBT.	Record the number of lesions and benign masses detected, record the number of false-positives, and recalls.
The performance of DBT data to standard mammography data.	Compare the performance of DBT to standard mammography for quality improvement.

The overall evaluation goals measure what has changed in the lives of women, families, and the community, as a result of this project. The evaluation process will measure the breast cancer disparity gap between White and African-American women to determine if the project has impacted the breast cancer mortality rates in Louisville. The key stakeholders in Louisville are the three health systems, the two major health plans, the managed care organizations, the federally qualified health centers, and local employers.

Implications Including Social Change

Local Community

The educational brochure promoting the need for preventive breast screening and outlining the benefits of DBT will be made available in key locations throughout Louisville to address the needs of learners in the local community. This information will be important to physicians, women, families, and community partners to impact the breast cancer rates in

Louisville. Educating local physicians about DBT is essential so they will be knowledgeable when their patients or patients referred to their practice inquire about DBT potential benefits. One of the benefits of DBT is cancer detection accuracy. Oncologists and physicians who treat high-risk, post-radiation, and post-surgical patients could find DBT inviting to help improve the lives of women they encounter (McGarry & Brand, 2013).

The implication for social change is that DBT has the potential to transform detection of breast cancer and impact the breast imaging industry (McGarry & Brand, 2013). DBT could detect more cancers and masses at an earlier stage and reduce the number of false-positive results that cause recall examinations. These improvements could reduce women's stress and agony over a questionable exam and reduce the exposure to additional radiation. The improvements may lead to an increase in the number of women seeking to be screened for breast cancer when the benefits of DBT are widely recognized.

Knowledge of available breast screening procedures will be necessary when the number of women seeking preventive breast screenings increases. Providing education to these women will impact their attitude and behavior. The benefits of DBT could lead to changes in women's attitude about preventive screening and the accuracy of the test. A positive change in health behavior could lead to a healthier population reducing the burden of cancer in the community. The entire population reaps the benefits when the status of chronic disease is impacted.

DBT could benefit local employers by creating a healthier workforce, reduction in lost time cases, and a reduction in healthcare cost. Employers have the power to shape the local landscape to accept DBT technology by negotiating with health plans to pay this new procedure.

Far-Reaching

DBT could be important to the nation to impact breast cancer incidence rates, survival rates, and mortality rates. Breast cancer is still the second leading cause of cancer deaths among women in this country. DeSantis et al. (2013) estimated there would be 232,340 new cases of invasive breast cancer and 39,620 deaths from breast cancer in 2013. DeSantis et al. (2013) stated in women's lifetime 1 in 8 will develop breast cancer. Adoption of DBTcould reduce some of these numbers associated with women living throughout the United States.

Conclusion

To impact breast cancer in Louisville and the nation, alternative methods must be introduced. The introduction of new technology in the field of mammography is a promising alternative to traditional mammography. The technology of DBT has shown improvement in detecting breast cancer in early stages. Traditional mammography takes a two dimensional image of the breast limiting the view to a fixed flat image. DBT takes multiple images of the breast using three dimensional images that increase visibility of the breast tissue. The three dimensional aspect of DBT alleviates overlapping of breast tissue resulting in the detection of lesions and masses at an earlier stage. Prompt diagnosis and treatment is crucial to improve breast cancer outcomes. Using DBT in clinical settings has the potential to increase the detection of breast cancer, reduce false-positive readings, thus reducing recall rates. More large-scale clinical trials need to be conducted to strengthen the case for the use of DBT.

In the next section, I will reflect on my project's strengths, limitations, and self-analysis of my role throughout the development of my project.

Section 4: Reflections and Conclusions

Introduction

Breast cancer is a serious disease for women across this country and especially for African-American women in Louisville, Kentucky. The disease is affecting the lives of these women at a higher rate than any other ethnic group in the Louisville Metro area. Although mammography screening rates are similar between White women and African-American women in Louisville, breast cancer mortality rates for Whites have declined while rates for African-American women have increased. These facts and my research led me to promote advancements in mammography screening innovations that could detect breast cancer earlier and with more accuracy than standard mammography.

In order to address the breast cancer disparity gap among women in Louisville, I was compelled to examine alternative breast cancer screening techniques. In reviewing many scholarly articles, reading newspaper editorials, and listening to television news broadcast, I became aware of the latest innovation in breast cancer screening and diagnosis. In 2011, DBT was approved for use in the United States. Because of the newness of DBT many health insurance companies are not covering the expense of the examination. The technology is provided in limited locations due to the cost investment that providers must incur to purchase the new breast screening equipment. The Women's Diagnostic Center in Louisville, Kentucky is the first and only breast center to offer 3D DBT in the metro area.

I am promoting the use of DBT as a powerful screening tool in the fight against breast cancer. My policy recommendation is for all major health insurance companies to cover the expense of this new test, for government legislators to provide funding to cover the expense for

low-income women, to give women a choice in their breast care, and to encourage breast centers in Louisville to invest in tomosynthesis technology.

Project Strengths

The strengths of my project of promoting DBT to address mammography screening techniques to combat breast cancer rates in Louisville are as follows:

- The need for innovations to increase the survival rate of African American women in Louisville with breast cancer;
- DBT has shown in research studies published in academic journals the ability to find tiny cancers when they are still treatable;
- The 3D technology allows physicians to see the entire breast;
- A local breast center in Louisville provides the technology; and
- The educational brochure attached with my project will bring awareness of DBT and options women have for breast screening.

Project Limitations

The limitations of my project in addressing the problem of mammography screening in African-American women in Louisville are as follows:

- The cost of breast centers purchasing a DBT machine is enormous, and some centers may choose to not offer this technology;
- DBT does not have a CPT code; therefore, health insurance companies are not covering or reimbursing for this screening test;
- Health insurance companies are waiting on additional clinical studies before endorsing and covering DBT;

- Women have to pay extra, out of their pockets, above the expense for a standard mammography test if they choose the tomosynthesis test. The expense in scholarly articles has shown a range from $70 - $100;
- Low-income women will not be able to afford the extra expense to have a DBT test;
- Radiologists and technicians training will be necessary on the new equipment to ensure accurate results; and
- The awareness of DBT might not reach women in a timely manner.

Recommendations for Remediation of Limitations

The recommendations I can make for the remediation of the limitations is to take the fight for the advancement of DBT to Frankfort, Kentucky where our legislators create policy. I would ask that funds be incorporated in the state budget in order for women to receive the latest in breast cancer detection testing. The legislators in Frankfort have included for the last two sessions $1,000,000 funding for the state's colon cancer screening program (Shepherd, 2014). Matching funds by a private foundation increased the total to $2,000,000 providing thousands of screenings to low-income, uninsured Kentuckians. Furthermore, the First Lady of Kentucky, Jane Beshear, sponsors a statewide initiative entitled "Horses and Hope" to educate, improve awareness, and offer free breast screenings for the members of Kentucky's horse industry. This program could be expanded to reach all women or another initiative started to cover all women in Kentucky using both standard and 3D mammography. The University of Louisville Hospital is an academic teaching hospital that cares for our indigent population. Medical cost from this

debilitating disease is enormous. Private foundations should invest in the hospital by offering grants to purchase the latest technology in breast cancer detection.

I could have addressed the problem differently by creating a training curriculum and materials to focus on breast cancer screening awareness and action plan instead of promoting a policy recommendation where I took a position on DBT. Alternatively, I could have performed an evaluation report of a breast center, mobile mammography unit, or hospital on the effectiveness of their breast screening program.

The alternative to the policy recommendation paper to address the problem of breast cancer is a training curriculum. I could outline to my audience the various mammography screening tests and when each test is appropriate to use. Included in the curriculum would be certified clinical workers to demonstrate breast self-examinations so women get to know their bodies and can detect when there has been a change in their breasts. The training curriculum would assist women with where to go to get a mammogram, identify available programs that will help them pay for the screening, and address other barriers that may hinder them from getting a breast screen. I would teach women what discussions they need to have with their physicians and provide them the knowledge to ask the right questions. The training curriculum would include resource information for women battling cancer. If I had conducted an evaluation study, I could have followed a mobile breast screening unit and evaluated if the mobile unit is as effective as going to a stationary breast center. Many mobile units are scheduled at health fairs, low-income housing units, shopping centers, and places of employment. I could have evaluated if women patronizing these mobile units are getting the same level of service as they would get at a brick and mortar facility.

