Evaluating Breast Health Education and Awareness in the College Environment Using the Health Belief Model

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ABSTRACT

Research was conducted among a university sample and investigated if modifying factors (age, race, and highest level of education) help shaped individual beliefs (self-efficacy and cues to action) and resulting action (health behavior) by utilizing the Health Belief Model (HBM) in self-reported frequencies. The study investigated if the sample heard of breast cancer (BC) and if the participants' socio-demographics and the HBM constructs were significant predictors. Participants who heard of BC may be in the advanced stages of the HBM where the individual viewed BC as a negative health consequence, desired to avoid BC, and motivated into practicing breast self-awareness and proved being educated and proactive in their breast health. The researcher-designed electronic survey was open to YSU students and faculty members during April and May 2015 (N= 179). Data were analyzed using IBM SPSS Statistics version 23. The independent variables of the HBM constructs, race, age, and highest level of education were compared with the dependent variable of the participant having heard of BC. The majority of participants were Caucasians, between the ages of 45-54 years, and had high levels of educational attainment. Most participants have heard of BC, have not had a personal diagnosis of BC or have had any family members diagnosed with BC. Participants who heard of BC were in the more advanced stages of the HBM implied that they follow proactive breast health practices and have strong individual beliefs, which can enable them to achieve greater confidence in one's ability to take action. This was supported with the statistical significance of the HBM construct "cues to action and self-efficacy" using binomial logistic regression. Age and highest level of education were also significant $p < .10$. Overall, the hypotheses were valid in this study.

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DEDICATION

This thesis is dedicated to my daughter, Keira Siobhan Finley, for being my most powerful source of motivation to continually excel. Keira thank you for being my constant sunshine and most of all, my greatest accomplishment in life. I hope you are proud of my achievements and believe that you can do anything in life all you have to try. I love you to the moon and back!

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CHAPTER I

INTRODUCTION AND STATEMENT OF THE PROBLEM

Chapter I outlines the contents of the research study. It will discuss breast cancer as an epidemic in the United States, the state of Ohio, and in Mahoning County. The population at risk for developing breast cancer, components of breast health education and awareness, as well as the theoretical framework for the study that could help reduce the epidemic will be discussed. The components of Chapter I include the introduction, statement of the problem, purpose of the study, hypotheses of the study, and limitations of the study. Chapter II is the review of the literature, and Chapter III is the methodology of this research. Chapter IV will discuss the results found from the study, and Chapter V will encompass the summary, discussion, limitations and the conclusion of the research, and the recommendations for future research efforts, followed by the references, appendices, tables, and figures.

Introduction

All people, whether male or female, are born with some breast cells and tissue. Even though males do not develop milk-producing breasts, a man's breast cells and tissue can still develop cancer. Men and women are in great need of early detection in order for better protection against breast cancer. This is because breast cancer is a national and state epidemic and is greatly affecting those living in Mahoning County where the breast cancer mortality rate is higher than the national average.

Northeast Ohio (NEO) has a total of 22 counties in the geographic region. According to the Komen NEO Community Profile (2009), of those 22 counties a total of 19 counties have a breast cancer mortality rate greater than the national average in the

region (Komen NEO, 2011). Furthermore, in the state of Ohio, Mahoning County (35/100K) has the third highest breast cancer mortality rate falling behind Jefferson County (41/100K) and Harrison County (43/100K) (Komen NEO, 2011). This study will focus on Mahoning County, a region in NEO with the third highest breast cancer mortality rate.

Even though there are other counties in NEO with similar or greater breast cancer mortality rates, this study will focus on Mahoning County. According to the Komen NEO Community Profile (2009), relatively 86.4% of NEO has a breast cancer mortality rate greater than the national average (see Table 1) (Komen NEO, 2011). It is because of this majority percentage that the breast cancer mortality incidence for NEO needs to be investigated and researched further. Perhaps in the future and overtime a solution will develop to reduce the alarming statistics. Overall, this study will concentrate on Mahoning County and has the potential to lead to greater awareness of the issue and current preventive measures can be assessed as well as improved. This research aims to achieve positive, proactive measures instead of just evoking a reaction.

This research will address the specific devastation that breast cancer and the lack of breast health education and awareness can inflict. The population at risk will be addressed in Chapter II, review of literature. The theoretical framework of the Health Belief Model (HBM) will be identified, success combating breast cancer will be reviewed, and research of breast health knowledge, awareness and health behaviors will be discussed in Chapter II and applied to answer the purpose of the research. In the battle against breast cancer, there is potential for change in the younger generations that could decrease the rising incidence and mortality rate.

Statement of the Problem

Being that breast cancer has great potential for mortality, we need to strive for greater efforts and work harder to limit the loss of life as a result of breast cancer. This will allow for the population of the United States, state of Ohio, and that of Mahoning County to benefit from preventive and proactive measures. Interventions need to be continuously sought out and implemented until significant change ensues. Women across the United States are at specific risk due to their age and likelihood of adapting life-long lifestyle habits such as physical inactivity, tobacco use, and/or alcohol use. Programs and interventions are offered for older women or women who are already affected by breast cancer at colleges across the nation, but breast cancer numbers still seem to rise. Young generations today are in danger and have the potential to negatively affect the rate of breast cancer incidence and mortality for years to come. If adolescents and young adults were to become more proactive and educated in their breast health there is great potential to improve the mortality rate of breast cancer in Mahoning County. Those younger generations who do not engage in healthier lifestyles and practices will lead to undoubtedly more excessive spending of health care dollars, an increase in preventable diseases, and premature death among the general population. This is why it is important to target younger generations such as adolescents and young adults to help instill lifelong, healthful practices and health behaviors.

Purpose of the Study

The purpose of this study is to investigate if modifying factors (age, race, and highest level of education) can help shape individual beliefs (self-efficacy and cues to action) and resulting action (health behavior) by utilizing the Health Belief Model (HBM)

in self-reported frequencies among a university population. The study will investigate if the sample has heard of breast cancer and if the participants socio-demographics and the HBM constructs are significant predictors among the sample. Participants who have heard of breast cancer may be in the advanced stages of the HBM where the individual views breast cancer as a negative health consequence, desires to avoid breast cancer, and are motivated into practicing breast self-awareness as well as being proactive and educated in their breast health. The key component of the HBM is the avoidance of a negative health consequence. To illustrate, breast cancer is a negative health consequence and the desire to avoid breast cancer can be used to motivate one into practicing breast self-awareness, being proactive, and educated in their breast health. Namely, the HBM is based on the understanding that a person will take a health-related action (i.e. Practice Breast Self-Awareness) if that person:

1. Feels that a negative health condition (i.e. Breast Cancer) can be avoided
2. Has a positive expectation that by taking a recommended action, he/she will avoid a negative health condition (i.e. being educated in one's breast health, practicing breast self awareness, utilizing breast cancer screening tools and tests)
3. Believes that he/she can successfully take a recommended health action (i.e. he/she can identify abnormal breast changes comfortably and with confidence).

The results of this study could have the potential to assist health professionals in developing more successful breast health promotion programs for younger generations. If breast health promotion programs engage the adolescents and young adults, the outcomes

of health promotion are more effective. By providing opportunities for adolescents and young adults to develop healthier lifestyles through raising awareness and providing breast health education there is the potential to fight the breast cancer incidence and also decrease breast cancer mortality rates in Mahoning County and in the state of Ohio. The school environment is the optimal setting to encourage and promote healthy active lifestyles, practices, and health behaviors.

This study will reveal if those surveyed believe it is important to take proactive measures to reduce the significant breast cancer mortality rate in Mahoning County. The importance of engaging one's self and the youth in breast health education and awareness will be demonstrated through this study. The following research questions were addressed in this study: 1) Will the subjects be aware of the statistically significant breast cancer mortality rate in Mahoning County? 2) Will the subjects be knowledgeable and aware of breast health education and breast cancer? 3) Will the subjects support a youth engagement program that would empower young women and promote breast health education and awareness?

The following formula represents the purpose of the study.

$$p = \frac{e^{\alpha + \beta x}}{1 + e^{\alpha + \beta x}}$$

Where p is the probability of a 1, e is the base of the natural logarithm (about 2.718) α and β are the parameters of the model (as in normal linear regression). The value of α yields P when x is zero, and β indicates how the probability of a 1 changes when x changes by a single unit (University of Strathclyde, n.d.). The University of Strathclyde (n.d.) states "because the relation between x and p is nonlinear, β does not have as straightforward an interpretation in this model as it does in ordinary linear

regression" (para. 1). An important concept in logistic regression is that of the odds ratios. Since logistic regression is based on the probability of an event occurring, the model allows us to calculate these, which are defined the ratio of the odds of an event occurring to it not occurring (University of Strathclyde, n.d.).

Hypotheses of the Study

This research and statement of the hypotheses were designed to reject the null hypotheses (H_0), thus accepting by default the alternative hypotheses (H_1).

- H_0: The majority of the surveyed population will not have heard of breast cancer.
- H_1: The majority of the surveyed population will have heard of breast cancer.
- H_0: The age range and highest level of education will not be a significant predictor in the participant having heard of breast cancer.
- H_1: The age range and highest level of education will be a significant predictor in the participant having heard of breast cancer.
- H_0: The Health Belief Model constructs will not significant factor in those participants who have heard of breast cancer.
- H_1: The Health Belief Model constructs will be a significant factor in those participants who have heard of breast cancer.

Limitations of the Present Study

This research was limited by the response rate of the study participants compared to the entire surveyed population. Another limitation of this survey or survey questioneers in general, is the element of self-selection bias, volunteerism, the willingness of subjects participating in the study. This study was also limited because the accuracy of the survey answers is uncertain due to the survey design in which the

investigator had to rely on the truthfulness of the participants. It is considered that with an anonymous survey, participants are more likely to respond truthfully without subject identification, but since the subject's truthfulness was uncertain the study was limited. This study was also limited due to the participant's possible misinterpretation of breast health practices, or even a misunderstanding of the survey questions, even though they were unambiguous and clearly stated.

Although there were two different methods of dissemination with the survey, both were representative of a convenience sample, which is a sample acquired by volunteers, or acquired by availability. Both disseminations were kept in the final results to represent the health beliefs of a greater sample. Another plausible limitation of the study could be attributed to the method of participation recruitment, the recipient may have immediately deleted the email or it may be filed as junk mail by the e-mail program, among other unknown reasons for non-participation.

The results of this study are also limited by the sample characteristics. Specifically, the majority of the participants in this study did not have breast cancer. It is likely that the results would differ if the sample included a greater proportion of individuals who had or have breast cancer. Additionally, the majority of the sample had attained high levels of education. It is also probable that if the sample included a greater number of participants with attained lower levels of education, the results would be different than what is presented in this study. Those who are at the most risk for breast cancer in Mahoning County were not reached through this study. The results of this study are not representative of the breast cancer population in Mahoning County.

Summary

The research may assist in predicting success among the university population with regards to breast health education and breast cancer awareness. Chapter II is an overview of the current literature that supports the purpose of this research, and Chapter III will provide the explanation of the methodology of this research. Chapter IV will reveal results of the study, and lastly Chapter V will hold conclusions of the research, discussion of results found, and will present suggestions for future research in the field.

CHAPTER II

REVIEW OF LITERATURE

Purpose

The purpose of this study is to investigate if modifying factors (age, race, and highest level of education) can help shape individual beliefs (self-efficacy and cues to action) and resulting action (health behavior) by utilizing the Health Belief Model (HBM) in self-reported frequencies. The study was conducted among a university sample that examined the participants view of breast cancer as a negative health consequence, their desire to avoid breast cancer, and motivation into practicing breast self-awareness as well as being proactive and educated in their breast health. The participant having heard of breast cancer was compared with the socio-demographics, and the constructs of the HBM. The review of literature will provide an overview of breast cancer; theoretical framework of the HBM; population at risk (including breast cancer in men); risk factors: modifiable and non-modifiable; breast cancer awareness, knowledge, and prevention sources; perceptions, attitudes, and beliefs; breast self-awareness; misconceptions among youths regarding breast cancer health, cause, and prevention; young women's breast health education and awareness legislation; gaps and limitations in breast cancer research; and summary of the literature review.

Operational Definitions

-Abnormal - deviating from the normal, average, or expected (Abnormal, n.d.).

-Abnormality - the quality or state of being abnormal (Abnormality, n.d.).

-Breast Cancer- (BC) - an uncontrolled growth of abnormal breast cells (Breast Cancer, n.d.).

-Breast Self-Awareness (BSA) - involves the knowledge of what is normal, the ability to look at and feel the breasts, and the ability to know what changes to look for and the proper course of action when an abnormal change is identified.

-Breast Self-Exam (BSE) - A method that may help women become familiar with the normal look and feel of their breasts. BSE is not recommended as a breast cancer-screening tool because it has not been shown to decrease breast cancer death (Breast Self-Exam, n.d.).

-Cancer - (1) a malignant tumor of potentially unlimited growth that expands locally by invasion and systemically by metastasis (2) an abnormal state marked by a cancer (Cancer, n.d.).

-Centers for Disease Control (CDC) - Major operating component of the United States Department of Health and Human Services. The organization serves as the national focus for developing and applying disease prevention and control, environmental health, and health promotion and health education activities designed to improve the health of the people of the United States (Centers for Disease Control and Prevention, 2014).

-Epidemic - affecting or tending to affect an atypically large number of individuals within a population, community, or region at the same time (Epidemic, n.d.).

-Family History - A record of the current and past health conditions of a person's biological (blood-related) family members that may help show a pattern of certain diseases within a family (Family History, n.d.).

-Genetic Linkage/Hereditary - Related to genes. The information in a person's genes can be passed on (inherited) from either parent (Genetic Linkage/Hereditary, n.d.).

-Health Belief Model (HBM) - a conceptual framework that describes a person's health behavior as an expression of health beliefs. The model was designed to predict a person's health behavior, including the use of health services, and to justify intervention to alter maladaptive health behavior. Components of the model include the person's own perception of susceptibility to a disease or condition, the perceived likelihood of contracting that disease or condition, the perceived severity of the consequences of contracting the condition or the disease, the perceived benefits of care and barriers to preventive behavior, and cues to action and self efficacy, the internal or external stimuli that result in appropriate health behavior by the person (Health Belief Model, n.d.).

-Menopause - the natural cessation of menstruation occurring usually between the ages of 45 and 55 with a mean in Western cultures of approximately 51 (2): the physiological period in the life of a woman in which such cessation and the accompanying regression of ovarian function occurs—called also climacteric (Menopause, n.d.).