Scholarship

I learned from my project study that there are various breast cancer screening and diagnostic tests available to detect and treat breast cancer. Each of the screening tests performs different functions depending on the circumstances surrounding a woman's breast problems. By reading an abundance of scholarly articles and health plan position papers, I learned it takes time for the medical community to adopt new technology. In order to accept new technology, many health providers follow research studies to assess the clinical outcomes. Within the next 10 years, some researchers believe DBT will take the place of standard mammography. The question is how many women could have been saved or received better treatment with the immediate embracement of DBT. Something I learned after selecting this topic is that everywhere I turned, from the television news, newspapers, editorials, and scholarly articles, DBT is an emerging technology that is taking center stage in the fight against breast cancer.

Project Development and Evaluation

What I learned about project development is the need to have a well-designed plan or roadmap to guide the project. I had to keep in mind the key stakeholders, those affected by both the project and the project's result, when developing my policy recommendation. As an African-American woman, having a sister who is a 19-year breast cancer survivor, I had to embark upon a project that I believe will make a difference in women's lives. Thinking about African-American women suffering and dying at a disproportionate rate from breast cancer convicted me to research this problem. As stakeholders, I believe physicians champion my cause and will invest in technology that could improve the lives of their patients, and health plans will get onboard when they see the value of the expense. It was important to the plan to outline the roles

and responsibilities of setting milestones to get approval for the aspects of the plan with a designated timeline. It is easy to lose focus on a project and make it too broad. Therefore, I defined the scope of my project to entirely focus and promote one method of breast cancer screening. In the development of this project, I had to consider the cost. I propose equipment that could cost breast centers approximately $500,000 to $1,000,000. The cost to me would be time and effort advocating change that has the potential to save lives. In order for the project to be successful, developing a communication plan to bring awareness of the project was important.

What I learned about project evaluation is throughout the process, I had to be aware and analyze the aspects and risks of the proposed policy recommendation ensuring the policy is one that would be used by key stakeholders. I had to evaluate the content and recommendations from researchers conducting studies on the relevance of DBT. Lastly, I had to analyze the risks and probabilities of the acceptance or nonacceptance of the proposed recommendation and assess the impact to the outcome of this project.

Leadership and Change

What I learned about leadership and change is that one person can make a difference, but one cannot embark on the journey alone. Leadership is not being out front and having other people follow behind me. Leadership is using the resources available to me to engage other people in a common goal, to fight breast cancer, which will impact and improve the lives of women in my community. Part of my role as a leader was to outline the objectives of my project and create a roadmap to achieving the objectives. Also, it is my responsibility to empower people to where we want to go and how we will get there. I just completed a leadership program called Leadership Southern Indiana that opened my understanding of the role of a good leader. I know

now that leadership is about being a servant, giving back of my talents, time, and money, to help improve the community where I live and work. It only takes one person to evoke change, and I must be the change that I want to see in my community. Change can be contagious and at times very slow. I must not become weary or tired of doing the right thing to help so many women affected by breast cancer. As a woman, I have the same risk as other women when it comes to breast cancer so I cannot take a back seat and think that it is not my problem. In one way or another, breast cancer may touch all of our lives through our mothers, grandmothers, sisters, aunts, cousins, coworkers, and friends.

Analysis of Self as Scholar

What I learned about myself as a scholar is I am driven to perform at the highest level possible. I tackled assignments with a focus and plan and had to learn how to take a break every once in a while to stay balanced with my work and home life. I did not always succeed in balancing my studies and home life causing major breakdowns. I would not trade anything for the experiences I have had during this educational journey. As a scholar, I worked hard reading books and articles, completing assignments, communicating, learning, and interacting with my fellow Walden scholars and professors, and learned how to effectively collect and analyze data.

Analysis of Self as Practitioner

What I learned about myself as a practitioner when I undertook the cause of breast cancer is this disease is tied to the quality metrics I measure at work. Collaborating with my partners, my research project can have an immediate impact on women's lives. During monthly collaborative meetings, I have been able to share my work and findings with members of the health community, nonprofit agencies, and employers. The Kentuckiana Health Collaborative is

leading a Louisville Community Healthcare Transformation Plan where we are bringing all healthcare stakeholders together to create a plan for healthcare delivery redesign, aligned incentives, data sharing, payment reform, advanced primary care utilization, and consumer and population health engagement. My project and insight will help shape the preventive screenings section of this plan. When I started this project, I had no idea that I would be using it within my career. I thought I would be using my knowledge and skills as an advocate on my own time after work hours.

Analysis of Self as Project Developer

What I learned about myself as a project developer is I had to stay focused in order to move the project forward to a satisfactory outcome. When discussing the project with coworkers, they tended to give me advice on other avenues to explore for my project. I learned I had to listen to their suggestions and then explain the objectives of my project. In order to reach project implementation, I had to handle tasks that focused on me moving the project towards its intended purpose. This entailed tasks of talking with healthcare providers at each of the major health plans about their position on DBT. I had to find out whom in Louisville and the surrounding areas were pioneering the new tomosynthesis technology to make sure the technology was available and accessible in my community. There would be no need to promote technology and educate women about tomosynthesis if it were not available for them to access. I learned as the project developer that I was the person responsible for getting project tasks completed.

The Project's Potential Impact on Social Change

As I reflect on the overall importance of my project work, I am humbled by the potential impact that it can have on the lives of all women in the Louisville Metro area. The early reports

on DBT have shown the detection of cancers missed by two dimensional machines or not felt by women performing self-breast exams. The advancement of DBT as a screening and diagnostic tool is inspiring. The reports are encouraging to me because research on African-American women has shown mammography screening results in detecting breast cancer when it is in Stage 3 or 4 and is harder to treat, thus making their 5-year survival rate lower than other ethnic groups. My work is imperative for women with dense breast tissue. Approximately 75% of women in their 40s have dense breasts, which put them at higher risk for developing breast cancer. Breast density decreases with age; however 50% of women in their 60s still have dense breast tissue. Because it is more difficult to detect cancer in dense tissue, DBT sensitivity has shown the ability to spot cancer in dense breast not possible with standard mammography. This technology can spare these women unnecessary callbacks and follow-up testing. With same day tomosynthesis results, radiologists avoid delays in setting up an action plan to care for patients.

I learned that going from a two dimensional image to a three dimensional image enhanced the visualization possibilities for radiologists, providing them with specific breast details to benefit the quality of care they can give their patients. I was amazed to learn about overlapping breast tissue caused by pockets of dense tissue surrounded by fat in the breast that contributed to abnormal test results. I personally have had to go back several times for additional testing due to errors seen on mammography screening. At one point, they put me on a 3-month plan for a year where they were watching tiny granular deposits in my breast the size of salt particles. This episode included an ultrasound test as well. It turned out to be nothing serious and now I am back to my yearly mammogram.

The project's potential impact on social change at the local level and beyond is a healthier city and nation with a more productive workforce and reduced healthcare utilization and cost. With the ability of DBT to find tiny cancers, this technology is a game changer in the early detection of breast cancer giving radiologists a clearer more detailed image to distinguish accurately between cancer masses, calcifications, and abnormalities. These abilities reduce false-positive results. The impact on social change is the reduction of stress and anxiety experienced by women who had to wait weeks to repeat screening test. With DBT, the radiologist can get clearer images and can review the results while the patient is still in their office. When the scan reveals an abnormality, the radiologist can better characterize the type distinguishing between a benign mass and potential cancer. The radiologist can accurately determine where in the breast the abnormality is located using DBT that simplifies testing and treatment. Employing simplicity in the testing and treatment of breast cancer lowers healthcare costs. By lowering out-of-pocket costs for women, eliminating the need for extensive surgery, or chemotherapy, will result in more positive outcomes.

The educational brochure can impact social change on the local scene by empowering women with knowledge to take control of their breast health. By knowing what questions, mammography screening options, and treatments of breast cancer available to them, women will be able to have a deeper discussion with their health care provider. This knowledge could be the difference between living a quality life for yourself and your family versus a life filled with pain and suffering. The Centers for Disease Control and Prevention (CDC, 2012) has reported that the mammography rate is now the same among White and African-American women. What remains different is the process following the mammogram. According to the CDC, African-American

women experience significant delays in diagnosis and treatment even when they have similar insurance coverage as Whites. The CDC noted that 20% of African-American women with an abnormal mammogram wait more than 60 days for a diagnosis, compared with 12% of White women. Thirty-one percent of African-American women wait 30 days to begin treatment, compared with 18% of White women (CDC, 2012). African-American women tend to develop a more aggressive form of breast cancer, and such delays could cost them their lives. If my project can help eliminate barriers to early diagnosis and quality treatment in African-American women, we can begin to close the breast cancer mortality gap in Louisville. No woman with cancer should experience a delay in treatment that lessens her survival. Women should not die from cancer because of their ethnicity and socioeconomic level. Social change will happen when the health care system treats all women equally.