-Menstruation - a discharging of blood, secretions, and tissue debris from the uterus that recurs in non-pregnant breeding-age primate females at approximately monthly intervals and that is considered to represent a

readjustment of the uterus to the non-pregnant state following proliferative changes accompanying the preceding ovulation (Menstruation, n.d.).

-Mortality Rate (MR)- the proportion of deaths to population, i.e. death rate (Mortality, n.d.).

-Modifiable Risk Factors- risk factors that can be changed or altered. (i.e. exercise, tobacco use, alcohol consumption).

-Non-modifiable Risk Factors - risk factors that cannot be changed or altered. (i.e. age, family history).

-Preventive - efforts to prevent disease (Preventive, n.d.)

-Proactive - relating to, caused by, or being interference between previous learning and the recall or performance of later learning (Proactive, n.d.).

-Risk Factor - something that increases risk or susceptibility (Risk Factor, n.d.).

-Tuberculosis (TB) - a usually chronic highly variable disease that is caused by a bacterium of the genus Mycobacterium (M. tuberculosis) and rarely in the United States by a related mycobacterium (M. bovis), is usually communicated by inhalation of the airborne causative agent, affects especially the lungs but may spread to other areas (as the kidney or spinal column) from local lesions or by way of the lymph or blood vessels, and is characterized by fever, cough, difficulty in breathing, inflammatory infiltrations, formation of tubercles, caseation, pleural effusion, and fibrosis—called also TB (Tuberculosis, n.d.).

Overview of Breast Cancer

Breast cancer is an epidemic in the United States, the state of Ohio, and Northeast Ohio Counties, especially Mahoning County. The mortality rates from breast cancer, the U.S. is estimated at 24 per 100,000, the state of Ohio is estimated at 28 per 100,000, and Mahoning County is estimated at 35 per 100,000. Both the state of Ohio and Mahoning County have mortality rates that exceed the mortality rate for the United States. Early detection of breast cancer can help reduce the number of late stage diagnoses and associated mortality rates. Breast self-awareness focuses on helping men and women become more familiar with their breasts to readily identify abnormal changes. In order for an improvement in the breast cancer mortality rate, more preventive measures are necessary. Engaging the youth would be extremely beneficial by increasing breast health education for the adolescents and young adults. The goal of this whole research study is to determine the university population's likelihood of having heard of breast cancer, their engagement in breast health promotional activities and general knowledge concerning their breast health.

In 2009, the state of Ohio was ranked 32nd in overall breast cancer incidence and fourth overall the nation for breast cancer mortality (Komen NEO, 2011). More importantly, the national BC mortality rate statistics was significantly less than the estimated value for Mahoning County with an expected breast cancer mortality rate of 35 women per 100,000 (Komen NEO, 2011). Mahoning County has the third highest breast cancer mortality rate in the NEO region (Komen NEO, 2011). See Table 1 in the appendix for the Komen NEO Community Profile Report 2011- 2012 that includes breast

cancer statistics for the United States, the state of Ohio, Mahoning County, and the top five counties in NEO with the highest mortality rates.

With the knowledge gained from this overview of breast cancer, the next section will discuss research that has been conducted successfully to develop a foundation for the specific population in this research.

Theoretical Framework of the Health Belief Model

Background

The Health Belief Model (HBM) was first developed in the 1950s. Since then the model has become one of the most widely used conceptual frameworks for understanding health behavior. According to ETR (n.d. a) the HBM has been successful "for almost half a century to promote greater condom use, seat belt use, medical compliance, and health screening use, to name a few behaviors" (para. 1). ETR (n.d. b) also states that social psychologists Hochbaum, Rosenstock, and Kegels (1950) "who were working in the U.S. Public Health Services in the 1950'"s and developed the health belief model "in response to the failure of a free tuberculosis (TB) health-screening program" (para. 1).

ETR (n.d. b) reports social psychologists Hochbaum, Rosenstock, and Kegels were surprised in 1950 "when they offered a free TB screening program for adults with TB screening x-rays from mobile units conveniently located in various neighborhoods, very few adults engaged in the opportunity" (para. 2). Pursuing this further, the program organizers began investigating why more adults did not come out for the free health-screening program (ETR, n.d. b). Furthermore, it was the social psychologist Hochbaum, who decided to study what factors motivated the few who did participate in the free screening program. Subsequently, Hochbaum learned through his research that the

individuals who participated in the free screening program were significantly motivated by their perceived risk of disease and perceived benefits of action.

Framework

The theoretical framework for motivating individuals to take positive health actions that utilizes the desire to avoid a negative health consequence as the prime motivation is known as the HBM (ETR, n.d. a). Namely, the HBM is based on the understanding that a person will take a health-related action (i.e. Practice Breast Self-Awareness) if that person:

1. Feels that a negative health condition (i.e. Breast Cancer) can be avoided
2. Has a positive expectation that by taking a recommended action, he/she will avoid a negative health condition (i.e. being educated in one's breast health, practicing breast self-awareness, utilizing breast cancer screening tools and tests)
3. Believes that he/she can successfully take a recommended health action (i.e. he/she can identify abnormal breast changes comfortably and with confidence).

In short, the key component of the HBM is the avoidance of a negative health consequence. To illustrate, breast cancer is a negative health consequence, and the desire to avoid breast cancer can be used to motivate one into practicing breast self-awareness, being proactive and educated in their breast health. With this in mind, the HBM is an effective framework of choice when developing health education strategies (ETR, n.d. a). Overall, according to Champion and Skinner (2008) "the HBM contains several primary concepts that predict why people will take action to prevent, to screen for, or to control

illness conditions; these include susceptibility, seriousness, benefits and barriers to a behavior, cues to action, and most recently, self-efficacy" (p. 46-47). See Figure 1 in the Appendix for the Health Belief Model diagram showing the flow of modifying factors, individual beliefs, and action.

Constructs

The HBM is comprised of six constructs that include: Perceived Susceptibility, Perceived Severity, Perceived Benefits, Perceived Barriers, Cues to Action, and Self-Efficacy.

Perceived Susceptibility. Perceived susceptibility refers to beliefs about the likelihood of getting a disease or condition (Champion & Skinner, 2008). In fact, an individual must believe there is a possibility of breast cancer before he/she can become interested in their breast health and take proactive measures to reduce their risk. That is if an individual shows signs of breast self-awareness, they will often exhibit literacy in their breast health and reliance and value of breast cancer screening tools.

Perceived Severity. According to Champion and Skinner (2008), perceived severity involves "feelings about the seriousness of contracting an illness or of leaving it untreated include evaluations of both medical and clinical consequences including death, disability, and pain and possible social consequences involving the effects of the conditions on work, family life, and social relations" (p. 47). Therefore, it is the combination of an individual's susceptibility and severity that has been labeled as perceived threat.

Perceived Benefits. Champion and Skinner (2008) state the construct of perceived benefits can be described when an individual "perceives personal susceptibility to a

serious health condition (perceived threat), whether this perception leads to behavior change will be influenced by the person's beliefs regarding perceived benefits of the various available actions for reducing the disease threat" (p. 47). Primarily involving other non-health-related perceptions, such as the financial savings related to quitting smoking or pleasing a family member by having a mammogram, these factors can also influence behavioral decisions. Altogether, Champion and Skinner (2008) recognized that "individuals exhibiting optimal beliefs in susceptibility and severity are not expected to accept any recommended health action unless they also perceive the action as potentially beneficial by reducing the threat" (p. 47).

Perceived Barriers. The potential negative aspects of a particular health action are known as the HBM construct of perceived barriers, which may act as obstructions to undertaking recommended behaviors (Champion & Skinner, 2008). In other words, Champion and Skinner (2008) described perceived barriers as "kind of nonconscious [*sic*], cost-benefit analysis occurs wherein individuals weigh the action's expected benefits with perceived barriers" (p. 47). According to Champion and Skinner (2008) an individual might have the perception that "it could help me, but it may be expensive, have negative side effects, be unpleasant, inconvenient, or time-consuming" (p. 47 - 48). Lastly, Champion and Skinner (2008) reported that it was Rosenbock who determined that it is the "combined levels of susceptibility and severity provide the energy or force to act and the perception of benefits (minus barriers) provide a preferred path of action" (p. 49).

Cues to Action. In the various early designs of the HBM, the concept of cues triggering actions was included. In fact, it was in 1958 that Hochbaum thought that

readiness to take action involved the combination of two constructs: perceived susceptibility and perceived benefits. Champion and Skinner (2008) noted Hochbaum's idea that cues to action "could only be potentiated by other factors, particularly by cues to instigate action, such as bodily events, or by environmental events, such as media publicity" (p.49). However, Hochbaum did not study the role of cues to action empirically, nor have cues to action been systematically studied. Champion and Skinner (2008) reported that in spite of the appeal of the concept of utilizing cues as triggering mechanisms "cues to action are difficult to study in explanatory surveys; a cue could be as fleeting as a sneeze or the barely conscious perception of a poster" (p. 49).

Self-Efficacy. Champion and Skinner (2008) reported that in 1997, Bandura defined self-efficacy as "the conviction that one can successfully execute the behavior required to produce the outcomes" (p. 49). Champion and Skinner (2008) stated Bandura coined the sixth construct of the HBM and "distinguished self-efficacy expectations from outcome expectations, defined as a person's estimate that a given behavior will lead to certain outcomes" (p. 49). It is known that "outcome expectations are similar to but distinct from the HBM concept of perceived benefits" (Champion & Skinner, 2008).

Champion and Skinner (2008) reported "in 1988 Rosenstock, Strecher, and Becker suggested for self-efficacy to be added to the HBM as a separate construct, while including original concepts of susceptibility, severity, benefits, and barriers" (p. 49). Except self-efficacy was not explicitly incorporated into the early formulations of the HBM. With this in mind, the original model was developed in the context of circumscribed preventive health actions (i.e. accepting a screening test or an immunization) that were not perceived to involve complex behaviors.

It was not until later in 1997 that Bandura recognized and made known "the importance of self-efficacy in initiation and maintenance of behavioral change" (Champion & Skinner, 2008). According to Champion and Skinner (2008) "for a behavior change to succeed, individuals must (as the original HBM theorizes) feel threatened by their current behavioral patterns (perceived susceptibility and severity) and believe that change of a specific kind will result in a valued outcome at an acceptable cost (perceived benefit)" (p. 50). Overall, Champion and Skinner (2008) state one "must feel themselves competent (self-efficacious) to overcome perceived barriers to take action" (p.50).

Discussion

The research has shown that diverse demographic, sociopsychological, and structural variables may influence perceptions and, thus, indirectly influence health-related behavior. Champion and Skinner (2008) mention "sociodemographic factors, particularly educational attainment, are believed to have an indirect effect on behavior by influencing the perception of susceptibility, severity, benefits, and barriers" (p.50). Over the years, Champion and Skinner (2008) note "the HBM has been used extensively to determine relationships between health beliefs and health behaviors, as well as to inform interventions" (p. 53). It is the relationships that exist among the HBM constructs that help determine relationships among health beliefs and interventions that often lead to the development of successful interventions.

Consequently, Champion and Skinner (2008) find "modifying factors include knowledge and sociodemographic factors" that have the potential to influence health perceptions in which an individual's health beliefs include "the major constructs of the

HBM: susceptibility, severity, benefits, barriers, and self-efficacy" (p. 50). As a result, the modifying factors affect such perceptions, similarly like cues to action. Overall, Champion and Skinner (2008) found it is "within the 'health belief' box, perceived susceptibility and severity are combined to identify threat" (p. 50). Likewise, it is the combination of beliefs that lead to behavior.

It is entirely consistent with the HBM that interventions are more likely to be effective if they address a person's specific perceptions about susceptibility, benefits, barriers, and self-efficacy (Champion & Skinner, 2008). For instance, perceived benefits and barriers may be stronger predictors of behavior change when perceived threat, including perceived severity and perceived susceptibility is higher than when the perceived benefits and barriers are low. According Champion and Skinner (2008) "under conditions of low perceived threat, benefits of and barriers to engaging in health-related behaviors should not be salient", however, "this relationship may be altered in situations where benefits are perceived to be very high and barriers very low" (p. 61). Yet, threat may not need to be high if perceived barriers are very low, evidence of this can be illustrated through the example of the convenience of flu shots being available at nearby, local sites, like grocery stores (Champion & Skinner, 2008). Therefore, it is the predictive power of one construct in the HBM that may depend on the values of another.

Research has shown that cues to action will have a greater influence on behavior in situations where perceived threat and benefits are high and perceived barriers are low (Champion & Skinner, 2008). The HBM construct, cues to action, is the only construct of the HBM that is most often missing from research. According to Champion and Skinner (2008), "perceived barriers were the most powerful single predictor across all studies and

behaviors" (p. 50). Champion and Skinner (2008) also suggested that the relationships between the HBM constructs "both perceived susceptibility and perceived benefits were important overall, perceived susceptibility was a stronger predictor of preventive health behavior than sick-role behavior" and "the reverse was true for perceived benefits" (p. 50). Overall, the HBM construct of perceived severity was the least powerful predictor in research; however, this dimension was strongly related to sick-role behavior (Champion & Skinner, 2008). More importantly, via the HBM, adherence to breast cancer screening methods is associated with greater perceived susceptibility, lower barriers, higher benefits, and cues to action in the form of recommendations from health care providers, family, and/or friends.

Population at Risk

It is becoming more common for Americans of all races to be at risk for breast cancer. It is no longer just the aging population that is at an increased risk, because of their age- a non-modifiable risk factor. The Centers for Disease Control (2014) states "breast cancer in the United States is the most common cancer in women" regardless of race or ethnicity (para. 1). The Centers for Disease Control (2011) reported that 220,097 women and 2,078 men in the US were diagnosed with breast cancer in addition to 40,931 women and 443 men in the US who reportedly died from breast cancer (para. 2).

Breast cancer is the most collective cancer in women regardless of race or ethnicity and the most common cause of death among Hispanic women. Breast cancer is the second most frequent cause of death from cancer of the breast among Caucasians, African Americans, Pacific Islanders, and American Indian/Alaska Native women. Specifically, Mahoning County's breast cancer mortality rate was estimated at 35 per

100-thousand individuals, significantly greater than the national average, which was estimated at less than 24 per 100-thousand individuals (Komen NEO, 2011). Overall, through the course of a lifetime, one in eight women will be diagnosed with breast cancer (A.D.A.M, 2013). Anyone who notices anything unusual about their breasts, whether male or female, should contact their physician immediately.

Namely, action is necessary for greater awareness and preventive measures. An improvement in the breast cancer mortality trends can be achieved with the adoption of a youth engagement program that is intended to educate and empower young men and women by promoting proactive breast health practices and breast self-awareness.

Breast Cancer in Men

Male breast cancer is rare, but it can still occur. Even though males do not develop milk-producing breasts, a man's breast cells and tissue can still develop cancer (National Breast Cancer Foundation, n.d.). However, it is because men are diagnosed with "breast cancer at less than one percent the rate of women, studies on risk factors associated with this cancer in men have been limited in size and scope" (National Cancer Institute, 2014). The American Cancer Society (2015) reports "breast cancer is about 100 times less common among men than among women and for men, the lifetime risk of getting breast cancer is about 1 in 1,000" (para. 2). According to the American Cancer Society (2015) "the number of breast cancer cases in men relative to the population has been fairly stable over the last 30 years" (para. 2). The National Cancer Institute (2015) reports "the mean age of diagnosis is between 60 and 70 years, though men of all ages can be affected with the disease" (para.2). The National Cancer Institute (2015) predicts

"there will be a total of 2,350 new cases of breast cancer and a total of 440 deaths (men only) in the United States" (para. 1).

Male breast cancer can exhibit the same symptoms as breast cancer in women, including a lump. Breast cancer in men is usually detected as a hard lump underneath the nipple and areola (National Breast Cancer Foundation, n.d.). The survival rate for men is similar to that of women with breast cancer but male breast cancer is thought to have a worse prognosis because of the occurrences of late stage diagnosis in men (National Breast Cancer Foundation, n.d.). According to the National Breast Cancer Foundation (n.d.) "men carry a higher mortality rate than women do, primarily because awareness among men is less and they are less likely to assume a lump is breast cancer, which can cause a delay in seeking treatment" (para. 2).

Men also may be less likely than women to report symptoms, which may lead to delays in diagnosis. Men are less likely to report symptoms because the majority of men are unaware of their specific risk for developing breast cancer. Men also are more likely to associate breast cancer with women instead of their own gender. Survival rates and treatment for men with breast cancer are very similar to those for women (National Breast Cancer Foundation, n.d.). Early detection of breast cancer allows for greater treatment options and often reduces the risk of dying from breast cancer for both men and women (National Breast Cancer Foundation, n.d.).

Risk Factors: Modifiable and Non-Modifiable

The risk factors of breast cancer can be divided into two groups. First being the non-modifiable risk factors are factors that unchangeable. Second being the modifiable risk factors are lifestyle factors that can be altered. The non-modifiable risk factors

include: age, family history, early onset of menstruation, and late menopause (Breastcancer.org, 2014). While modifiable risk factors include: obesity, estrogen and progesterone hormone replacement therapy, alcohol consumption, tobacco use, and physical inactivity (Breastcancer.org, 2014).

It is estimated about twenty to thirty percent of women with breast cancer have a family history of the disease, suggesting a genetic linkage as an increased risk (A.D.A.M, 2013). It is estimated that about five to ten percent of breast cancers are thought to be hereditary, caused by abnormal genes passed from parent to child (Breastcancer.org, 2014). Kratzke, et al., (2014) found that "non-Hispanic college women (40 %) were significantly more likely to have a breast cancer family history compared to Hispanic college women (30 %) (p = .014)" (p. 126). The National Cancer Institute (2015) also states "definite familial tendencies are evident with an increased incidence seen in men who have a number of female relatives with breast cancer" (para. 3).

Women who began menstruation early, before age twelve or went through menopause late, after age fifty-five are at an increased risk for developing breast cancer (Breastcancer.org, 2014). Kratzke, et al., (2014) reported that participants had similar basic knowledge levels of modifiable BC risk factors for alcohol consumption (52 %), obesity (72 %), childbearing after age 35 (63 %), and menopausal hormone therapy (68 %) using bivariate analyses (p. 126). Women who have three alcoholic drinks per week have a 15% higher risk of breast cancer when compared to women who don't drink at all and the risk of breast cancer goes up another 10% for each additional drink women regularly have each day (Breastcancer.org, 2014). Breastcancer.org (2013) reported, "nine out of ten breast cancer cases can be triggered and/or promoted by unhealthy

lifestyle factors and environmental exposures" (para. 15). These exposures include: obesity, lack of exercise, smoking, alcohol consumption, unhealthy chemicals consumed through eating, drinking from plastic containers, breathing, and using personal care products that includes certain hair care products such as relaxers (Breastcancer.org, 2013). It is because of the modifiable risk factors linked to breast cancer that the promotion of breast cancer risk reduction through engagement in proactive and healthy lifestyle practices are supported.

One of the largest studies conducted to date pooled data from studies of about 2,400 men with breast cancer and 52,000 men without breast cancer and confirmed that risk factors for male breast cancer include obesity, a rare genetic condition called Klinefelter syndrome, and a condition involving excess breast tissue called gynecomastia (National Cancer Institute, 2014). The National Cancer Institute (2014) reports, "men with the highest body mass index had a 35 % greater risk of breast cancer compared to men with the lowest body mass index" (para. 2). The National Cancer Institute (2015) describes the predisposing risk factors for men "include radiation exposure, estrogen administration, and diseases associated with hyperestrogenism (excessive estrogen), such as cirrhosis or Klinefelter syndrome" (para. 3). On the whole, women are more likely to develop BC than men, simply because of the difference in gender.

Breast Cancer Awareness, Knowledge, and Prevention Sources

Kratzke, et al., (2014) found for "non-Hispanic college women, the most common media channels or sources were the Internet (75 %), magazines (69 %), and television (56%)" (p. 126). In this study, Kratzke, et al., (2014) also found that for non-Hispanic women, "interpersonal sources were providers (72 %), friends (57 %), and mother (35

%)" (p.126). Kratzke, et al. (2014) determined that "Hispanic college women, most common media channels or sources were the Internet (74 %), magazines (69 %), and television (61 %) and the interpersonal sources were providers (79 %), friends (65 %), and mother (36 %) (p.126). Furthermore, the study by Kratzke, et al., (2014) found a "greater percentage of college women with a breast cancer family history reported mother-daughter communication compared to college women without a breast cancer family history" (p.127). Overall, this study indicated that breast cancer prevention education for college women is needed to include risk reduction for modifiable health behavior changes as a new focus.

Kratzke, et al., (2014) unexpectedly found "that only 36 % of the participants reported breast cancer prevention mother-daughter communication" (p. 128). Kratzke, et al. (2014) also determined that "younger non-Hispanic college women were more likely to receive mother-daughter communication compared to older non-Hispanic college women" (p. 128). In contrast, there was no difference between younger and older Hispanic college women and mother-daughter communication in this study. In this study, the findings provided preliminary evidence in support of needed breast cancer prevention education to influence college women to make informed decisions about healthy lifestyles and modifiable risk factors for breast cancer risk reduction (Kratzke, Cynthia; Amatya, Anup; Vilchis, Hugo, 2014). Overall, this study provided findings that aid in building a foundation for future breast health education and breast cancer awareness.

Perceptions, Attitudes, and Beliefs

Silk, et al., (2006) revealed in a study "both adolescent and mother groups recognized gender and heredity as relevant risk factors related to susceptibility, and

detection as a strategy to decrease severity of breast cancer through early treatment" (para. 1). Additionally while adolescent girls communicated more about efficacy issues, mothers focused significantly more than adolescent girls on the role of government and industry in breast cancer prevention and treatment.

Asci and Sahin (2011) found "before the application of HBM-based breast health program, less than half of the mothers (39.2%) performed BSE; however, 3 months after the breast health program, the proportion increased to 78.4%, which was statistically significant (p = 0.00)" (p. 680). In this study the BSE ability scores of mothers were measured according to BSE control list immediately and three months after breast health program based on HBM after both periods the there was a statistically significant improvement in the scores. Asci and Sahin (2011) reported "the mean number of the mass correctly detected by mothers on breast pattern containing eight masses was higher immediately after the program (7.56 ± 0.80) than after three months (7.54 ± 0.83) according to the study's results" (p. 680). In this study, the mean score of benefits of BSE perception were found to be higher (t = 5.922, p = 0.00) three months after breast health program, and the mean score of barriers-BSE perception were found to be lower (t = 3.685, p = 0.01), both of which were statistically significant. It was determined in this study the mean scores of confidence and health motivation perceptions were found to be higher three months after breast health program than before. Additionally in this study, there was a statistically significant difference in confidence perception (t = -10.192, p = 0.00), but not significant in health motivation (t = -2.523, p = 0.15).

A study by Weiss, Hebard, and Boffetta (2013) "aimed to identify the extent to which US women were aware of factors that can influence BC risk along with a

developed profile of women most interested in taking steps to reduce their risk" (para. 1). The sample believed that family history or a genetic mutation caused breast cancer 45.5% of the time and also believed that lifestyle choices were thought to cause breast cancer 29.3% of the time, while environmental exposures were thought to cause breast cancer 25.2% of the time.

According to Weiss, Hebard, and Boffetta (2013):

> With regard to perceived impact of certain behaviors on breast cancer risk, more than half the women believed that not smoking/avoiding second-hand smoke, managing weight, avoiding unnecessary radiation, avoiding/limiting extra hormones, exercising, eating 'real' food, getting the right amount of vitamin D, eating a plant-based diet, limiting alcohol consumption, breastfeeding, buying organic produce, using non-harmful personal care products, and cooking/storing food in non-reactive containers have a moderate to strong impact on reducing breast cancer risk" (para. 3).

When in reality, the percentage of female participants who actually carried out each behavior was less than the percentage of women who believed the factor had a moderate to strong impact on reducing risk for most of the factors.

Weiss, Hebard, and Boffetta (2013) found "most of the women (78%) were interested or very interested in learning how to reduce risk" and the results indicated that the women who were committed to reducing risk and planned to seek out more information were "more likely to be white, aged 30-51, have at least one child, and a little overweight" (para. 3). The top three factors in this study that the participants wanted to learn more about were exercise (41%), monitoring weight (35%), and eating "real" food

(30%) and conversely, the study participants were relatively uninterested in learning how to reduce their alcohol consumption (12%) (Weiss, Hebard, & Boffetta, 2013).

Shepperd, et al. (1990) reported that a:

> Health act is seen as a function of an individual's beliefs among four subjective dimensions: (a) perceived level of personal susceptibility to a particular condition (e.g., the degree to which a woman feels that she is likely to get BC); (b) perceived degree of severity of the consequences which might result from contracting the condition (e.g., the degree to which a woman believes having breast cancer would seriously disrupt her life); (c) estimation of the recommended health action's potential benefits or efficacy in preventing or reducing susceptibility and/or severity (e.g., the degree to which a woman believes that BSE can help detect BC early); and (d) possible psychological or physical barriers to performing the health behavior (e.g., the degree to which a woman lacks confidence in her ability to do a BSE) (p. 360-361).

Shepperd, et al., (1990) suggested “that the overall reported frequency of BSE practice among women of lower income and lower education is comparable to the practice rates reported by women of higher income and higher education” (p. 368). Overall finding that more women of lower income and education reported never having practiced BSE compared to their higher income and education sample.

However, the Shepperd, et al., (1990) “study showed that there were no differences in the practice of regular BSE” among women with differing income and education levels (p. 368). Shepperd, et al., (1990) reported, “31 % the lower-income and -education sample reported practicing regular BSE; 37 % of the higher-income and -

education sample reported practicing regular BSE" (p.368). According to Shepperd, et al., (1990) "performance rates in this study were comparable to national survey data which indicate that between twenty and forty percent of American women practice BSE regularly" (p. 368). The findings in this study indicate that there was no statistical difference between samples of women in regular BSE practice, challenging prior research that suggested poorer and less educated women tend to practice BSE less frequently than more affluent and more educated women.

Conversely, this data revealed by this study found that, like the general population, the majority of lower-income, lower-education women do not perform regular BSE. Overall, the quality of BSE reported by the two samples was also comparable and revealed according to the quality index revealed that BSE performance by both groups of women was poor (Shepperd, Solomon, Atkins, Foster, & Frankowski, 1990). As a result of this study, the findings were encouraging because the data suggested that lower-income, lower-education women of childbearing age, like more affluent women who have received more education, may benefit from intervention strategies designed to reduce the barriers to BSE practice. This study recognizes that the challenge lies in developing and refining these strategies to make them accessible to all women regardless of income and education.

In summary, Asci and Sahin (2011) "determined that the HBM based breast health program were determined to improve susceptibility and health motivations, but the differences were statistically insignificant" (p. 681). Asci and Sahin (2011) recommended in the future that a "breast cancer HBM scale could be used to determine health

perception on screening behaviors in woman groups with different characteristics" (p. 681).

Overall, the Asci and Sahin (2011) study indicated that participation in the breast health program proved to be effective in encouraging breast health practices such as BSE and at the same time was also effective in helping one to understand and learn how to reduce to breast health practice barriers. More importantly, the Weiss, Hebard, and Boffetta (2013) study proved that the knowledge gap between the perceived causes of breast cancer and the assumed causes of BC were substantial, and the disparity between the perceived impact of certain lifestyle factors on risk and actually doing these behaviors were even greater. Substantial efforts to narrow the gap between the perceived causes of breast cancer and the assumed causes of breast cancer are imperative.

Breast Self-Awareness

Breast self-awareness (BSA) is promoted to help combat breast cancer in men and women. BSA is focused on helping a person become more familiar with his or her breasts to readily identify abnormal changes. In essence, BSA is a two-step process where a man or woman is familiar with his or her breasts and aware of any new changes also with the ability to understand of the implications of these changes. Where if there are suspected abnormal changes, a health care provider should be contacted immediately. However, it is argued by some that BSA contributes to increased anxiety and unnecessary alarm for men and women. Yet, delayed evaluation of a breast abnormality "may be associated with breast cancer and can result in late stage breast cancer diagnosis" (Brid Mac Bride MB, 2012). BSA is paramount in the early detection of breast cancer and should be a part of a men and women's general BH (Brid Mac Bride MB, 2012).

The American Cancer Society (2013) reports, “research has shown that self-awareness seems to be more effective for detecting breast cancer than structured breast self-exams” (p. 21). The American Cancer Society (2013) “no longer recommends that all women perform monthly breast self-exams (BSE), women should be informed about the potential benefits and limitations associated with BSE” (p. 21). Instead BSA is promoted for men and women and the American Cancer Society (2013) “experts have concluded that self-awareness seems to be at least as effective for detecting breast cancer as structured BSE” (p. 21). More often than not, breast abnormalities were more likely to be detected by women incidentally while bathing or getting dressed, instead of when a structured BSE was performed. BSA is a low cost, efficient method for men and women to be proactive in their breast health. BSA can be effective in reducing barriers for one to be proactive in their breast health such as a lack of health insurance, financial burden, preconceived beliefs, lack of knowledge or education, under-treatment, attitudes towards screening exams and cultural views.