Implications, Applications, and Directions for Future Research

The implications of my project on future research are following the advancement of DBT as it spreads into clinical settings. Extend research studies with African-American women to examine invasive breast cancers and other abnormalities. Conduct future research that will measure DBT impact on breast cancer mortality rates.

The applications that can be made to the educational field are evidence-based medical results on the performance of DBT. The ability to examine and report potential weaknesses of DBT, and the impact of this new technology on radiologists can advance the field of radiology.

Reflecting on the direction of future research in the area of breast cancer, I would like to focus on examining why African-American women acquire a more aggressive breast cancer than other groups. Also, how environmental and social determinants impact African-American

women's breast health. I would like to explore the relationship between African-American women challenged with breast cancer and their physician.

Conclusion

As an African-American woman with a sister that is a breast cancer survivor, my project study was meaningful on several levels. The disparity gap in breast cancer mortality rates among African-American women in Louisville, Kentucky is alarming. Exploring available mammography screening options led me to DBT. This innovative breast screening and diagnostic tool has shown superior performance in the early detection of breast cancer while simultaneously reducing false-positive results. Locally, DBT technology is only available at the Women's Diagnostic Center in Louisville. Future large-scale research in clinical settings will determine whether major health insurance companies provide a procedural code for payment and reimbursement of this new technology. At present, DBT is used in conjunction with standard mammography or used solo. Within this decade, some researchers believe DBT will replace standard mammography as the main screening tool to detect breast cancer. The technology is promising and has the potential to improve the lives of women affected by breast cancer.

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Appendix A: Ed.D Project Study

Why Digital Breast Tomosynthesis Should be Used as a Screening Tool

Accompanied by an Educational Brochure

Introduction

Breast cancer is the second leading cause of cancer death among women in the United States, as well as in Louisville, Kentucky. Breast cancer is uncontrolled cellular growth occurring in the breast ducts or lobules. Cancer can develop anywhere in the breast. Cancer grows in the cells lining the ducts connecting the lobules to the nipple (Reynolds, 2013). There are many factors that can contribute to the risk of a woman developing breast cancer. The risk factors include age, family history, early menstruation, late menopause, obesity, physical inactivity, excessive alcohol consumption, oral contraceptives, extended use of estrogen and progestin hormones, race or ethnicity, and dense breasts (Reynolds, 2013). The benefit of breast screening is early detection of tumors while they are small and treatable. Cancer caught and treated early improves survival rates. Women should be aware that not all breast cancers can be detected by imaging (Freimanis & Yacobozzi, 2014).

White women normally have higher breast cancer incidence rates than African-American women; however, among African-American women age 45 and younger, the breast cancer incidence rates are higher than White women of this age group. Louisville's breast cancer mortality rates (24.4/100,000) are still higher than the national average (22.6/100,000) where breast cancer mortality rates have declined 34% since 1990. However, all ethnic groups have not benefited in the decline (DeSantis, Ma, Bryan, & Jemal, 2014; Nesbitt, 2014). Racial and ethnic disparities in breast cancer rates in Louisville persist as rates for White women declined 13% while rates for African-American women increased by 17% from 2006 to 2010 (Nesbitt, 2014).

An important imaging tool that has been used to detect breast abnormalities is the two dimensional digital mammogram. Despite its importance two dimensional mammography limits the breast view to a flat fixed image. New technology has advanced imaging to three dimensional mammography for breast cancer screening and diagnosis. In February 2011, the Food and Drug Administration (FDA) approved the Selenia Dimensions System, the first 3-D imaging device for use in the United States. In several studies conducted using digital breast tomosynthesis (DBT), the imaging device has shown improvement in the accuracy of breast cancer detection and diagnosis. DBT has the potential to change the performance of screening and diagnostic mammography.

Opposing Position

Many health plans and professional societies are still watching the results from research studies gauging the effectiveness of DBT. A criticism is that large clinical studies have not been conducted to solidify the role of DBT in breast cancer screening and diagnosis.

The Society of Breast Imaging (SBI) and the American College of Radiology (ACR)

The SBI and ACR issued a statement concerning the tomosynthesis study conducted by Skaane et al. (2013) in Oslo, Norway. Both societies agreed that the results of their study was promising but did not define the role of tomosynthesis in clinical practice. The study reviewed 12,631 screening examinations from a single institution performed on women 50 to 69 years old. The use of DBT with two dimensional mammography showed results of a 40% increase in invasive cancer detection, 15% reduction in false-positive results, and 27% increase in detection of all breast cancers (McGarry & Brand, 2013). Both professional societies questioned the replication of these results in a second screening trial. They expressed that the study did not

provide statistical information about subgroups that could benefit or not from the addition of DBT. The SBI and ACR questioned how DBT would influence the screening accuracy in women with risk factors, women of different ages, and women with breast density. Both societies were concerned about readings by radiologists with various expertise and practices that were not familiar with DBT (ACR, 2013).

National Comprehensive Cancer Networks (NCCN)

The NCCN expressed their concern that there is insufficient evidence to recommend DBT for routine screening or diagnosis even though the results of studies have shown promise. Regarding sensitivity, accuracy, recall rates, and specificity, the NCCN stated that comparative data establishing DBT as equal to or better than another breast imaging technology is lacking. Agreeing with the SBI and ACR, there is controversy about the role of DBT. They questioned if DBT role should be for screening, diagnostic, or surveillance purposes (NCCN, 2013).

The American College of Obstetricians and Gynecologist (ACOG)

When reviewing breast cancer screening, ACOG did not include DBT in their recommended screening methods. ACOG acknowledged that DBT had shown promise in designated clinical circumstances and as a supplement to mammography diagnosis, but would not consider DBT as an alternative to traditional mammography (ACOG, 2011).

Anthem Blue Cross Blue Shield

Anthem's position is that DBT is considered investigational and not medically necessary for all indications. DBT is not a covered procedure under any Anthem policy. Anthem has based their decision on the results of many research studies. While the studies showed DBT as

promising, the researchers expressed additional studies are needed to determine DBT role in the clinical environment (Anthem, 2014).

Humana, Inc.

Humana is closely watching the research being conducted with DBT before endorsing this product. Humana does not cover this screening method under any of their policies. Their position is DBT is considered investigational and not identified as widely used and accepted for use as a screening and diagnostic tool as reported in nationally recognized peer-reviewed medical literature (Humana, 2013).

Acknowledgement of Opposing Views

Mammography is a proven screening examination that has reduced breast cancer mortality (Shan, Ng, & Shaw de Paredes, 2014). Advancements in mammography technology introduced DBT as an aim to improve the sensitivity of mammography for the detection of breast tumors (Teertstra et al., 2010). Despite the concern for the lack of guidelines and the limited research and use of DBT in clinical settings, I believe early results have shown promise in improving screening mammography numbers and will continue to improve numbers as it expands in clinical practice.

My Position Promoting DBT Verses Other Imaging Methods

Although many researchers have expressed reputable concerns about DBT, I still believe my position of promoting this new technology is the best one. Approximately 15 to 30% of breast cancers are undetectable by conventional mammography (Reynolds, 2013). Using DBT for screening and diagnosis can improve the detection and treatment of breast cancer. There are many screening methods used to detect breast cancer. I will address these breasts imaging methods verses DBT.

Conventional Mammography

Conventional mammography has been the gold standard for breast screening and diagnosis of breast cancer. This method uses a two dimensional screen-film imaging technique. Conventional mammography is highly sensitive for detection of calcifications, however the detection of small masses of cancer are compromised by the presence of dense breast tissue (Freimanis & Yacobozzi, 2014). Regular screening can display changes in the breast allowing for the detection of cancer at an early stage. As a diagnostic tool, conventional mammography can evaluate the size of a mass and determine the location. Conventional mammography has several limitations. There is the potential for high rates of false-positive results leading to repeated rescreening. With rescreening women are exposed to additional radiation. Overdiagnosis of cancer detection can lead to treatment of insignificant cancers resulting in possible breast deformity, blood vessel blockage, lymphedema, and chemotherapy toxicity (Reynolds, 2013). Overlapping tissue in two dimensional imaging may limit the specificity (location) and sensitivity (visibility) of lesions (Timberg et al., 2010). These limitations can

affect women emotionally and psychologically, induce anxiety, cause possible medical complications, and additional financial costs (Freimanis & Yacobozzi, 2014).