It is through prompt and appropriate treatment the outlook for men and women with breast cancer can be optimistic. When the cancer is detected early, there is a greater likelihood that it can be treated with breast conserving treatment. The fight against breast cancer is strengthened via promotion of breast self-awareness. Breast self-awareness has empowered men and women to become mindful, proactive and responsible for their breast health. Breast self-awareness needs greater promotion and research because of its potential benefits and emphasis on positive breast health practices.

Misconceptions among Youths Regarding Breast Cancer Health, Cause, and Prevention

Astoundingly, it was reported in a Breastcancer.org (2013) "survey of 2,500 girls ages 8-18, nearly thirty percent believed they might currently have breast cancer" (para. 1). The results were shocking being that breast cancer is in fact, exceedingly rarely found in women under the age of eighteen (Breastcancer.org, 2013). Though the majority of breast cancers are found in women who are 50 years of age or older, it can also affect younger women. It is estimated that only eleven percent of all new cases of breast cancer in the United States are found in women younger than forty-five years of age (Breastcancer.org, 2014). The results of the Breastcancer.org (2013) survey raise the question "Why are so many young women mistaking the normal signs of breast development as symptoms of breast cancer?" (para. 2). This misconception may be a result of the knowledge gap between the perceived causes of breast cancer and the assumed causes of BC. This is because, "greater than twenty percent of the girls surveyed believe that breast cancer is caused by infection, tanning, drug use, stress, and breast injury or bruising" (Breastcancer.org, 2013). However, none of the mentioned causes increase the risk of developing breast cancer. Surprisingly, very few girls surveyed knew how to reduce their risk of developing breast cancer in their lifetime. The low-levels of literacy of breast health are in dire need of improvement for the reduction in the knowledge gap and increase in breast health practices.

In a study of relatively 3,000 girls, aged 8 to 18, Breastcancer.org (2009) reported "about 66 % percent of the girls reported that a close relative or friend had been diagnosed with breast cancer" and "five percent of the participants reported a mother with breast cancer" (para. 2). Breastcancer.org (2009) reported "approximately 33 % of

the girls reported that they already were worried about being diagnosed with breast cancer" (para. 3). Breastcancer.org (2009) reported that many of the study's participants believed that many common myths about breast cancer causes were valid and mistakenly believed that factors known not to increase breast cancer risk did increase risk. Furthermore, Breastcancer.org (2009) reported "only 45% of the girls had talked to a parent and only 40% had talked to a doctor about normal breast development and breast cancer" (para. 8). Overall, the results of the study were troublesome because young women and girls who were misinformed about breast cancer may begin to view the disease as something that eventually will happen to them. This perception carried by young women can be attributed to the lack of information to empower young women to establish proactive breast health behaviors to reduce their risk of ever getting breast cancer.

One could hypothesize that this misconception may be due, in part, to the media's influence on young girls in how they represent breast cancer on television, in print, and on the internet, being that the sample of young women were very aware of media stories on breast cancer. Young women are very impressionable and it seems that their response to the media's presentation of breast cancer awareness has initiated fear because of the lack of resources to provide greater understanding of breast health and breast cancer. According to a Breastcancer.org (2008) study, researchers hypothesized "that media coverage may be contributing to the girls' fear and misconceptions" and were "concerned that the participant's fears and misconceptions could prohibit making healthy choices to keep their breast cancer risk as low as it can be" (para. 5). With such a vast need for breast cancer prevention education among younger adults, the youth populations were

explored in this thesis research. Unfortunately breast health education and awareness was not targeted or aimed at this population group. If early preventive measures were used, such as the promotion of youth breast health education and awareness, then this could result in the reduction of the breast cancer mortality rate. Young women need to be made aware of the need to adopt healthy diet and lifestyle choices to reduce breast cancer risk and keep it minimal, supporting the need for greater breast health educational efforts to dispel myths for the younger female populations.

It is evident that without accessible and accurate information, young women can mistake regular breast development changes, such as the formation of breast buds, as symptoms of breast cancer. This is because of the alarming statistical findings that are associated with breast cancer mortality rate and the misconceptions of young women signifying that there is a critical need for youth engagement involving the promotion breast health education and awareness. Engaging the youth in breast health education and awareness program promotes optimal adolescent and young adult understanding of breast health education, development, awareness, and wellness along with being informed of breast cancer risks and myths. Furthermore, engaging the youth in a breast health education and awareness program will assist in developing strategies for improving measurable breast health, awareness, and developmental outcomes for young women. Overall, it is the understanding of facts, reassurance, and a thorough discussion of breast health that are necessary. Whether breast health education takes place in school or at home, knowledge is a powerful tool that can replace girls' fears and misconceptions with understanding, awareness, and healthy choices.

Young Women's Breast Health Education and Awareness Legislation

On Tuesday, December 9, 2014, the United States House of Representatives considered the Young Women's Breast Health Education and Awareness Requires Learning Young (EARLY) Act Reauthorization of 2014, H.R. 5185. It was representative Wasserman Schultz who introduced the H.R. 5185 on July 24, 2014. The EARLY Act was a bill that began in the House of Representatives and amends the Public Health Service Act to reauthorize through FY2019 the EARLY Act. On, December 17, 2014, H.R. 5185 was presented to President Barack Obama and the bill was signed into law the following day and it became Public Law Number 113-265.

The EARLY Act was initially signed into law in 2010 and authorized the CDC to implement a broad education and outreach campaign to highlight the breast cancer risks facing young women. H.R. 5185 reauthorizes programs related to young women's breast health and breast cancer, including a public education campaign, a health care professional education campaign, research activities, support for young women diagnosed with breast cancer, and reporting requirements. According to the Library of Congress (2014) "the purpose of the EARLY Act was to support: (1) campaigns to educate the public and health care professionals about young women's breast health, (2) research into prevention of breast cancer in young women, and (3) support for young women with breast cancer" (para.1). Evaluations are required to identify any activities that are duplicative with other efforts and to evaluate the success and impact of the reauthorization of the EARLY Act.

The importance of the EARLY Act is the focus on young women with the need to take preventive measures and the significance of breast health education. The legislation

of the EARLY Act is imperative to a forward movement and greater strides to reduce the breast cancer epidemic. The EARLY Act acknowledges and supports the need to educate younger generations including youths and young adults in their breast health. The EARLY Act justifies breast health promotion and educational efforts for younger generations instead of typically focusing on aged women.

Gaps and Limitations in Breast Cancer Research

Breast cancer research studies often rely research instruments that utilize a self-reported survey design. This can lead to limitations that are a result of potential biased responses among participants for the sensitive health topic (i.e. breast cancer) that could have resulted in errors or untruthful responses. Some participants may not disclose personal information about their breast health practices or breast cancer diagnoses. In breast cancer research it is important to consider limitations such as the health perceptions, attitudes, and behaviors of the participants.

According to the United States Department of Health and Human Services (n.d.) "adolescents (ages 10 – 19) and young adults (ages 20 – 24) make up about 21% of the population in the United States" (para. 2). Unfortunately, breast health education and awareness efforts are not targeted or aimed at this particular population group. If early preventive measures were used such as the promotion of youth breast health education and awareness programs, the breast cancer mortality rate may be reduced.

Summary

The review of literature has summarized the current research completed on the topic of discussion. The review of literature has recognized breast cancer as an epidemic in the United States, the state of Ohio and in Mahoning county, reviewed the theoretical

framework of the HBM in research, discussed the population at risk for breast cancer, breast cancer in men, breast cancer risk factors, and the importance of breast health education and breast self-awareness. With this knowledge there is still a gap in research focusing on breast health knowledge, practice, and awareness targeting adolescents and young adults. Indicating the need for breast health education and breast cancer awareness programs in the university environment, public school systems, or within each family unit. The research can be applied for future breast health education and awareness program development, if the hypotheses are correct. Results can also be adapted to other universities, public school systems, or local health departments.

In this study, the sample included a total of 179 participants. In the sample, 157 (87.7%) participants identified with the Caucasian race. A total of 49 (27.4%) participants were between the ages of 45 and 54 years. The next most common age range in the sample was between the ages of 55 and 64 years with a total of 48 (26.8%) participants. The sample consisted of a total of 149 (83.2%) female and 29 (16.2%) male participants. Relatively three-fourths of the sample indicated that they have attained high levels of education including a Bachelor's degree and beyond. A total of 63 (35.2) participants indicated that they have earned a Masters degree and 39 (21.8%) participants have earned a Doctoral degree. The majority of the participants, 156 (87.2%) indicated that they have heard of breast cancer before while 23 (12.8%) indicated that they have not heard of breast cancer before. The great majority of participants, 171 (95.5%) have not been diagnosed with breast cancer and only 8 (4.5%) have been diagnosed with breast cancer. More than half of the sample, a total of 105 (58.7%) participants indicated that they do not have a family history of breast cancer and 74 (41.3%) participants have a

family member diagnosed with breast cancer. See Table 3 in the appendix for a complete description of the sample's demographics and Table 4 for the sample's breast cancer knowledge and history.

The expected outcome of this research study is to raise awareness about the density of breast cancer in Mahoning County and attempt to propose causes and solutions to the problems. The researcher expected for 100% of the sample to have heard of breast cancer, not only 87.2% of those surveyed. The researcher expected a higher percentage of the sample to have breast cancer himself or herself or a family member diagnosed. This is because of the high number of new cases of breast cancer, known cases of breast cancer, and breast cancer death rates in Mahoning County. Furthermore, it was expected that the great majority of participants would be female.

CHAPTER III

METHODS

Chapter III outlines the methodology of this research study. The purpose of this study is to use the Health Belief Model (HBM) to investigate if the community is engaging in breast health promotion activities and is knowledgeable about their breast health. This can assist health professionals in developing more successful breast health education and awareness programs for younger generations through the evaluation of the university population. This may enable health programs to promote healthy lifestyles more successfully, help fight the breast cancer mortality rate and improve breast health knowledge and awareness. The HBM is based on six constructs that help gauge an individual's health beliefs and health behaviors, as well as to inform interventions. This study will answer three distinct research questions relating to the issue of breast cancer and the need for health promotion focusing on breast health education and awareness: 1) Are the subjects aware of the statistically significant breast cancer mortality rate in Mahoning County, using the HBM? 2) Are the subjects knowledgeable and aware of breast health education and breast cancer, according to the HBM? 3) Will the subjects support a youth engagement program that would empower young women and promote breast health education and awareness, based upon the HBM?

The type of research utilized is a survey research design, in which exploration will lead to insight regarding a university population and their tendencies towards having heard of breast cancer along with their breast health knowledge, awareness, and practices. The results could later be applied in health program development at campus gyms or recreation centers, and possibly through other health organizations. Data were collected

through a volunteer-based online survey and analyzed using inferential and descriptive statistics. This research project will acquire data to look at the perceptions of breast health knowledge and awareness among a university population. This study evaluated the likelihood of having heard of breast cancer and compliance of breast health education and awareness behaviors of university students and faculty members. By pairing the HBM variables and resulting components long with the socio-demographic characteristics, relationships can be presented, compared, and analyzed for correlation. The data will conclude the sample characteristics of those participants who have heard of breast cancer and seemingly have strong or weak breast health beliefs that will be a reflection of the levels of breast cancer awareness among a university sample. This chapter will state the theoretical framework used during the development of methods and procedures for this study. The study was quasi-experimental volunteer self-report in design. A copy of the electronic survey can be found in the appendix.

Hypotheses

This research and statement of the hypotheses is designed to reject the null hypotheses (H_0), thus accepting by default the alternative hypotheses (H_1).

- H_0: The majority of the surveyed population will not have heard of breast cancer.
- H_1: The majority of the surveyed population will have heard of breast cancer.
- H_0: The age range and highest level of education will not be a significant predictor in the participant having heard of breast cancer.
- H_1: The age range and highest level of education will be a significant predictor in the participant having heard of breast cancer.

- H_0: The Health Belief Model constructs will not significant factor in those participants who have heard of breast cancer.
- H_1: The Health Belief Model constructs will be a significant factor in those participants who have heard of breast cancer.

Setting

This study was conducted at a midwestern urban research university with relatively 14,000 students and faculty members. According to College Portrait in fall of 2013, there were a total of 13,381 students (1,203 graduate students) enrolled at Youngstown State University. 74% of students are Caucasian, 14% are African American, 3% Hispanic, 1% Asian, and less than 1% American Indian or Alaskan Native, and Native Hawaiian or Pacific Islander (College Portrait, n.d.). College Portrait (n.d.) estimates that the average age of YSU students is 24 years of age that 25% of students at YSU are greater than 25 years of age for undergraduate students. There are similar numbers of males and females, respectively.

Survey dissemination took place in April and May 2015 via the university personal announcement web portal and emails were also sent to the entire university population, including students and faculty members.

Participants

The sample included participants who were 18 years of age or older. This was a primary requirement for partaking in the study. The number of subjects for the study was dependent on availability. The researcher invited the entire YSU population to participate in this research study. A convenience sample design was most feasible for collection,

since it was reliant on volunteers. The researcher aimed to achieve a minimum of 100 responses and strived for the targeted response rate of 200 participants.

Subject participation in this research study was completely voluntary. The subjects were able to withdraw from participating in the study by: 1) not clicking on the electronic link, 2) deleting the invitation email, or 3) not submitting a response. The potential participants were notified that participation in this study is voluntary, although all questions must be answered in order to submit the survey and to be eligible for the $25.00 dollar VISA gift card incentive.

The inclusions of this research study were limited to male and female subjects who were willing to participate in the survey and who were also 18 years of age and older as well as YSU students or faculty members. The study subjects excluded were those who were not willing to participate in the survey or those who were under the age of 18 and not eligible to participate. A total of 179 responses were gained and the data collection period ended on May 18, 2015.

The researcher intended to add to the validity of the study by designing a randomized method for recruiting participants. However, the desired random selection of participants was not a viable option for the researcher. Due to University email policies, the researcher was given the option of surveying the entire YSU population or the entire population of the Bitonte College of Health and Human Services. The researcher decided to survey the entire YSU population to ensure ample participation allowing for the study to have statistical significance. On March 31, 2015, the principal investigator submitted a second request for electronic survey dissemination that included the modifications of research approved by YSU's IRB.

The dissemination process met the criteria of IRB exemption for minimal risk survey research. Survey identification numbers coded the survey participants. However, personal information was utilized to determine the grand prize winner of the $25.00 dollar VISA gift card. The personal information supplied by the participants was used only for the lottery drawing and properly discarded after selecting the grand prize winner and were thereby not included in the survey data. There were not any risks involved for YSU students and/or faculty members for their participation in this study. The study results were handled in a professional manner. There were no adverse events to the subject's health or identity by participating in the study. Furthermore, the utilization of Google Forms to collect and analyze data eliminated the possibility of human error ensuring reliability of the study. More importantly, all documents and data were stored on a personal, password-protected computer accessible only to the researcher. Among the 14,000 students and faculty invited, 179 responses were gained, thus making the sample (N=179).

Measurement Instrument

A multiple question survey was developed to collect participant data on demographics, breast cancer background, and the constructs of the Health Belief Model. The researcher-made survey *Evaluating Breast Health Education and Awareness in the College Environment Using the Health Belief Model* was designed with a total of 23 questions with two of those questions pertaining to entering the lottery drawing. The electronic survey was hosted via the survey software, Google Forms. In order for the participant to submit their response, the first 22 survey questions must be answered. The only question that is optional is the very last survey question that is reserved for the

participants who wished to enter the lottery drawing for a $25.00 dollar VISA gift card. The final survey question is where the participant was required to enter their contact information for the lottery drawing.

This study's survey was created using Google Forms. Google Forms allows users to build surveys for free and does not place any limitations of the number of questions allowed per survey form or limit the maximum number of participants. Google Forms uses Google Sheets to open, edit, and create spreadsheets of the collected data. This data can be converted to a Microsoft Excel document and then opened via statistical software of choice. The only way to access or participate in the electronic survey was through the following hyperlink:

https://docs.google.com/forms/d/1zkt44J6qw8FfgmZVAtC2EthFSpDZIqMyUatsyGCOwuQ/viewform.

Only the principal investigator and those involved in the research process were provided with access to the research instrument's hyperlink. This prohibited the general public from accessing the research instrument. After the data collection period ended, the survey expired and those who attempted to access the hyperlink were informed that the data collection period ended and the survey was no longer available. The research instrument was developed by the researcher while being supervised by the three members of the researcher's thesis committee. Multiple occurrences of enhancements were conducted to better develop the survey's validity. The survey responses were collected and analyzed by Google Forms, so human error was not a concern in affecting reliability.

The survey seeks to gain information regarding the participants' perceived risk for breast cancer and if the individual utilizes screening and preventive methods, in correlation with the HBM. Even though breast cancer is more common in women than men, men can still get breast cancer. Men who have a family history of the disease have

an increased chance of developing breast cancer due to this non-modifiable risk factor. The researcher developed the survey so that both males and females were able to participate in the study. By inviting both males and females to participate the researcher expected to generate a larger sample for the study.

The brief survey focused on different aspects of breast health knowledge and awareness by using a modified, unique version of the Health Belief Model. The survey took the subject about five to seven minutes to complete. As previously indicated, basic demographical information was collected including variables “race”, “age”, “gender”, and “highestedu”. The variable “race” had the following selections for the participant to indicate their race/ethnicity: Caucasian/White, African American/African/Black/Caribbean, American Indian, Pacific Islander/Asian, Hispanic/Latino, Other and prefer not to answer. The variable “age” had the following selections for the participant to indicate their age range: 18-24 years, 25-34 years, 35-44 years, 45-54 years, 55-64 years, and 65 + years. The variable “gender” had the following options: male, female, and prefer not to answer. The variable “highestedu” had the following selections indicating the highest level of education obtained: High School/GED, Some college, 2 year college degree (Associate’s Degree), 4 year college degree (Bachelor’s Degree), Masters degree, Doctoral degree, Professional degree (MB, DO, MD), and Prefer not to answer.

The survey was comprised of three dichotomous questions requesting a single answer of “yes” or “no” evaluating the sample’s BC background and knowledge including the variables “heardofBC”, “selfBC”, and “famBC”. The variable “heardofBC” measured if the participant has heard of breast cancer. The variable “selfBC” measured if

the participant has or had breast cancer. The variable “famBC” measured if the participant has or had a family member with breast cancer.

The remaining survey questions utilized a five point Likert Scale ranging from strongly disagree (1), disagree (2), neutral (3), agree (4) and strongly agree (5). These particular 14 survey items focused involved variables that comprised the theoretical framework and constructs of the HBM. The 14 HBM survey questions were combined for factor analysis including: selfriskgreat, physicalhealthrisk, BCriskfactors, valueBHBSA, BSApreventefforts, youthpromotion, activediff, MCstat, eduBH, priorBHedu, imphealth, screentest, confidentBSA, and childpart. In the next paragraph, the HBM survey questions and the associated variable will be discussed.

The first variable “selfriskgreat” was a HBM survey question that asked the participant to evaluate the question: “My chances for getting breast cancer are great”. The second HBM survey question involved variable “physicalhealthrisk” that asked the participant to evaluate the question: “My physical health makes it more likely that I will get breast cancer”. The third variable “BCriskfactors” was a HBM survey question that asked the participant to evaluate the statement: “Age, family history, obesity, and physical inactivity can increase the chance of developing breast cancer”. The fourth variable “valueBHBSA” was a survey question that asked the participant to evaluate the statement: “Significant help can be gained by being educated in my breast health and by practicing breast self-awareness”. The fifth variable “BSApreventefforts” was a survey question that asked the participant to evaluate the statement: “Being aware and hands-on in my breast health can help prevent future problems”. The sixth variable “youthpromotion” was a survey question that asked the participant to evaluate the

statement: “Educating the youth about their breast health and encouraging awareness can help instill lifelong healthy habits through adulthood”. The seventh variable “activediff” was a survey question that asked the participant to evaluate the statement: “Being active in my breast health would require starting new habits, which is difficult”. The eighth variable “MCstat” was a survey question that asked the participant to evaluate the statement: “In Mahoning County the death rate from breast cancer is estimated at 35/100,000 women. This is significantly greater than the national average death rate from breast cancer that is estimated at 24/100,000 women”. The ninth variable “eduBH” was a survey question that asked the participant to evaluate the statement: “I feel that I am educated in my breast health”. The tenth variable “priorBHedu” was a survey question that asked the participant to evaluate the statement: “I have received educational information about my breasts”. The eleventh variable “imphealth” was a survey question that asked the participant to evaluate the statement: “I frequently do things to improve my health”. The twelfth variable “screentest” was a survey question that asked the participant to evaluate the statement: “I rely on screening tests for breast cancer (i.e. breast self exam, breast self awareness, clinical breast exam)”. The thirteenth variable “confidentBSA” was a survey question that asked the participant to evaluate the statement: “I feel confident that I understand how my breasts normally feel and look, I would be notice any unusual changes”. The fourteenth variable “childpart” was the last HBM survey question that asked the participant to evaluate the statement: “If I had or have a female child, I would allow them to participate in a youth program that promotes breast health education and awareness at school”.

The survey was conveniently hosted via computer with Internet access, so reports were generated directly from Google Forms, to Google Sheets, and included statistical software exporting capabilities. Multiple questions were asked to allow for a well-rounded analysis of the sample. The consent form of the survey was also an agreement that the participant was 18 years or older, eligible and willing to complete the entire survey.

Since the modifications of research created slightly less benign questions it was necessary for the principal investigator to address the sensitive topic of breast cancer. The principal investigator addressed the sensitivity of the subject by making the participant aware of available Student Health Services at YSU. Health resource information was provided to the participants and if they were interested in speaking with someone about their health or breast cancer in general, they were advised to contact Student Health Services located in Kilcawley House on YSU campus or by calling (330) 941-3489. The participants were also informed that Student Health Services are free to YSU students and information is kept confidential. Providing health resource information for the participants minimizes the potential for emotional and/or psychological harm of subjects associated with the sensitivity of the research instrument topics. Additionally, the consent document fully informs the participant of what is voluntary and what is not, minimizing the perception of coercion to participate. The ability to minimize harms aided in having achieved the criteria of exemption for minimal risk survey research.

Procedures

This study began with a “Request for Initial Approval of Research Proposal” that was granted prior to approval from YSU’s Internal Review Board (IRB) for the

Protection of Human Subjects. Modifications of research were prepared, submitted, and final approval was granted by the IRB on March 31, 2015. The researcher prepared a letter of request for the Administrative Assistant to the Dean of the Bitonte College of Health and Human Services to disperse the electronic survey via email to the entire YSU population of students and faculty using the university email directory. Using a survey method, the investigator surveyed the participants' having heard of breast cancer along with evaluating their levels of breast health education and awareness.

The researcher did not initially decide to offer compensation for the participant's time and contribution to the research study by completing the electronic survey. After considering the incentive for individuals to participate in the study, the researcher determined it was necessary to compensate the participants. The researcher decided to provide incentive for participation in the research study by offering the participant entry in a lottery drawing for a chance to win a $25.00 dollar VISA gift card. The researcher generated the results of the computerized lottery drawing by utilizing www.random.org. The True Random Number Service website, is a free, true random number generator. The researcher used survey identification numbers to select the grand prize winner beginning with number two and ending with number 180 (N=179). The researcher had to do a total of two drawings to determine the grand prize winner, as the first number drawn was that of a respondent who did not want participate in the lottery drawing. The second drawing was successful in generating a grand prize winner.

The survey dissemination took place in April and May of 2015 via my.ysu.edu webpage portal and YSU email. Original permission from the IRB was obtained on February 25, 2015 to send emails inviting students and faculty members to take the

survey by including a direct hyperlink to the research instrument. Response and approval for dissemination of the electronic survey related to IRB Protocol #108-15, was received on March 31, 2015 post approval of modifications of research. Following the submission of the "Amendment/Modification of Research" form to the IRB, approval was granted for dissemination of the revised survey and the lottery for participant compensation. The researcher developed a request for the distribution of the electronic survey and submitted the request to Mr. Steve Katros, Administrative Assistant to Dean Mosca. The request for electronic survey dissemination was sent and delivered via e-mail on March 3, 2015.

The first study invitation was posted on the my.ysu.edu personal announcement web portal inviting students and faculty to participate. The second invitation was inserted into an email that was sent to the entire YSU population of students and faculty. A reminder email was also delivered. An informed consent letter and survey hyperlink were included in the email for participants to conveniently access the survey. Beginning on April 9, 2015 through April 30, 2015 the study invitation was posted on my.ysu.edu in the personal announcements web portal. The second method of dissemination involved email recruitment that gained the majority of respondents. The initial target response rate of 100 participants was achieved. On April 16, 2015 the initial email invitation was sent to the entire university population and a reminder email invitation was sent on April 30, 2015. The electronic survey dissemination invited YSU students and faculty members to participate through a friendly email, with no projected influencing factors from the study. On May 7, 2015 after meeting and discussing the sample size with the investigator's thesis committee, it was decided to extend the collection period and attempt to achieve a target response rate of 200 participants. On May 18, 2015 the data collection period

closed and a 40th day census was obtained. The sample size did not achieve the revised targeted response rate of 200 participants as the final sample included a total of 179 respondents.

Among the survey dissemination, the participants were invited to engage in the study by clicking a provided hyperlink for direct access to the electronic survey. The entire survey took about 5-7 minutes to complete, as estimated and stated in the participant informed consent document. Once the participant finished the survey the researcher expressed gratitude for taking the survey in a short concluding message that informed the participant that their response was collected and that their participation was greatly appreciated. Participants were thanked for the contribution to the research study and willingness to complete the electronic survey. At this time, participants were provided with health resource information and informed of available student health services for those participants who had any questions or concerns about their own personal health or the subject of the research study. The collected data from the sample were analyzed to determine if the sample has heard of breast cancer and what factors contribute to their breast health education and awareness.

Data Analysis

The data analysis program IBM SPSS Statistics version 23 was used to analyze the data. Statistical and qualitative techniques were used to analyze the data. Descriptive and inferential statistics were used to convey the results of the data. Once all statistical analysis was completed, the null hypotheses were then tested and evaluated for rejection or acceptance. A p-value is a measure of statistical significance that indicates probability of an event occurring due to chance alone (University of Michigan, 2010). The greater

the *p*-value, the higher the probability the event observed can be explained by chance (University of Michigan, 2010). According the University of Michigan (2010), generally *p*-value results can range from 0.0 to 1.0 and *"p*-values of either 0.05 or 0.01 are used as a cutoff value, but this value is arbitrary" (para. 1). Results larger than the determined cutoff value were considered likely to have attributed the event to chance, while results smaller than the cutoff value were likely to have occurred because of a real explanation (University of Michigan, 2010). In this study all *p*-values reported were values less than .10. It is common for these tests to have been run with an alpha level of .05 (5%), but other levels commonly used also include .01 (1%) and .10 (10%) (Statistics How To, n.d.). According to San José State University (n.d.), when the "*p*-value is less than or equal to .10, the observed difference is considered to be marginally significant" (para 5). Using a *p*-value of less than .10 will show how some factors were close the .05 alpha level and were marginally significant in this study. If the sample size were greater, a larger study would have had the potential to produce higher levels of confidence (i.e. *p*-values less than .05 or .01) (Shuttleworth, 2008). In this study, setting the alpha to .10, then a p-value of .10 or less was required to reject the null hypothesis and established statistical significance.

Summary

This chapter concludes the theoretical framework used during the development of methods and procedures for this study. Chapter IV will conclude the results study and report statistical significance amongst the variables that could lead to positive applications in the college environment or local community. The measurement instrument, electronic survey, will be presented in the appendix.

CHAPTER IV

RESULTS

Chapter IV features the results of the current research to identify if components of the Health Belief Model (HBM) can be correlated with self-reported frequency of breast cancer knowledge and awareness. Demographic information will be presented to describe the sample, the research questions, hypotheses, and methods will be reviewed. The results that will be presented in Chapter V will include the research conclusions, discussion and supplementary appendices.

Hypotheses

This research and statement of the hypotheses is designed to reject the null hypotheses, thus accepting by default the alternative hypotheses.

- H_0: The majority of the surveyed population will not have heard of breast cancer.
- H_1: The majority of the surveyed population will have heard of breast cancer.
- H_0: The age range and highest level of education will not be a significant predictor in the participant having heard of breast cancer.
- H_1: The age range and highest level of education will be a significant predictor in the participant having heard of breast cancer.
- H_0: The Health Belief Model constructs will not significant factor in those participants who have heard of breast cancer.
- H_1: The Health Belief Model constructs will be a significant factor in those participants who have heard of breast cancer.

Review of Methodology

The purpose of this study is to investigate if modifying factors (age, race, and highest level of education) can help shape individual beliefs (self-efficacy and cues to action) and resulting action (health behavior) by utilizing the Health Belief Model (HBM) in self-reported frequencies. Participants who have heard of breast cancer may be in the advanced stages of the HBM where the individual views breast cancer as a negative health consequence, desires to avoid breast cancer, and are motivated into practicing breast self-awareness as well as being proactive and educated in their breast health. This research can assist health professionals in developing more successful health programs for younger generations, targeting youth and young adult populations. This may enable health programs to promote breast health education and breast self-awareness more successfully and could potentially help combat the breast cancer epidemic and late stage diagnosis with greater awareness and involvement in one's breast health.