Digital Mammography

Digital mammography has replaced film mammography in many breast facilities. The introduction of digital mammography has improved imaging, but it still uses a two dimensional projection maintaining the issue of overlapping tissue (Sechopoulos, 2013). Digital mammography's overall diagnostic accuracy is similar to film mammography. However, digital mammography is more accurate in women younger than age 50, women who are premenopausal or perimenopausal, and women with dense breast (Freimanis & Yacobozzi, 2014). An important aspect of digital mammography is its flexibility that can develop imaging to resolve some of the limitations of conventional mammography (Sechopoulos, 2013). Advantages that digital mammography have over conventional film-screen mammography are the ease of data storage and sharing, lower exposure to radiation, improved contrast and magnification, images are available faster, and specificity is better than film-screen mammography (Reynolds, 2013). Patient surveys divulged women have decreased anxiety with digital mammography, perhaps related to its faster results (Reynolds, 2013).

Ultrasonography (Ultrasound)

Ultrasonography uses sound waves to visualize the breast and does not expose women to radiation. Ultrasonography is proficient in imaging dense breast tissue because breast density does not affect ultrasound waves. When evaluating the differences between solid lesions and benign cysts in the breast, ultrasonography has a 98% to 100% accuracy rate for diagnosing fluid-filled benign cysts (Reynolds, 2013). Because ultrasonography is dependent on the operator

performing the screening there may be variability in the quality of the images. Like conventional mammography, the false-positive rate is high in that normal breast tissue can imitate cancer on ultrasounds leading to biopsies that reveal benign results (Freimanis & Yacobozzi, 2014). Ultrasound is not commonly used as a screening mammography but is beneficial as a diagnostic tool. When women have dense breasts and cannot undergo magnetic resonance imaging (MRI), physicians may recommend ultrasonography for screening. Ultrasonography's cost is similar to conventional mammography and less than the cost of an MRI (Freimanis & Yacobozzi, 2014).

Magnetic Resonance Imaging (MRI)

Magnetic resonance imaging is not a stand-alone screening approach for breast cancer. Its use is accessory. Women at greater risk for developing breast cancer benefit from the use of MRI as a screening tool. When lesions are not visible using other screening techniques, MRI may be used. MRI is useful in detecting small lesions missed by mammography, producing higher quality images in women with augmented or dense breast, and aid in treatment and follow-up (Reynolds, 2013). Because breast density is not a problem for MRI, it is highly sensitive to invasive cancer and detects additional invasive breast tumors exceeding the ones found by mammography or ultrasonography (Freimanis & Yacobozzi, 2014). The NCCN outlined that MRI is advantageous in addition to an annual mammogram as following (Reynolds, 2013):

- When a woman or a first degree relative has a BRCA mutation;
- When a family history of breast cancer exist;
- The existence of a history of lobular carcinoma in situ;
- When a woman had radiation treatment to the chest between ages 10 and 30 years; and
- When a woman or a first degree relative has the TP53 or PTEN gene mutations.

Issues with MRI in breast screening are high false-positive rates, the cost of the examination is more expensive than conventional mammography and ultrasonography, and the cost of the equipment (Freimanis & Yacobozzi, 2014; Reynolds, 2013). MRI does not involve radiation however it uses a nonradioactive gadolinium-based intravenous contrast agent for effective cancer screening (Freimanis & Yacobozzi, 2014). Women allergic to the contrast agent, pregnant, or who have poor renal function must forgo using MRI for breast cancer screening. Women with devices, such as aneurysm clips or pacemakers, cannot have a MRI. Highly claustrophobic women may not be able to tolerate MRI. It is vital that MRI not replace mammography as a screening technique because calcification that may indicate ductal carcinoma *in situ* is not visible on MRI (Freimanis & Yacobozzi, 2014).

Computed Tomography (CT)

Computed tomography is similar to MRI as it is an auxiliary to conventional mammography in the detection of breast cancer. CT can visualize the internal structures of small nodes and detect organism changes distinguishing malignant from benign tumors (Reynolds, 2013). Although CT contains radiation exposure, it may benefit women that cannot utilize MRI. Women with metallic implants, those who are obese, or women who have severe claustrophobia may benefit from CT (Reynolds, 2013). CT works with conventional mammography and is not suitable as a replacement method for screening.

Positron Emission Tomography (PET)

Positron emission tomography is appropriate as a breast cancer diagnostic tool. The guidelines of the NCCN recommend the use of PET when the stage of cancer is questionable or

suspicious, especially with local advanced or metastatic breast cancer (Reynolds, 2013). PET is not relevant as a screening tool.

Digital Breast Tomosynthesis (DBT)

Digital breast tomosynthesis is a technique that acquires a limited number of breast projections from a narrow angular range that are combined to reconstruct a resemblance of a three dimensional breast image. The acquisition process is similar to conventional mammography where the compressed breast is stationary, except the difference is an x-ray tube revolves in one plane around the stationary compressed breast acquiring a series of images at each x-ray tube position. The acquired series of projections are processed using a reconstruction algorithm of the different location images of the breast tissue computing their vertical position creating a three dimensional image of the distribution of breast tissue (Sechopoulos, 2013).

DBT fulfills two important expectations for implementation in mammography screening: higher malignancy conspicuity for cancers and the ability to discover cancers missed or overlooked by mammography (Skaane et al., 2012). DBT ability to reduce or eliminate overlapping breast tissue is valuable to women with dense breast, thus decreasing the number of false-positive findings. These findings were confirmed in a clinical study where DBT reduced the recall rates. In a study comparing digital mammography and DBT for visibility of cancers, DBT was superior in detecting cancers. DBT also has shown superiority over conventional mammography in the discovery of subtle architectural distortions and measurement of breast cancer size. In a large study comparing DBT and conventional mammography on the clarity of calcifications, DBT demonstrated equal or greater clarity and the distribution of calcifications within the ducts (Skaane et al., 2012).

When normal breast tissue structure obscures clear visualization of an abnormality, anatomical noise occurs. The two dimensional function of conventional mammography limits anatomical noise, but the three dimensional capabilities of DBT eliminates anatomical noise by solving the problem of overlapping breast tissue. DBT has the capability of distinguishing cysts from tumors. DBT low-radiation dose and short examination time of approximately seven seconds makes it an appealing imaging method for breast cancer screening and diagnosis (Reynolds, 2013). In the Reader Study 1, conducted by Dr. Elizabeth Rafferty at Massachusetts General Hospital, she found gains in specificity, improved margin, and lesion visibility by combining two dimensional and three dimensional methods that improved recall rates by approximately 40% (Reynolds, 2013). Reynolds (2013) noted that at the time of the printing of his article, tomosynthesis was being used primarily for breast and chest examinations, angiographic, orthopedic, and dental investigations. Reynolds stated that the goal of DBT is to overcome obstacles of conventional mammography. Some advantages of DBT that he noted are:

- DBT minimizes the tissue overlap seen on two dimensional mammography by capturing multiple images and angles;
- Combining two dimensional digital mammography with DBT using craniocaudal and mediolateral oblique projections are more likely to detect benign breast lesions than two dimensional mammography alone. Research showed a statistical significant of $p = .002$ with improved detection rate of 45.6% combining two and three dimensional mammography verses 36.8% for two dimensional mammography alone (Reynolds, 2013);

- DBT showed improved specificity and sensitivity compared to full-field digital mammography in a study of 738 women with malignant lesions. Sensitivity was 97.5% for mammography and 100% for DBT. Specificity was 51% for mammography and 74.2% for DBT (Reynolds, 2013);
- DBT has the potential to eliminate the need for extra diagnostic images. DBT eliminates summation shadows caused by overlapping tissue. An estimated 25% of mammogram recalls are the result of normal breast tissue overlapping on images (Reynolds, 2013). DBT can exclude the majority of false-positive findings on initial screening;
- DBT can identify the location of a breast lesion with a single mediolateral oblique projection due to its three dimensional ability to show the x and y coordinates of a lesion or other finding;
- DBT can clearly image the margins and shapes of masses, which can help determine or rule out a cancer diagnosis. Cancerous lesions often have speculated or ill-defined margins;
- Interpreting radiologists' learning curve is essentially eliminated. The criteria for detection and diagnosis of breast cancer is the same as those used with conventional mammography;
- The effectiveness of DBT in women with dense breast tissue may ease women's anxiety improving their care; and
- DBT uses half as much compression on the breast as conventional mammography making DBT a more comfortable procedure.