The following research questions were addressed in this study:

1. Will the subjects agree with the statistically significant breast cancer mortality rate in Mahoning County?
2. Will the subjects show signs of cues to action and self-efficacy according to the HBM?
3. Will the subjects agree with breast health education and awareness promotion for adolescent and young adult populations?

The type of research utilized is a survey research design in which exploration will lead to insight regarding a university population and their tendencies towards breast health beliefs and practices. The results could later be applied in health program

development for public school systems, at community recreation centers, and possibly through other health organizations. Data were collected through an online survey and analyzed using the binary logistic regression model which was appropriate for the binary dependent variable that have order but it can not be determined that the interval between "strongly disagree" and "disagree" is equivalent to the interval between "disagree" and "neutral", nor can it be determined that there is an absolute zero point for level of agreement (Virginia Tech, n.d.).

A survey designed by the researcher was disseminated via two convenience-sampling methods, first by posting a personal announcement to YSU students and faculty via the web portal and then by emailing the entire population of a midwestern urban research university with relatively 14,000 students during the months of April and May 2015. The study sample included 179 responses total. Descriptive and inferential statistics were used to describe the statistical analyses. Frequency distributions were produced to show the univariate analysis of variables representing demographic characteristics (race, age, gender, highestedu), breast cancer background (heardofBC, hasBC, and famBC). There were a total of 14 survey questions that focused on the HBM and were combined for factor analysis including: selfriskgreat, physicalhealthrisk, BCriskfactors, valueBHBSA, BSApreventefforts, youthpromotion, activediff, MCstat, eduBH, priorBHedu, imphealth, screentest, confidentBSA, and childpart. The dependent variable for the multivariate analysis was a breast cancer background variable, specifically “heardofBC”. By pairing the HBM variables and resulting components, the demographic characteristics, relationships can be presented, compared, and analyzed for correlation. The data will conclude the sample characteristics of those participants who

have heard of breast cancer and seemingly have strong or weak breast health beliefs that will be a reflection of the levels of breast cancer awareness among a university sample. Post participation in the study, the sample might be more likely to engage in proactive breast health practices and become more aware of their breast health and enable participation in breast cancer screenings, new habits of breast self awareness, greater educational levels, and personal risk awareness and reduction.

A binomial logistic regression predicts the probability that an observation falls into one of two categories of a dichotomous dependent variable based on one or more independent variables that can be either continuous or categorical. Using logistic regression, the goal is to predict from knowledge of relevant independent variables not a precise numerical value of a dependent variable, but rather the probability (p) that it is 1 (event occurring) rather than 0 (event not occurring) (University of Strathclyde, n.d.). A binomial logistic regression is also known as a binary logistic regression and can often referred to simply as logistic regression. In this case, binominal logistic regression will estimate the probability of the sample having heard of breast cancer.

The following formula represents the purpose of the study:

$$p = \frac{e^{\alpha + \beta x}}{1 + e^{\alpha + \beta x}}$$

Where p is the probability of a 1, e is the base of the natural logarithm (about 2.718) α and β are the parameters of the model (as in normal linear regression). The value of α yields p when x is zero, and β indicates how the probability of a 1 changes when x changes by a single unit (University of Strathclyde, n.d.). The University of Strathclyde (n.d.) states “because the relation between x and p is nonlinear, β does not have as straightforward an interpretation in this model as it does in ordinary linear

regression" (para. 1). An important concept in logistic regression is that of the odds ratios (*OR*). Since logistic regression is based on the probability of an event occurring, the model allows us to calculate these, which are defined the ratio of the odds of an event occurring to it not occurring (University of Strathclyde, n.d.).

Statistical Analysis

Using IBM SPSS Statistics version 23, statistical analyses were performed on the data obtained from the survey *Evaluating Breast Health Education and Awareness in the College Environment Using the Health Belief Model*. The univariate analysis provided data for the frequency distribution of the categorical variables. Additionally, the binary logistic regression was used to evaluate the relationships between multiple categorical variables by pairing the hypotheses variables to determine if a correlation exists. Furthermore, a cutoff p-value < .10 was used for all tests of statistical significance.

The data derived from this research study is that of an applied statistical method. Using an applied statistical method involves the combination of descriptive statistics and inferential statistics application. Descriptive statistical methods were used summarize the data collected from the survey and to better communicate the results research study. Inferential statistical methods were also used to help draw inferences and conclusions about the selected subject population. Table 2 in the appendix presents a summary of the definitions of the variables in this study.

Descriptive Statistics

Simple descriptive statistics tools such as frequency and percentage were used to describe the socio-demographic characteristics of the respondents. The socio-demographic information of race, age range, gender, highest level of education, self

breast cancer, and family breast cancer status describe the sample but not used in the immediate analyses will be discussed. The participants were among different age groups including 15 (8.38%) from ages eighteen to twenty-four, 22 (12.29%) were of ages twenty-five to thirty-four, 40 (22.35%) were of ages thirty-five to forty-four, 49 (27.37%) were of ages forty-five to fifty-four, 49 (27.37%) were fifty-five to sixty-four, and 4 (2.23%) were sixty-five or older. The race of the participants included 157 (87.71%) Caucasian/White respondents, 10 (5.59%) African American/African/Black/Caribbean respondents, 0 (0.0%) American Indian respondents, 4 (2.23%) Pacific Islander/Asian respondents, 5 (2.79%) Hispanic/Latino respondents, 2 (1.12%)respondents selected other and 1 (0.56%) preferred not to answer or indicate their race/ethnicity. When analyzing the frequency of the participant's gender, the study was comprised of 149 (83.24%) females, 29 (16.20%) males, and 1 (0.56%) respondent preferred not to indicate their sex. Among the highest level of education obtained, in this study, 5 (2.79%) respondents stated that they have a high school diploma/GED, 18 (10.06%) have some college, 12 (6.70%) have a 2-year college degree (Associate's degree), 38 (21.23%) have a 4-year college degree (Bachelor's degree), 63 (35.20%) have a Masters degree, 39 (21.79%) have a Doctoral degree, 3 (1.68%) have a Professional degree (MB, DO, MD), while 1 (0.56%) preferred not to answer (see Table 3).

Among the study participants, 156 (87.15%) of respondents answered "yes" having heard of breast cancer and the remaining 23 (12.85%) of respondents indicated that they have not heard of breast cancer before by answering "no". A total of 3 (4.47%) study participants answered "yes" indicating that they have or have had breast cancer, while 171 (95.53%) answered "no" that they have not ever had breast cancer. Among the

study participants 74 (41.34%) of the study participants answered “yes” that they have or have had a family member with breast cancer, while 105 (58.66%) participants indicated that they have not ever had a family member with breast cancer by answering “no”. Table 4 presents a summary of the frequencies of the demographic characteristics and breast cancer background.

Inferential Statistics

The researcher opted to conduct an exploratory factor analysis (EFA) of the data to reduce the number of variables associated with the Health Belief Model (HBM). Employing an EFA allowed the researcher to refine the number items on a scale for the purposes of scale development. The researcher was able to then determine the number of latent variables (dimension/factor) underlying a set of items. The researcher used EFA in this study to determine whether one or multiple dimensions exist for the HBM set of variables. More importantly, the researcher used the dimensions produced by the EFA for further analysis and in this case, binary logistic regression with dichotomous dependent variables.

Factor Analysis

A factor analysis with a Varimax (orthogonal) rotation of the fourteen Likert scale questions from the *Evaluating Breast Health Education and Awareness in the College Environment Using the Health Belief Model* survey questionnaire was conducted on data gathered from 179 participants. An examination of the Kaiser-Meyer Olkin measure of sampling adequacy suggested that the sample was factorable (KMO = 0.74).

The extraction technique of the factor analysis involved extracting factors with eigenvalues greater than one. Eigenvalues are the variances of the factors that were used

to restrict the number of factors to only those that are the most influential in the model (UCLA: Statistical Consulting Group, n.d.). The rotation technique was set to an orthogonal rotation called Varimax, which creates perpendicular vectors. A Varimax rotation was used to encourage the shifting of axes to minimize correlations to reduce factors. Overall, a Varimax rotation aims to minimize the number of factor co-variation and produces factors that are uncorrelated. The scores of the factor analysis were saved as new variables in the data set for further analysis. As a result of the factor analysis the 14 variables were reduced to five components.

Data were subjected to factor analysis using exploratory factor analysis and orthogonal Varimax rotation. The Kaiser-Meyer-Olkin measure (KMO) varies between 0 and 1, and values closer to 1 are better; a value of .6 is a suggested minimum (UCLA: Statistical Consulting Group, n.d.). All KMO values for the individual items were well above 0.5 and the KMO was 0.74, indicating the data were sufficient for exploratory factor analysis. The Bartlett's test of sphericity x^2 (91) = 575.54, $p < .001$ showed that there were patterned relationships between the items. When combining the results of the KMO and Bartlett's test of sphericity, together they identify a minimum standard that should be passed before a factor analysis should be conducted (UCLA: Statistical Consulting Group, n.d.). Using an eigenvalue cut-off of 1.0, there were five components that explained the cumulative variance of 62.70%. The scree plot confirmed the findings of retaining five factors. Table 5 shows the factor loadings after rotation using a significant factor criterion of greater than .30.

The eigenvalues ranged from 0.24 and 3.66. A total of five factors satisfied Kaiser's criterion of eigenvalues greater than one and those extracted explained 62.7% of

the variance. This was decided based on eigenvalues, cumulative variance, and inspection of the scree plot. The first component, FAC1_2 of the model had an eigenvalue of 3.67 and accounted for 26.2% explaining most of the variance. The second component, FAC2_2 had an eigenvalue of 1.71 and accounted for 12.2% of the variance explained. The third component, FAC3_2 had an eigenvalue of 1.32 and accounted for 9.4% of the variance explained. The fourth component, FAC4_2 had an eigenvalue of 1.10 and accounted for 7.8% of the variance. The fifth component, FAC5_2 had an eigenvalue of 1.00 and accounted for 7.1% and accounts for the least amount of variance. The sixth component of the extraction did not have an eigenvalue greater than one to indicate significance but appears to be a useful factor with an eigenvalue of 0.90 and accounts for 6.5% of the variance. There is a drop to the seventh factor eigenvalue.

The principal component analysis reproduced communalities and residuals that were computed between observed and reproduced correlations. There were a total of 55 (60.0%) non-redundant residuals with absolute values greater than 0.05. In component one, FAC1_2, there were a total of six independent variables that increase the regression specifically including: valueBHBSA (0.414), eduBH (0.754), priorBHedu (0.850), imphealth (0.371), screentest (0.675), and confidentBSA (0.632). The first component, FAC1_2 represents the HBM constructs of “cues to action” and “self-efficacy”. Component two, FAC2_2, included a total of five independent variables that increase the regression specifically: valueBHBSA (0.661), BSApreventefforts (0.639), youthpromotion (0.688), screentest (0.675), and childpart (0.660). The second component, FAC2_2 represents the HBM constructs of “perceived benefits”. Component three, FAC3_2, included a total of four independent variables, three of which increase the

regression and one that decreases the regression: selfriskgreat (0.744), physicalhealthrisk (0.703), activediff (0.328), and imphealth (-0.477). The third component, FAC3_2 represents the HBM constructs of “perceived susceptibility”. The first three components that included the following constructs of the HBM explained a large proportion of the variance in the model (47.8%). Component four, FAC4_2, included a total of two independent variables, one of which increase the regression and one that decreases the regression: BCriskfactors (0.756), and activediff (-0.665). The fourth component, FAC4_2 represents the HBM constructs of “perceived barriers”. Component five, FAC5_2, included a single independent variable that increases the regression specifically: MCstat (0.780). Finally, the fifth component, FAC5_2 represents the HBM constructs of “perceived severity”.

Binomial Logistic Regression

The dependent variable that measures having heard of breast cancer is “yes”. In this case, “yes” is equal to 1 if the respondent has heard of breast cancer… and 0 otherwise. Being that the dependent variable was discrete, the ordinary least squares regression can be used to fit a linear probability model. However, since the linear probability model is heteroskedastic and may predict probability values beyond the (0,1) range, the logistic regression model is used to estimate the factors, which include breast health behavior and awareness. The binary logistic regressions included comparisons of having heard of breast cancer frequency with the Health Belief Model constructs, age, race, and highest level of education attained to test the hypotheses. The dependent variable was tested in binary logistic regression separately against the controls, and separately against Health Belief Model and controls combined to find differences in

results due to the control variables. The logit estimates (Exp (B)) will be represented as odds ratios (*OR*) and the statistical significance as (*p*).

The variables "age" (age), "race" (race), "highest level of education attained" (highestedu), and the “health belief model components”(FAC1_2, FAC2_2, FAC3_2, FAC4_2, and FAC5_2) were useful predictors for distinguishing between groups based on responses to "having heard of breast cancer" (heardofBC). These predictors differentiate survey respondents who have not heard of breast cancer from survey respondents who have heard of breast cancer. All of the variables were entered in to the equation simultaneously.

Statistical significance was found in the controls model among having heard of breast cancer and HBM construct “cues to action and self-efficacy” (*OR* 0.67; $p < .10$), age (*OR* 1.40; $p < .10$), and highest level of education (*OR* 0.74; $p < .10$). The *OR* increases in comparison to students and faculty members who are older and have higher levels of education attainment, the older the students or faculty members were and with higher levels of education attainment were more likely to have heard of breast cancer. Furthermore, the findings of statistical significance indicate that those who have had heard of breast cancer are in the advanced stages of the HBM where the individual views breast cancer is a negative health consequence, desires to avoid breast cancer, and are motivated into practicing breast self-awareness as well as being proactive and educated in their breast health. More importantly these statistical results support the HBM in which the modifying factors (age, race, highestedu) help shape individual beliefs (self-efficacy and cues to action) and resulting action (health behavior).

The Exp (B) is the odds ratio (*OR*) associated with each predictor in the model. The logistic regression coefficients give the change in the log odds of the outcome for a one-unit increase in the predictor variable (Starkweather PhD & Herrington PhD, 2014). It is expected that predictors that increase the logit will display *OR* greater than 1.0, those predictors that do not have an effect on the logit will display an *OR* of 1.0 and predictors which decrease the logit will have *OR* values less than 1.0 (Starkweather PhD & Herrington PhD, 2014). The value of *OR* for variable FAC1_2 was 0.670 which implies that a one unit increase in FAC1_2 decreased the odds by approximately two-thirds times that survey respondents have heard of breast cancer. The value of *OR* for variable FAC2_2 was 1.158 which implies a one-unit increase in FAC2_2 increased the odds by approximately one and one-sixth times that survey respondents having heard of breast cancer. The *OR* for variable FAC3_2 was 1.072, which implies that a one-unit increase in FAC3_2 increased the odds by approximately one and one-sixteenth times that survey respondents having heard of breast cancer. The *OR* for variable FAC4_2 was 1.314, which implies that a one-unit increase in FAC4_2 increased the odds by approximately one and one-third times that survey respondents having heard of breast cancer. The *OR* for variable FAC5_2 was 0.898, which implies that a one-unit increase in FAC5_2 decreased the odds by approximately four-fifths times that survey respondents have heard of breast cancer. The *OR* for variable age was 1.403, which implies that a one-unit increase in age increased the odds by approximately one and one-halves times that survey respondents having heard of breast cancer. The value of *OR* for variable highestedu was 0.739, which implies that a one-unit increase in highest level of education decreased the odds by approximately three-quarters times that survey respondents having heard of

breast cancer. The value of *OR* for variable race was 1.306, which implies that a one-unit increase in race increased the odds by approximately one and one-third times that survey respondents having heard of breast cancer. (see Table 6 in the appendix).

The binomial logistic regression analysis verified that each statement about the relationship between an independent variable and the dependent variable was correct in both direction of the relationship and the change in likelihood associated with a one-unit change of the independent variable. Using binomial logistic regression, the minimum ratio of valid cases to independent variables for logistic regression is 10 to 1, with a preferred ratio of 20 to 1. In this analysis, there are 179 valid cases and 8 independent variables. The ratio of cases to independent variables is 29.8 to 1, which satisfies the minimum requirement. In addition, the ratio of 29.8 to 1 satisfies the preferred ratio of 20 to 1. The presence of a relationship between the dependent variable and combination of independent variables is based on the statistical significance of the model chi-square at step 1 after the independent variables have been added to the analysis. In this analysis, the probability of the model chi-square (8.92) was insignificant with a value of 0.349, which is greater than the level of significance of 0.05. The null hypothesis that proves that there is no difference between the model with only a constant and the model with independent variables was rejected. The existence of a relationship between the independent variables and the dependent variable was supported and significant at the < .10 level of significance.

Multicollinearity in the logistic regression solution is detected by examining the standard errors for the b coefficients (Univerisity of Texas at Austin, n.d.). A standard error larger than 2.0 indicates numerical problems, such as multicollinearity among the

independent variables (Univerisity of Texas at Austin, n.d.). The logistic regression model showed that none of the independent variables in this analysis had a standard error larger than 2.0. The Hosmer and Lemeshow Test was the preferred test of goodness-of-fit (Starkweather PhD & Herrington PhD, 2014). As with most chi-square based tests however, it is prone to inflation as sample size increases (Starkweather PhD & Herrington PhD, 2014). The model fit was acceptable χ^2 (8) = 10.10, p = 0.258, which indicates our model predicts values not significantly different from what we observed. A key piece of information obtained from the classification table in the binomial logistic regression is the overall percentage. This showed how well the full model correctly classified cases based upon the overall percentage (with all predictors & the constant) and was 87.2% accurate, which was excellent.

The proportional by chance accuracy rate was computed by first calculating the proportion of cases for each group based on the number of cases in each group in the classification table at Step 0. The proportion in the "yes" group was 156/179 = 0.872. The proportion in the "no" group was 23/179 = 0.128. Then, the proportion of cases in each group was squared and summed ($0.872^2 + 0.128^2 = 0.776$). The proportional by chance accuracy rate was 0.776. The accuracy rate computed by SPSS was 87.2% that was less than the proportional by chance accuracy criteria of 97% (1.25 x 77.6% = 97.0%). The criteria for classification accuracy were not satisfied in this model.

Summary

This chapter concludes the results of the study. This research and statement of the hypotheses was designed to reject the null hypotheses, thus accepting by default the alternative hypotheses. In this study the binomial logistic regression helped support the

validity of the hypotheses. In which, all three of the null hypotheses (H_0) were rejected and the alternative hypotheses were accepted (H_1). The majority of the survey population stated that they have heard of breast cancer. The first H_0 was rejected with 87.15% of the sample indicating that they have heard of breast cancer supporting the H_1. Additionally the age range of the participants was a significant predictor in the binomial logistic regression model (*p*-value = 0.084). The age range of the participants increased the likelihood of the participant having heard of breast cancer increases the odds by 1½ times. The reported levels of highest educational attainment increased the likelihood of the participants having heard of breast cancer decreased the odds by ¾ times and was statistically significant with a *p*-value of 0.064. These statistics helped support the H_1, that the participants' age range and highest level of education attainment would be a significant predictors. Furthermore the health belief model constructs were also significant predictors in the binomial logistic regression model. In which the null hypothesis was rejected in the alternative hypothesis was supported for the third hypothesis. This was specific for the last construct of the HBM, "cues to action and self-efficacy" that was statistically significant with a *p*-value of 0.086. The HBM construct "cues to action and self-efficacy" increased the likelihood of the participants having heard of breast cancer decreased the odds by ⅔ times. Overall, the hypotheses were valid in this study.

The reported levels of highest educational attainment increased the likelihood of the participants having heard of breast cancer decreased the odds by ¾ times and was statistically significant with a *p*-value of 0.064. The most common race of the participants was Caucasian and the majority age range was 45-54 years of age. The gender of the

sample was predominately female. The bulk of the participants had high levels of educational attainment primarily consisting of a Master's degree. The majority of the sample indicated that they have heard of breast cancer but there were some participants who stated that they have not heard of breast cancer. Additionally, the majorities of the participants have not been diagnosed with breast cancer or have had any family members diagnosed with breast cancer. Overall, the factor analysis with a Varimax (orthogonal) rotation suggested that the sample was factorable based upon the Kaiser-Meyer Olkin measure of sampling adequacy (KMO = 0.74). Statistical significance was found in the controls model among having heard of breast cancer and HBM construct "cues to action and self-efficacy" (*OR* 0.67; $p < .10$), age (*OR* 1.40; $p < .10$), and highest level of education (*OR* 0.74; $p < .10$). The *OR* increases in comparison to students and faculty members who are older and have higher levels of education attainment, the older the students or faculty members were and with higher levels of education attainment were more likely to have heard of breast cancer. Furthermore, the findings of statistical significance indicate that those who have had heard of breast cancer are in the advanced stages of the HBM where the individual views breast cancer is a negative health consequence, desires to avoid breast cancer, and are motivated into practicing breast self-awareness as well as being proactive and educated in their breast health. More importantly these statistical results support the HBM by proving that modifying factors (age, race, highestedu) can help shape individual beliefs (self-efficacy and cues to action) and resulting action (health behavior). Supporting, that heard of breast cancer are in the advanced stages of the HBM where the individual views breast cancer as a negative health consequence, desires to avoid breast cancer, and are motivated into practicing

breast self-awareness as well as being proactive and educated in their breast health. There was no evidence of numerical problems in binary logistic regression. Moreover, the classification accuracy did not surpass the proportional by chance accuracy criteria; therefore the utility of the model was not supported. The results of this study indicate that there is a need for further research and investigation of breast health knowledge and breast cancer awareness. Chapter V will conclude the study and discuss specific findings from this research. Tables and the survey materials will be presented in the appendix.

CHAPTER V

SUMMARY AND CONCLUSIONS

This is the final chapter of the research study. The summary includes an overview of the problem studied, the hypotheses, and the procedures used to conduct the study. This summary is followed by a discussion of the results, implications, and recommendations for future research.

Research Summary

Early education and other novel strategies are necessary to combat the high breast cancer mortality rate. This is because Mahoning County has a breast cancer mortality rate greater than the national average and has the third highest rate in Northeast Ohio. Through the creation and utilization of a youth engagement program, adolescents and young adults will gain exposure to educational and healthful breast health habits.

All people, whether male or female, are born with some breast cells and tissue. Even though males do not develop milk-producing breasts, a man's breast cells and tissue can still develop cancer. Men and women are in great need of early detection in order for better protection against breast cancer. The Centers for Disease Control (2011) reported that 220,097 women and 2,078 men in the US were diagnosed with breast cancer in addition to 40,931 women and 443 men in the US who reportedly died from breast cancer (para. 2). Male breast cancer is rare, but it can still occur. Even though males do not develop milk-producing breasts, a man's breast cells and tissue can still develop cancer (National Breast Cancer Foundation, n.d.). However, it is because men are diagnosed with "breast cancer at less than one percent the rate of women, studies on risk factors

associated with this cancer in men have been limited in size and scope" (National Cancer Institute, 2014).

This is because breast cancer is a local, state, and national epidemic and even more accurate for those living in Mahoning County where the breast cancer mortality rate is higher than the national average. Furthermore, in the state of Ohio, Mahoning County (35/100K) has the third highest breast cancer mortality rate falling behind Jefferson County (41/100K) and Harrison County (43/100K) (Komen NEO, 2011). Even though there are other counties in NEO with similar or greater breast cancer mortality rates, this study will focus on Mahoning County. According to the Komen NEO Community Profile (2009), relatively 86.4% of NEO has a breast cancer mortality rate greater than the national average (see Table 1) (Komen NEO, 2011). It is because of this majority percentage that breast cancer mortality incidence for NEO needs to be investigated and researched further to help in the future and overtime to reduce the alarming statistics. Overall, this study will concentrate on Mahoning County and has the potential to lead to greater awareness of the issue and current preventive measures can be assessed as well as improved. This research aims to achieve positive, proactive measures instead of just evoking a reaction.

Breast self-awareness (BSA) is promoted to help combat breast cancer in men and women. BSA is focused on helping a person become more familiar with his or her breasts to readily identify abnormal changes. The American Cancer Society (2013) reports, "research has shown that self-awareness seems to be more effective for detecting breast cancer than structured breast self-exams" (p. 21). BSA is a low cost, efficient method for men and women to be proactive in their breast health. BSA can be effective in reducing

barriers for one to be proactive in their breast health such as a lack of health insurance, financial burden, preconceived beliefs, lack of knowledge or education, under-treatment, attitudes towards screening exams and cultural views.

It is through prompt and appropriate treatment the outlook for men and women with breast cancer can be optimistic. When the cancer is detected early, there is a greater likelihood that it can be treated with breast conserving treatment. The fight against breast cancer is strengthened via promotion of breast self-awareness. Breast self-awareness has empowered men and women to become mindful, proactive and responsible for their breast health. Breast self-awareness needs greater promotion and research because of its potential benefits and emphasis on positive breast health practices. However there is still a gap in research focusing on breast health knowledge, practice, and awareness targeting younger generations (i.e. adolescents and young adults). Indicating the need for breast health education and breast cancer awareness programs in the university environment, public school systems, or within each family unit.

Purpose and Hypotheses

The purpose of this study is to investigate if the Health Belief Model (HBM) in regard to an individual's awareness of breast cancer and breast health practices can help to predict levels of breast health education and awareness in self-reported frequencies. This research can assist health professionals in developing more successful health programs for younger generations, targeting youth and young adult populations. This may enable health programs to promote breast health education and breast self-awareness more successfully and could potentially help combat the breast cancer epidemic and late stage diagnosis with greater awareness and involvement in one's breast health.

The following research questions were addressed in this study:

1. Will the subjects be aware of the statistically significant breast cancer mortality rate in Mahoning County?
2. Will the subjects be knowledgeable and aware of breast health education and breast cancer?
3. Will the subjects support a youth engagement program that would empower young women and promote breast health education and awareness based upon the HBM survey questions?
4. Will the subjects show signs of breast self-awareness and being proactive in their breast health?

This research and statement of the hypotheses was designed to reject the null hypotheses (H_0), thus accepting by default the alternative hypotheses (H_1).

- H_0: The majority of the surveyed population will not have heard of breast cancer.
- H_1: The majority of the surveyed population will have heard of breast cancer.
- H_0: The age range and highest level of education will not be a significant predictor in the participant having heard of breast cancer.
- H_1: The age range and highest level of education will be a significant predictor in the participant having heard of breast cancer.
- H_0: The Health Belief Model constructs will not significant factor in those heard of breast cancer.
- H_1: The Health Belief Model constructs will be a significant factor in those participants who have heard of breast cancer.

A binomial logistic regression predicts the probability that an observation falls into one of two categories of a dichotomous dependent variable based on one or more independent variables that can be either continuous or categorical. Using logistic regression, the goal is to predict from knowledge of relevant independent variables not a precise numerical value of a dependent variable, but rather the probability (p) that it is 1 (event occurring) rather than 0 (event not occurring) (University of Strathclyde, n.d.). A binomial logistic regression is also known as a binary logistic regression and can often referred to simply as logistic regression. In this case, binominal logistic regression will estimate the probability of the sample having heard of breast cancer.

The following formula represents the purpose of the study.

$$p = \frac{e^{\alpha + \beta x}}{1 + e^{\alpha + \beta x}}$$

Where *p* is the probability of a 1, e is the base of the natural logarithm (about 2.718) α and β are the parameters of the model (as in normal linear regression). The value of α yields P when x is zero, and β indicates how the probability of a 1 changes when x changes by a single unit (University of Strathclyde, n.d.). The University of Strathclyde states "because the relation between *x* and *p* is nonlinear, β does not have as straightforward an interpretation in this model as it does in ordinary linear regression" (para. 1). An important concept in logistic regression is that of the odds ratios. Since logistic regression is based on the probability of an event occurring, the model allows us to calculate these, which are defined the ratio of the odds of an event occurring to it not occurring (University of Strathclyde, n.d.).

In this study the binomial logistic regression helped support the validity of the hypotheses. In which, all three of the null hypotheses (H_0) were rejected and the alternative hypotheses were accepted (H_1). The majority of the survey population stated that they have heard of breast cancer. The first H_0 was rejected with 87.15% of the sample indicating that they have heard of breast cancer supporting the H_1. Additionally the age range of the participants was a significant predictor in the binomial logistic regression model (*p*-value = 0.084). The age range of the participants increased the likelihood of the participant having heard of breast cancer increases the odds by 1½ times. The reported levels of highest educational attainment increased the likelihood of the participants having heard of breast cancer decreased the odds by ¾ times and was statistically significant with a *p*-value of 0.064. These statistic helped support the H_1, that the participants' age range and highest level of education attainment would be a significant predictor. Furthermore the health belief model constructs were also significant predictors in the binomial logistic regression model. In which the null hypothesis was rejected in the alternative hypothesis was supported for the third hypothesis. This was specific for the last construct of the HBM, "cues to action and self-efficacy" that was statistically significant with a *p*-value of 0.086. The HBM construct "cues to action and self-efficacy" increased the likelihood of the participants having heard of breast cancer decreased the odds by ⅔ times. Overall, the hypotheses were valid in this study.