Some disadvantages of DBT that Reynolds (2013) noted are:

- In screening mammography, the low sensitivity for detecting calcifications;
- The initial cost of implementation of DBT;
- Reimbursement issues;
- A higher average glandular dose (AGD) of radiation compared with conventional mammography; and
- A woman's shoulder can hinder the collection of angle images when the moving detector tube is in the mediolateral oblique projection.

In a study by Friedewald et al. (2014) conducted at 13 United States academic and nonacademic breast centers, they examined retrospective analysis of screening performance metrics to determine if conventional digital mammography combined with tomosynthesis is connected with better performance of breast screening. The performance metrics included cancer detection rate, recall rate, positive predictive value for recall, and positive predictive value for biopsy. The researchers analyzed data from two timeframes. In Period 1, start dates ranged from March 2010 to October 2011 through the implementation date of tomosynthesis, breast screenings only included conventional digital mammography. In Period 2, start dates ranged from March 2011 to October 2012 with screenings through December 31, 2012, breast screenings included conventional digital mammography plus tomosynthesis. The combined mode of digital mammography plus tomosynthesis confronts the primary limitations of conventional digital mammography by increasing visibility of invasive cancers while simultaneously reducing false-positive results. Combining the technology of tomosynthesis with conventional digital mammography increases the total radiation dose to twice the level of conventional digital mammography alone, but is still below the radiation limits outlined by the

Food and Drug Administration. The 13 breast centers screened 454,850 women, which included n = 281,187 for conventional digital mammography alone with a mean age of 57 years and n = 173,663 for conventional digital mammography plus tomosynthesis with a mean age of 56.2 years. In a comparison of the 2 datasets, digital mammography plus tomosynthesis had significantly better performance outcomes than conventional digital mammography alone. The results revealed a 15% reduction in recall rates with simultaneous 29% increase in cancer detection, 49% increase in positive predictive value for recall, and 21% increase in positive predictive value for biopsy (Friedewald et al., 2014). After tomosynthesis implementation at these research sites, they noted a 41% increase in the detection of invasive cancers while detection of ductal carcinoma *in situ* was unchanged (Friedewald et al., 2014). A mammography method resulting in a decline of unnecessary test and biopsies, while simultaneously increasing cancer detection supports the potential benefits of DBT as a tool for screening (Friedewald et al., 2014).

McGarry and Brand (2013) reported that John C Lincoln Deer Valley Hospital, located in Phoenix, originally used DBT only on women with dense breast tissue. Once the hospital evaluated the quality impact of DBT, they determined all women should receive DBT at no additional cost and purchased an additional imaging unit to handle increased volumes. The hospital's evaluation revealed a 69% reduction in spot view callbacks (reducing the number of women who undergo unnecessary biopsies) and 6% decrease in the overall recall rate. There was a 40% increase in their breast cancer detection rate. Their positive predictive value for screenings increased 33% (McGarry & Brand, 2013). John C. Lincoln Deer Valley Hospital completely

replaced two dimensional mammography and made three dimensional DBT their standard of care for mammography screening and diagnosis.

DBT equipment is twice the cost of conventional mammography machines. Jim Culley, of Hologic, Inc., reported that mammography centers across the country are purchasing the new machines and promoting the screening test to women as a more accurate test than conventional mammography (Grady, 2014). Out of 13,500 mammography centers in the United States, approximately 1,100 are equipped with tomosynthesis technology (Grady, 2014). This technology has shown improved cancer detection and reduction in call backs, however women may have to pay more to get the newer test. Culley estimated that over six million American women will undergo DBT this year (Grady, 2014).

Summary

The breasts are an important symbol to women representing femininity, nurturing, sexuality, and motherhood. There are various tests with different purposes that can examine the breast. The tests include conventional mammography, digital mammography, ultrasound, MRI, CT, PET, and DBT. Cancer screening can lead to possible medical complications, emotional, psychological, and financial cost. Receiving a false-positive breast cancer screening can induce anxiety in many women. Repeated screenings due to false-positives can result in the exposure to additional radiation and overdiagnosis resulting in unnecessary interventions. Providers and radiologists should take into consideration that excessive false-positive findings may drive women away from breast screening, influence insurance providers to limit coverage, and ultimately limit access to lifesaving procedures. Health care resources are strained and over screening of women could eventually limit access to this service. Because some breast cancers

cannot be detected by screening, clinicians should be mindful that findings should be further evaluated. Breast lesions and masses have been more visible with DBT than with conventional mammography. Ultrasound and MRI have shown the ability to improve cancer detection, but have been unsuccessful in simultaneously reducing false-positive results. A potential advantage of DBT is the ability simultaneously to improve cancer detection rates while reducing false-positive results.

The long-term worth of DBT is still being determined. The validation of specific performance benchmarks directly related to patient outcomes will determine the success of DBT. The success of mammography in reducing mortality rates is predicated on detecting and treating small asymptomatic cancers before they metastasize. The introduction of DBT has shown the ability to detect invasive cancers and may be of value in improving patient outcomes from mammography screening. Verification of continued research data will determine whether DBT misses tumors or saves lives.

McGarry and Brand (2013) expressed it was rare for providers to totally transition to DBT as the sole screening and diagnostic care for all women. They recommended that providers should assess their patient population and resources to determine whether an investment in DBT is advantageous. However, for providers who can afford the investment, McGarry and Brand (2013) suggested complete transition to three dimensional DBT mammography for all patients.

Presently there is not a current procedural terminology (CPT) code for DBT. A CPT code for DBT is essential for clinicians to be able to order DBT and obtain reimbursement. Some payers are reimbursing DBT as a two dimensional mammogram, while some centers are using an unlisted procedure code or asking women to pay an additional $30 to $70 upfront to defray costs

(McGarry & Brand, 2013). Dr. Thomas Helbich (Reynolds, 2013), of the Medical University of Vienna, predicted that DBT will replace full-field digital mammography within the next 10 years. His reasoning was DBT higher sensitivity, enhanced image quality, and ability to image dense breast tissue (Reynolds, 2013).

After extensive research, I strongly believe that breast centers in the Louisville Metro area would benefit from an investment in DBT equipment. When the health plans of Anthem, Humana, Medicare, and Medicaid cover the expense of the tomosynthesis screening test, we could start to close the breast cancer disparity gap among White and African-American women in Louisville, Kentucky. Local employers must demand coverage of this technology in their health benefit plans. DBT could enhance the lives of all women making Louisville Metro a healthier city. The health of a city promotes social change.

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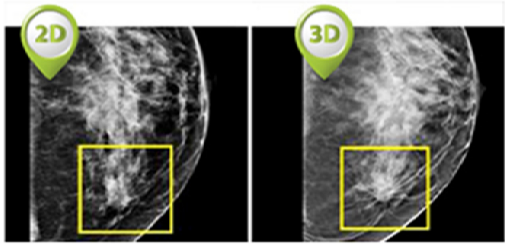
Advantages of Tomosynthesis

- *Earlier detections of breast cancer reducing unnecessary diagnostic interventions*
- *Minimizes tissue overlap seen on 2-dimensional mammography that hides cancer or makes normal tissue appear abnormal*
- *More likely to detect benign (non-cancerous) breast lesions than 2-dimensional mammography*
- *Demonstrated improved sensitivity (detected more cancer) and specificity (reduced recall imaging)*
- *Eliminates breast tissue shadows that cause false-positive findings*
- *The ability to identify the location of a breast mass*
- *Clearly images the margins and shapes of masses which can help determine or rule out a cancer diagnosis*
- *Uses half as much compression on the breast as standard mammography making it a more comfortable procedure*

Digital Breast Tomosynthesis
A 3D mammogram

What is 3D mammography?

3D mammography is a new technology in the fight against breast cancer that allows physicians to examine your breast tissue one layer at a time, The layers are combined to create a 3-dimensional picture of the breast allowing physicians to see inside the breast more clearly than with a standard 2-view mammogram detecting more cancers and fewer women recalled for additional imaging.



Tomosynthesis may not be covered by your health insurance company, Check before having the procedure.

Shah, N., Ng., T., & Shaw de Paredes, E. (2014). Basics of digital breast tomosynthesis. *Applied Radiology*. Retrieved from http://cdn.agilitycms.com/applied-radiology/PDFs/AR_03-14_Shah.pdf

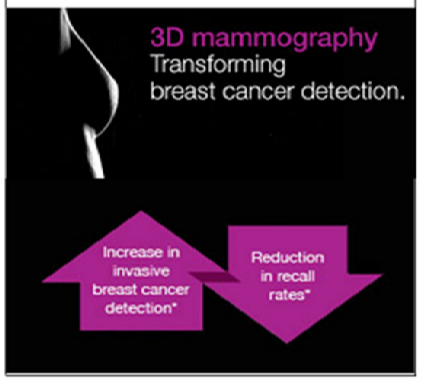
American Cancer Society www.cancer.org

Mammograms can detect breast cancer early

For Yourself

For Your Family

For Life



Why should I have regular mammograms?

A mammogram can help to detect breast cancer early, often before symptoms occur or before you can feel the lump yourself. Early detection can save lives. When breast cancer is found early the chances for successful treatment are much better.

Breast cancer can develop at any time. All women are at risk of breast cancer, regardless of your age or lack of a family history of breast cancer. The risk of getting breast cancer increases as you age.

New technology may detect cancer before there are any outward symptoms at all.

What should I expect when I have a mammogram?

The procedure takes about 20 minutes. The actual breast compression only lasts a few seconds.

You will be shown to a dressing room where you will undress above the waist to have a mammogram, The facility will give you a wrap to wear.

Inside the exam room a technologist will gather a short medical history. The technologist will position your breasts on the mammogram machine plate lowering the plastic upper plate to compress the breast and take images.

You may feel some discomfort when your breasts are compressed and for some women it can be painful.

The digital images are displayed immediately inside the exam room for review by the technologist. If there is a need for repositioning she can take additional images right away.

You will return to the dressing room, get dressed and be on your way.

Questions I should ask my doctor.

What can I do to lower my risk of getting breast cancer?

What screening tests should I get and how often should I have them?

Do I have dense breasts? How is breast density measured?

What causes breast lumps or changes?

If my mammogram is not normal, what happens next?

If more tests and/or treatment are needed, will you refer me to a doctor who specializes in breast problems?

What are my treatment options? Which options do you suggest for me and why?

What follow up care will I need? When do I need to see you again?

Limitation of Mammography

No screening test is 100% perfect. Not all breast cancers can be seen on mammography.

Appendix B: Health Belief Model

INDIANA UNIVERSITY

SCHOOL OF NURSING

Center for Research and Scholarship

March 5, 2013

Teresa Campbell

Dear Ms. Campbell,

Thank you for your interest in my work. You have permission to modify and use the Champion Health Belief Model for your use as long as you cite my work and send me an abstract of your completed project.

Sincerely,

Victoria Champion, Ph.D., R.N., F.A.A.N.
Distinguished Professor
Edward W. and Sarah Stam Cullipher Endowed Chair
Associate Director Cancer Prevention and Control/Population Sciences
Indiana University Simon Cancer Center

VC:dd

Demographic Profile

Have you ever had a mammogram?

Yes _____
No _____

Recency of mammogram:

Less than 1 year _____
1 – 2 years _____
2 + years _____

Race/Ethnicity: _____

Age: 40 – 49 _____ 50 – 59 _____ 60 – 69 _____ 70+ _____

Marital Status:

Married _____
Divorced _____
Separated _____
Widowed _____
Single _____

Household Income:

Less than $15,000 _____
$15,000 - $35,000 _____
$35,001 - $55,000 _____
$55,001 - $75,000 _____
$75,000 + _____

Education:

Less than High School _____
GED/High School Graduate _____
Some College _____
College Graduate _____
Graduate Degree _____

Medical Care:

Health Insurance Yes _____ No _____
Regular Doctor Yes _____ No _____

Susceptibility

1. It is likely that I will get breast cancer.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

2. I feel I will get breast cancer sometime during my life.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

3. There is a good possibility I will get breast cancer in the next 10 years.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

4. My chances of getting breast cancer in the next few years are great.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

5. I am more likely than the average woman to get breast cancer.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

Severity

1. The thought of breast cancer scares me.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

2. When I think about breast cancer, my heart beats faster.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

3. I am afraid to think about breast cancer.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

4. Problems I would experience with breast cancer would last a long time.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

5. Breast cancer would threaten a relationship with my boyfriend, husband, or partner.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

6. If I had breast cancer my whole life would change.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

7. If I developed breast cancer, I would not live longer than 5 years.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

Benefits

1. When I get a recommended mammogram, I feel good about myself.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

2. When I get a mammogram, I don't worry as much about breast cancer.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

3. My doctor or nurse will praise me if I obtain the recommended mammogram.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

4. Having a mammogram will help me find breast lumps early.

   Strongly disagree (1) _____
   Disagree (2) _____
   Neutral (3) _____
   Agree (4) _____
   Strongly agree (5) _____

5. Having a mammogram decreases my chances of dying from breast cancer.

   Strongly disagree (1) _____
   Disagree (2) _____
   Neutral (3) _____
   Agree (4) _____
   Strongly agree (5) _____

6. Having a mammogram decreases my chances of requiring radical or disfiguring surgery if breast cancer occurs.

   Strongly disagree (1) _____
   Disagree (2) _____
   Neutral (3) _____
   Agree (4) _____
   Strongly agree (5) _____

7. Having a mammogram will help find a lump before it can be felt by myself or a health professional.

   Strongly disagree (1) _____
   Disagree (2) _____
   Neutral (3) _____
   Agree (4) _____
   Strongly agree (5) _____

Barriers

1. Having a routine mammogram or x-ray of the breasts would make me worry about breast cancer.

   Strongly disagree (1) _____
   Disagree (2) _____
   Neutral (3) _____
   Agree (4) _____
   Strongly agree (5) _____

2. Having a mammogram or x-ray of the breast would be embarrassing.

   Strongly disagree (1) _____
   Disagree (2) _____
   Neutral (3) _____
   Agree (4) _____
   Strongly agree (5) _____

3. Having a mammogram or x-ray of the breast would take too much time.

   Strongly disagree (1) _____
   Disagree (2) _____
   Neutral (3) _____
   Agree (4) _____
   Strongly agree (5) _____

4. Having a mammogram or x-ray of the breast would be painful.

   Strongly disagree (1) _____
   Disagree (2) _____
   Neutral (3) _____
   Agree (4) _____
   Strongly agree (5) _____

5. Having a mammogram or x-ray of the breast would cost too much money.

   Strongly disagree (1) _____
   Disagree (2) _____
   Neutral (3) _____
   Agree (4) _____

Strongly agree (5) _____

6. I am afraid to have a mammogram because I might find out something is wrong.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

7. I am afraid to have a mammogram because I don't understand what will be done.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

8. I don't know how to go about getting a mammogram.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____
.

9. People doing mammograms are rude to women.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

10. Having a mammogram exposes me to unnecessary radiation.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____

Agree (4) _____
Strongly agree (5) _____

11. It is difficult to get transportation for a mammogram.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

12. It is difficult to get child care to get a mammogram.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

13. I have other problems more important than getting a mammogram.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

14. I cannot remember to schedule a mammogram.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

15. Getting a mammogram would be inconvenient for me.

Strongly disagree (1) _____
Disagree (2) _____

Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

16. Getting a mammogram could cause breast cancer.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

17. Forgetting my appointment keeps me from getting a mammogram.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

18. I am too old to need a routine mammogram.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

19. Getting a mammogram is not necessary because my doctor already examines my breasts.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

Cues to Action

1. Having a friend with breast cancer motivates me to get a mammogram.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

2. Media messages from television, newspaper, radio, and the internet prompt me to obtain a mammogram.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

3. Recommendation by my health care provider stimulates me to get a mammogram.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

4. Experiencing symptoms of breast cancer makes me get a mammogram.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

5. A family history of breast cancer motivates me to get a mammogram.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

Self-efficacy

1. I can get a mammogram even if my health provider does not tell me to get one.

   Strongly disagree (1) _____
   Disagree (2) _____
   Neutral (3) _____
   Agree (4) _____
   Strongly agree (5) _____

2. I can get transportation to have a mammogram.

   Strongly disagree (1) _____
   Disagree (2) _____
   Neutral (3) _____
   Agree (4) _____
   Strongly agree (5) _____

3. I can arrange other things in my day to have a mammogram.

   Strongly disagree (1) _____
   Disagree (2) _____
   Neutral (3) _____
   Agree (4) _____
   Strongly agree (5) _____

4. I can talk to people at the mammogram center if I have a problem.

   Strongly disagree (1) _____
   Disagree (2) _____
   Neutral (3) _____
   Agree (4) _____
   Strongly agree (5) _____

5. I will get a mammogram even if I am worried.

   Strongly disagree (1) _____
   Disagree (2) _____
   Neutral (3) _____
   Agree (4) _____

Strongly agree (5) _____

6. I will get a mammogram even if I don't know what to expect.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

7. I can find a way to pay for a mammogram.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

8. I can make an appointment for a mammogram.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

9. I know where to go to get a mammogram.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

10. I can get a mammogram.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____

Agree (4) _____
Strongly agree (5) _____

11. I feel confident that mammography will detect any abnormalities in my breasts.

Strongly disagree (1) _____
Disagree (2) _____
Neutral (3) _____
Agree (4) _____
Strongly agree (5) _____

Appendix C: Recruitment Flyer

Appendix D: Consent Form

You are invited to take part in a research study to examine and predict adherence to recommended mammography screening guidelines. I'm inviting African-American women ages 40 and over, with no previous diagnosis of breast cancer, who reside in Louisville, Kentucky to be in the study. This form serves as your "informed consent" to allow you to understand this study before deciding whether to take part.

This study is being conducted by researcher Teresa Campbell, who is a doctoral student at Walden University. You may already know the researcher as the Director of the UAW-Ford Community Healthcare Initiative or Executive Director of the Kentuckiana Health Collaborative, but this study is separate from that role.

Background Information:
The purpose of this study is to determine which of the six constructs (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, self-efficacy) of the Health Belief Model are predictive of African-American women ages 40 and over in Louisville, Kentucky obtaining mammograms.

Procedures:
If you agree to be in this study, you will be asked to:

- Read the consent form
- Complete a 1 minute demographic profile
- Complete a 5 - 10 minute questionnaire

Here are some sample questions:

1. My chances of getting breast cancer in the next few years are great.
2. The thought of breast cancer scares me.
3. Having a mammogram or x-ray of the breasts will help me find lumps early.
4. Having a mammogram or x-ray of the breasts would take too much time.
5. I can find a way to pay for a mammogram.
6. A family history of breast cancer motivates me to get a mammogram.

Voluntary Nature of the Study:
This study is voluntary. Everyone will respect your decision of whether or not you choose to be in the study. No one at your place of employment, your union affiliation, or event sponsors will treat you differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind during or after the study. You may stop at any time.

Risks and Benefits of Being in the Study:
Being in this type of study involves some risk of the minor discomforts that can be encountered in daily life, such as, distress of revealing personal information, talking about health habits, and loss of time. Being in this study would not pose risk to your safety or wellbeing.

The potential benefits of this study are to predict the health behaviors of African-American women, understand triggers that cause these women to action, and the ability to create appropriate interventions to increase mammography screening.

Payment:
No monetary payments, thank you gifts, or any other form of compensation will be associated with participating in this research study.

Privacy:
Any information you provide will be kept confidential. The researcher will not use your personal information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in the study reports. Data will be kept secure on a laptop that is password protected. Anti-virus security software to protect data is up-to-date. Data will be backed up on an external drive and secured in a locked vault separate from the original data. The laptop will be secured in a locked cabinet. Data will be kept for a period of at least 5 years, as required by the university.

Contacts and Questions:
You may ask any questions you have now. Or if you have questions later, you may contact the researcher via phone number at (and/or email address at. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is. Walden University's approval number for this study is 08-07-13-0247835 and it expires on August 6, 2014.

The researcher will give you a copy of this form to keep.

Statement of Consent:

I have read the above information and I feel I understand the study well enough to make a decision about my involvement. In order to protect your privacy, signatures will not be collected and completion of the survey will indicate your consent, if you choose to participate. I understand that I am agreeing to the terms described above.

Appendix E: 4 Seasons Salon Letter of Cooperation

Letter of Cooperation

July 19, 2013

Yolanda Buckner

Dear Ms. Campbell,

Based on my review of your research proposal, I give permission for you to conduct the study entitled *Predicting Adherence to Mammography Screening Practices among African-American Women in Louisville, Kentucky* within the 4 Seasons Salon. As part of this study, I authorize you to recruit African-American women ages 40 and over by distributing flyers advertising the study within the salon. You can collect data on women volunteering to participate in the study by administering self-report questionnaires. Upon completion of your project we would appreciate a summary of your results. Individuals' participation will be voluntary and at their own discretion.

We understand that our organization's responsibilities include: access to African-American female personnel, completion of administered surveys in the salon, and supervision that the partner will provide. We reserve the right to withdraw from the study at any time if our circumstances change.

I confirm that I am authorized to approve research in this setting.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the research team without permission from the Walden University IRB.

Sincerely,

Yolanda Buckner

Yolanda Buckner
Owner

Appendix F: McDaniel Family Reunion Letter of Cooperation

Letter of Cooperation

August 31, 2013

Gina Bowling
McDaniel Family Reunion
Chickasaw Park
Louisville, KY 40212

Dear Ms. Campbell,

Based on my review of your research proposal, I give permission for you to conduct the study entitled *Predicting Adherence to Mammography Screening Practices among African-American Women in Louisville, Kentucky* at my family reunion. As part of this study, I authorize you to recruit African-American women ages 40 and over by distributing flyers advertising the study at the reunion. You can collect data on women volunteering to participate in the study by administering self-report questionnaires. Individuals' participation will be voluntary and at their own discretion.

We understand that our family's responsibilities include: access to African-American female personnel and an area to administer surveys. We reserve the right to withdraw from the study at any time if our circumstances change.

I confirm that I am authorized to approve research in this setting.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the research team without permission from the Walden University IRB.

Sincerely,

Gina Bowling
McDaniel Family Union Representative

Appendix G: Burnett Avenue Baptist Church Letter of Cooperation

Letter of Cooperation

September 1, 2013

Pastor Daniel Corrie Shull
Burnett Avenue Baptist Church
6800 S. Hurstbourne Parkway
Louisville, KY 40291

Dear Ms. Campbell,

Based on my review of your research proposal, I give permission for you to conduct the study entitled *Predicting Adherence to Mammography Screening Practices among African-American Women in Louisville, Kentucky* at the Burnett Avenue Baptist Church. As part of this study, I authorize you to recruit African-American women ages 40 and over by advertising the study at the church. You can collect data on women volunteering to participate in the study by administering self-report questionnaires. Individuals' participation will be voluntary and at their own discretion.

We understand that our church's responsibilities include: access to African-American female personnel and an area to administer surveys. We reserve the right to withdraw from the study at any time if our circumstances change.

I confirm that I am authorized to approve research in this setting.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the research team without permission from the Walden University IRB.

Sincerely,

Lauren L. White

Rev. Daniel Corrie Shull
Pastor

Lauren White
Executive Staff

Appendix H: Zion Baptist Church Letter of Cooperation

Letter of Cooperation

September 14, 2013

Jenyl Johnson
Zion Baptist Church
Health and Beauty Fair
2200 W. Muhammad Ali Blvd.
Louisville, KY 40212
502.644-4193

Dear Ms. Campbell,

Based on my review of your research proposal, I give permission for you to conduct the study entitled *Predicting Adherence to Mammography Screening Practices among African-American Women in Louisville, Kentucky* at the Zion Baptist Church Health and Beauty Fair. As part of this study, I authorize you to recruit African-American women ages 40 and over by distributing flyers advertising the study at the fair. You can collect data on women volunteering to participate in the study by administering self-report questionnaires. Individuals' participation will be voluntary and at their own discretion.

We understand that our organization's responsibilities include: access to African-American females and space for completion of administered surveys at the fair. We reserve the right to withdraw from the study at any time if our circumstances change.

I confirm that I am authorized to approve research in this setting.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the research team without permission from the Walden University IRB.

Sincerely,

Jenyl Johnson
Event Organizer

Appendix I: Little Flock Baptist Church Letter of Cooperation

Letter of Cooperation

September 28, 2013

Glynis Williams
Little Flock Baptist Health Fair
1030 S. Hancock
Louisville, KY 40203

Dear Ms. Campbell,

Based on my review of your research proposal, I give permission for you to conduct the study entitled *Predicting Adherence to Mammography Screening Practices among African-American Women in Louisville, Kentucky* at our health fair. As part of this study, I authorize you to recruit African-American women ages 40 and over by distributing flyers advertising the study at the health fair. You can collect data on women volunteering to participate in the study by administering self-report questionnaires. Individuals' participation will be voluntary and at their own discretion.

We understand that our responsibility includes access to African-American women and an area to administer surveys. We reserve the right to withdraw from the study at any time if our circumstances change.

I confirm that I am authorized to approve research in this setting.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the research team without permission from the Walden University IRB.

Sincerely,

Glynis Williams

Glynis Williams
Little Flock Baptist Church

Benefit Scale

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
When I get a recommended Mammogram I feel good about myself.	.295	.228	1.674	1	.196	1.344	.859	2.102
When I get a mammogram, I don't worry as much about breast cancer.	.277	.207	1.797	1	.180	1.319	.880	1.978
My doctor or nurse will praise me if I obtain the recommended mammogram.	-.204	.256	.636	1	.425	.815	.494	1.346
Having a mammogram will help me find breast lumps early.	-.354	.293	1.464	1	.226	.702	.395	1.245
Having a mammogram decreases my chances of dying from breast cancer.	.201	.243	.680	1	.410	1.222	.758	1.970
Having a mammogram decreases my chances of requiring radical or disfiguring surgery if breast cancer occurs.	-.168	.268	.394	1	.530	.845	.500	1.429
Having a mammogram will help find a lump before it can be felt by myself or a health professional.	.483	.212	5.169	1	.023	1.621	1.069	2.458
Constant	.971	1.223	.630	1	.427	2.641		

Appendix K: Champion's Health Belief Model Barriers Survey Responses

Barriers Scale

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Having a routine mammogram or x-ray of the breasts would make me worry about breast cancer.	.075	.280	.073	1	.787	1.078	.623	1.865
Having a mammogram or x-ray of the breast would be embarrassing.	.723	.705	1.051	1	.305	2.061	.517	8.212
Having a mammogram or x-ray of the breast would take too much time.	-.509	.417	1.491	1	.222	.601	.265	1.361
Having a mammogram or x-ray of the breast would be painful.	.297	.273	1.184	1	.276	1.346	.788	2.300
Having a mammogram or x-ray of the breast would cost too much money.	.874	.514	2.891	1	.089	2.396	.875	6.558
I am afraid to have a mammogram because I might find out something is wrong.	-.706	.308	5.243	1	.022	.494	.270	.903
I am afraid to have a mammogram because I don't understand what will be done.	-.084	.557	.023	1	.880	.919	.308	2.741
I don't know how to go about getting a mammogram.	-.716	.605	1.401	1	.237	.489	.149	1.600

People doing mammograms are rude to women.	-.602	.355	2.880	1	.090	.548	.273	1.098
Having a mammogram exposes me to unnecessary radiation.	-.755	.336	5.051	1	.025	.470	.243	.908
It is difficult to get transportation for a mammogram.	.022	.605	.001	1	.970	1.023	.313	3.347
It is difficult to get child care to get a mammogram.	.882	.452	3.820	1	.051	2.417	.997	5.855
I have other problems more important than getting a mammogram.	-.288	.389	.549	1	.459	.750	.350	1.606
I cannot remember to schedule a mammogram.	-.298	.459	.421	1	.517	.743	.302	1.825
Getting a mammogram would be inconvenient for me.	-.410	.651	.396	1	.529	.664	.185	2.377
Getting a mammogram could cause breast cancer.	-.485	.558	.754	1	.385	.616	.206	1.840
Forgetting my appointment keeps me from getting a mammogram.	.926	.490	3.576	1	.059	2.525	.967	6.597
I am too old to need a routine mammogram.	.627	.850	.545	1	.460	1.872	.354	9.902
Getting a mammogram is not necessary because my doctor already examines my breasts.	-.608	.564	1.164	1	.281	.544	.180	1.643
Constant	4.381	.866	25.582	1	.000	79.905		

Appendix L: Champion's Health Belief Model Self-efficacy Survey Responses

	Self-efficacy Scale							
	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
I can get a mammogram even if my health provider does not tell me to get one.	-.147	.331	.196	1	.658	.864	.451	1.652
I can get transportation to have a mammogram.	.186	.367	.256	1	.613	1.204	.586	2.472
I can arrange other things in my day to have a mammogram.	-.972	.563	2.983	1	.084	.378	.126	1.140
I can talk to people at the mammogram center if I have a problem.	.882	.337	6.835	1	.009	2.416	1.247	4.682
I will get a mammogram even if I am worried.	.507	.677	.562	1	.454	1.661	.441	6.259
I will get a mammogram even if I don't know what to expect.	.194	.723	.072	1	.789	1.214	.294	5.002
I can find a way to pay for a mammogram.	-1.694	.597	8.065	1	.005	.184	.057	.592

I can make an appointment for a mammogram.	.329	.392	.705	1	.401	1.390	.644	2.997
I know where to go to get a mammogram.	.681	.527	1.671	1	.196	1.976	.704	5.550
I can get a mammogram.	.064	.765	.007	1	.933	1.066	.238	4.772
I feel confident that mammography will detect any abnormalities in my breasts.	.712	.334	4.545	1	.033	2.038	1.059	3.923
Constant	-.396	1.539	.066	1	.797	.673		

Curriculum Vitae

Teresa L. Couts

Objective

To obtain a position that utilizes my skills, work ethic, achievements, and abilities.

Education

Walden University Doctor of Education	Baltimore, MD 21202 Expected Graduation 8/2014
Indiana University/Purdue University M.S. Adult Education	Indianapolis, IN 46206 May 2009
Indiana University Southeast B.A. Psychology	New Albany, IN 47130 December 2005
Associated Airline School Travel Consultant	Coral Gables, FL 33114 July 1977
Jeffersonville High School Diploma	Jeffersonville, IN 47130 June 1975

Work Experience

Ford Motor Company Kentucky Truck Plant — Louisville, KY 40241, August 1995 - Present

- **UAW Director:** UAW- Ford Community Healthcare Initiative. Responsible for initiating community activities designed to improve the overall health status of area residents and improve the quality and cost effectiveness of the local health care delivery system. Co-Executive Director of the Kentuckiana Health Collaborative which is convened by the UAW-Ford Community Healthcare Initiative. June 2011 – Present.
- **UAW-Ford Trainer**: Train salary and hourly workforce in safety, teambuilding, quality and Ford process classes. Certified as a Diversity facilitator and Six Sigma Green Belt. Efficient at special events, meetings, and promotional event planning and delivery. May 2000 – June 2011.
- **Alternate Benefit Representative**: Assist hourly and retired employees with medical, dental, and vision benefits; retirement packages; death claims; buy-out separation packages; and trouble-shooting employee problems. December 2006 – June 2011.
- **6-Sigma Black Belt Trained:** Completed 6 week course, closed first project, passed certification test.
- **Coordinator for Connectivity Program**: Managed Kentucky Truck's computer giveaway program for both hourly and salary employees, helping them order their computers, how to purchase upgrades, solve problems with People PC, UPS, local telephone carriers, and the UAW-Ford National Program Center. March 2000 – May 2000.
- **Vehicle Assembly Technician**: Assembled trucks and sports utility vehicles in the Frame and Chassis Departments. August 1995 – March 2000.

Hoosier Lottery New Albany, IN 47150
September 1989 – August 1995

- **Regional Secretary:** Covering fifteen southern counties of Indiana. Performed a variety of office clerical duties and secretarial support service for Regional Manager. Ability to use a personal computer and software applications. Processed lottery applications, delivered lottery tickets, and supported sales staff.
- **Claims Clerk:** Processed winning ticket claims, balanced money drawer daily, and sold scratch-off and online tickets.
- **Telemarketing Representative:** Phoned lottery retailers to sell tickets. Processed returned packages of tickets. Top telemarketing rep in the state in 1994, named Sales Rep of the Year.

Conway Enterprise New Albany, IN 47150
August 1986 – September 1989

- **Accounts Receivable Clerk:** Processed incoming checks, made collection calls to delinquent customers.
- **Customer Service Representative:** Handle customer phone orders for labels and rubber stamps. Handled complains. Inspected reworks on labels and approved for quality to ship.

Citizens Fidelity Bank Louisville, KY 40202
May 1978 – May 1983

- **Trust Department Receptionist:** Answered multi-line telephone, greeted trust customers and typed letters. Completed monthly trust report.
- **Credit Clerk:** Phoned creditors from loan applications to check applicant's credit for loan officers. Processed loan applications over the phone from dealers. Microfiche loan paperwork for storage. Categorized microfiche and file.

Loyal Travel Louisville, KY 40202
July 1977 – May 1978

- **Travel Consultant:** Travel consultation for corporate and leisure clients in the areas of flight arrangements, motor coach tours, hotel accommodations and car rentals.

Union Involvement

Local 862 By-Laws Committee
Local 862 Community Service Committee
Southern Indiana CAP Council
Volunteer for charitable and political activities
Past Council Member Family Service & Learning Center

Computer Skills

Proficient operating a computer; use essential internet skills; operate Microsoft Office Programs and database/statistic software
Word, Outlook, Power Point, Excel, Publisher, Access, Mini Tab, SPSS

Honors

Psi Chi National Honor Society
Pinnacle National Honor Society
Phi Eta Sigma National Honor Society
YMCA Adult Black Achiever Award
Golden Key International Honor Society

References