Survey

The type of research conducted was a survey research design, in which exploration would lead to insight regarding a university population and their reported frequency of having heard of breast cancer and implies tendencies towards proactive

breast health practices and behavior. The data used in this study was obtained from an electronic survey designed and administered by the researcher through electronic disseminations in the university environment. The participants were at least 18 years of age and 179 students responded to the survey in April and May 2015. The participants were all current students or faculty members at the university. The results could later be applied in breast health promotion program development on campus or in the community, and possibly through other health organizations. Data was collected through an online survey and analyzed using the binomial logistic regression model, which was appropriate for the binary dependent variable.

The data were analyzed using IBM SPSS Statistics version 23. Frequency distributions were produced to show the univariate analysis of variables representing demographic characteristics (race, age, gender, highestedu) and breast cancer background (heardofBC, hasBC, and famBC). There were a total of 14 survey questioned that focused on the HBM and were combined for factor analysis including: selfriskgreat, physicalhealthrisk, BCriskfactors, valueBHBSA, BSApreventefforts, youthpromotion, activediff, MCstat, eduBH, priorBHedu, imphealth, screentest, confidentBSA, and childpart. The dependent variable for the multivariate analysis was a breast cancer background variable, specifically having heard of breast cancer (heardofBC). Inferential and descriptive statistical analyses were completed.

Results

Using IBM SPSS Statistics version 23 was used for statistical analyses on the data obtained from the survey *Evaluating Breast Health Education and Awareness in the College Environment Using the Health Belief Model*. The univariate analysis provided

data for the frequency distribution of the categorical variables. Additionally, the binary logistic regression was used to evaluate the relationships between multiple categorical variables by pairing the hypotheses variables to determine if a correlation exists. Furthermore, a cutoff p-value < .10 was used for all tests of statistical significance.

The data derived from this research study is that of an applied statistical method. Using an applied statistical method involves the combination of descriptive statistics and inferential statistics application. Descriptive statistical methods were used summarize the data collected from the survey and to better communicate the results research study. Inferential statistical methods were also used to help draw inferences and conclusions about the selected subject population. Table 2 in the appendix presents a summary of the definitions of the variables in this study.

Descriptive Statistics

Simple descriptive statistics tools such as frequency and percentage were used to describe the socio-demographic characteristics of the respondents. The socio-demographic information of race, age range, gender, highest level of education, self breast cancer, and family breast cancer status describe the sample but not used in the immediate analyses will be discussed. The participants were among different age groups including 15 (8.38%) from ages eighteen to twenty-four, 22 (12.29%) were of ages twenty-five to thirty-four, 40 (22.35%) were of ages thirty-five to forty-four, 49 (27.37%) were of ages forty-five to fifty-four, 49 (27.37%) were fifty-five to sixty-four, and 4 (2.23%) were sixty-five or older. The race of the participants included 157 (87.71%) Caucasian/White respondents, 10 (5.59%) African American/African/Black/Caribbean respondents, 0 (0.0%) American Indian respondents, 4 (2.23%) Pacific Islander/Asian

respondents, 5 (2.79%) Hispanic/Latino respondents, 2 (1.12%) respondents selected other and 1 (0.56%) preferred not to answer or indicate their race/ethnicity. When analyzing the frequency of the participant's gender, the study was comprised of 149 (83.24%) females, 29 (16.20%) males, and 1 (0.56%) respondent preferred not to indicate their sex. Among the highest level of education obtained, in this study, 5 (2.79%) respondents stated that they have a high school diploma/GED, 18 (10.06%) have some college, 12 (6.70%) have a 2 year college degree (Associate's degree), 38 (21.23%) have a 4 year college degree (Bachelor's degree), 63 (35.20%) have a Masters degree, 39 (21.79%) have a Doctoral degree, 3 (1.68%) have a Professional degree (MB, DO, MD), while 1 (0.56%) preferred not to answer (see Table 3).

Among the study participants, 156 (87.15%) of respondents answered "yes" having heard of breast cancer and the remaining 23 (12.85%) of respondents indicated that they have not heard of breast cancer before by answering "no". A total of 3 (4.47%) study participants answered "yes" indicating that they have or have had breast cancer, while 171 (95.53%) answered "no" that they have not ever had breast cancer. Among the study participants 74 (41.34%) of the study participants answered "yes" that they have or have had a family member with breast cancer, while 105 (58.66%) participants indicated that they have not ever had a family member with breast cancer by answering "no". Table 4 in the appendix presents a summary of the frequencies of the demographic characteristics and breast cancer background.

Inferential Statistics

The researcher opted to conduct an exploratory factor analysis of the data to reduce the number of variables associated with the Health Belief Model (HBM).

Employing a factor analysis allowed the researcher to refine the number items on a scale for the purposes of scale development. The researcher was able to then determine the number of latent variables (dimension/factor) underlying a set of items. The researcher used factor analysis in this study to determine whether one or multiple dimensions exist for the HBM set of variables. More importantly, the researcher used the dimensions produced by the factor analysis for further analysis and in this case, binary logistic regression with a dichotomous dependent variable.

Factor Analysis

A factor analysis with a Varimax (orthogonal) rotation of the 14 Likert scale questions from the *Evaluating Breast Health Education and Awareness in the College Environment Using the Health Belief Model* survey questionnaire was conducted on data gathered from 179 participants. An examination of the Kaiser-Meyer Olkin measure of sampling adequacy suggested that the sample was factorable (KMO=0.74).

The extraction technique of the factor analysis involved extracting factors with eigenvalues greater than one. Eigenvalues are the variances of the factors that were used to restrict the number of factors to only those that are the most influential in the model (UCLA: Statistical Consulting Group, n.d.). The rotation technique was set to an orthogonal rotation called Varimax, which creates perpendicular vectors. A Varimax rotation was used to encourage the shifting of axes to minimize correlations to reduce factors. Overall, a Varimax rotation aims to minimize the number of factor co-variation and produces factors that are uncorrelated. The scores of the factor analysis were saved as new variables in the data set for further analysis. As a result of the factor analysis the 14 variables were reduced to five components.

Data were subjected to factor analysis using exploratory factor analysis and orthogonal Varimax rotation. The Kaiser-Meyer-Olkin measure (KMO) varies between 0 and 1, and values closer to 1 are better; a value of .6 is a recommended minimum (UCLA: Statistical Consulting Group, n.d.). All KMO values for the individual items were well above 0.5 and the KMO equaled 0.74 and indicated that the data were sufficient for exploratory factor analysis. The Bartlett's test of sphericity x^2 (91)= 575.54, p< 0.001 showed that there were patterned relationships between the items. The results of the KMO and Bartlett's test of sphericity combined they identify a minimum standard that should be passed before a factor analysis should be conducted (UCLA: Statistical Consulting Group, n.d.). Using an eigenvalue cut-off of 1.0, there were five components that explained the cumulative variance of 62.70%. The scree plot confirmed the findings of retaining five factors. Table 5 shows the factor loadings after orthogonal rotation using a significant factor criterion of 0.3.

The eigenvalues ranged from 0.24 and 3.66. A total of five factors satisfied Kaiser's criterion of eigenvalues greater than one. The five extracted components explained 62.7% of the variance. This was determined based on eigenvalues, cumulative variance, and inspection of the scree plot (see Figure 2 for Scree Plot). The first component (FAC1_2) of the model had an eigenvalue of 3.67 and accounted for 26.2% of the variance. Cues to Action and Self Efficacy (FAC1_2), combined components of the HBM (FAC1_2) explained most of the variance. The second component (FAC2_2) had an eigenvalue of 1.71 and accounted for 12.2% of the variance explained. The third component (FAC3_2) had an eigenvalue of 1.32 and accounted for 9.4% of the variance explained. The fourth component (FAC4_2) had an eigenvalue of 1.10 and accounted for

7.8% of the variance. The fifth component (FAC5_2) had an eigenvalue of 1.00 and accounted for 7.1% and accounts for the least amount of variance. The sixth component of the extraction did not have an eigenvalue greater than one to indicate significance. However the sixth component that was not extracted in the analysis appears to be a useful factor with an eigenvalue of 0.90 and accounts for 6.5% of the variance. When analyzing the scree plot there is a drop to the seventh factor eigenvalue (see Figure 2).

The exploratory factor analysis reproduced communalities and residuals that were computed between observed and reproduced correlations. There were a total of 55 (60.0%) non-redundant residuals with absolute values greater than 0.05. In component one (FAC1_2) there were a total of six independent variables that increased the regression specifically including: valueBHBSA (0.414), eduBH (0.754), priorBHedu (0.850), imphealth (0.371), screentest (0.675), and confidentBSA (0.632). The first component (FAC1_2) represents the HBM constructs of “cues to action and self-efficacy”. Component 2 (FAC2_2) included a total of five independent variables that increase the regression specifically: valueBHBSA (0.661), BSApreventefforts (0.639), youthpromotion (0.688), screentest (0.675), and childpart (0.660). The second component (FAC2_2) represents the HBM constructs of “perceived benefits”. Component three (FAC3_2) included a total of 4 independent variables, three of which increase the regression and one that decreases the regression: selfriskgreat (0.744), physicalhealthrisk (0.703), activediff (0.328), and imphealth (-0.477). The third component (FAC3_2) represents the HBM constructs of “perceived susceptibility”. The first three components that included the following constructs of the HBM explained a large proportion of the variance in the model (47.8%). Component four (FAC4_2) included a total of two

independent variables, one of which increase the regression and one that decreases the regression: BCriskfactors (0.756), and activediff (-0.665). The fourth component (FAC4_2) represents the HBM constructs of “perceived barriers”. Component five (FAC5_2) included a single independent variable that increases the regression specifically: MCstat (0.780). Finally, the fifth component (FAC5_2) represents the HBM constructs of “perceived severity”.

Binomial Logistic Regression

The dependent variable that measures having heard of breast cancer is YES. YES is equal to 1 if the respondent has heard of breast cancer… and 0 otherwise. Being that the dependent variable was discrete, the ordinary least squares regression can be used to fit a linear probability model. However, since the linear probability model is heteroskedastic and may predict probability values beyond the (0,1) range, the logistic regression model is used to estimate the factors, which include breast health behavior and awareness. The binary logistic regressions included comparisons of having heard of breast cancer frequency with the Health Belief Model constructs, age, race, and highest level of education attained to test the hypotheses. The dependent variable was tested in binary logistic regression separately against the controls, and separately against Health Belief Model and controls combined to find differences in results due to the control variables. The logit estimates (Exp (B)) will be represented as odds ratios (*OR*) and the statistical significance as (*p*).

The variables “age” (age), “race” (race), “highest level of education attained” (highestedu), and the “health belief model components” (FAC1_2, FAC2_2, FAC3_2, FAC4_2, and FAC5_2) were useful predictors for distinguishing between groups based

on responses to "having heard of breast cancer" (heardofBC). These predictors differentiate survey respondents who have not heard of breast cancer from survey respondents who have heard of breast cancer. All of the variables were entered in to the equation simultaneously.

Statistical significance was found in the controls model among having heard of breast cancer and HBM construct “cues to action and self-efficacy” (*OR* 0.67; $p < .10$), age (*OR* 1.40; $p < .10$), and highest level of education (*OR* 0.74; $p < .10$). The *OR* increases in comparison to students and faculty members who are older and have higher levels of education attainment, the older the students or faculty members were and with higher levels of education attainment were more likely to have heard of breast cancer. Furthermore, the findings of statistical significance indicate that those who have had heard of breast cancer are in the advanced stages of the HBM where the individual views breast cancer is a negative health consequence, desires to avoid breast cancer, and are motivated into practicing breast self-awareness as well as being proactive and educated in their breast health. More importantly these statistical results support the HBM by proving that modifying factors (age, race, highestedu) can help shape individual beliefs (self-efficacy and cues to action) and resulting action (health behavior).

The Exp (B) is the odds ratio (*OR*) associated with each predictor in the model. The logistic regression coefficients give the change in the log odds of the outcome for a one-unit increase in the predictor variable (Starkweather PhD & Herrington PhD, 2014). It is expected that predictors that increase the logit will display *OR* greater than 1.0, those predictors that do not have an effect on the logit will display an *OR* of 1.0 and predictors which decrease the logit will have *OR* values less than 1.0 (Starkweather PhD &

Herrington PhD, 2014). The *OR* for variable FAC1_2 was 0.670 and implied that a one-unit increase in HBM construct "cues to action and self-efficacy" decreased the odds by approximately two-thirds times that survey respondents have heard of breast cancer. The *OR* for variable FAC2_2 was 1.158 implied a one-unit increase in HBM construct "perceived benefits" increased the odds by approximately one and one-sixth times that survey respondents having heard of breast cancer. The *OR* for variable FAC3_2 was 1.072, which implies that a one-unit increase in HBM construct "perceived susceptibility" increased the odds by approximately one and one-sixteenth times that survey respondents having heard of breast cancer. The *OR* for variable FAC4_2 was 1.314, which implies that a one-unit increase in HBM construct "perceived barriers" increased the odds by approximately one and one-third times that survey respondents having heard of breast cancer. The *OR* for variable FAC5_2 was 0.898, which implies that a one-unit increase in HBM construct "perceived severity" decreased the odds by approximately four-fifths times that survey respondents have heard of breast cancer. The *OR* for variable age was 1.403, which implies that a one-unit increase in age increased the odds by approximately one and one-halves times that survey respondents having heard of breast cancer. The value of *OR* for variable highestedu was 0.739, which implies that a one-unit increase in highest level of education decreased the odds by approximately three-quarters times that survey respondents having heard of breast cancer. The value of *OR* for variable race was 1.306, which implies that a one-unit increase in race increased the odds by approximately one and one-third times that survey respondents having heard of breast cancer. (see Table 6).

The binomial logistic regression analysis verified that each statement about the relationship between an independent variable and the dependent variable was correct in both direction of the relationship and the change in likelihood associated with a one-unit change of the independent variable. Using binomial logistic regression, the minimum ratio of valid cases to independent variables for logistic regression is 10 to 1, with a preferred ratio of 20 to 1. In this analysis, there are 179 valid cases and 8 independent variables. The ratio of cases to independent variables is 29.8 to 1, which satisfies the minimum requirement. In addition, the ratio of 29.8 to 1 satisfies the preferred ratio of 20 to 1. The presence of a relationship between the dependent variable and combination of independent variables is based on the statistical significance of the model chi-square at step 1 after the independent variables have been added to the analysis. In this analysis, the probability of the model chi-square (8.92) was insignificant with a value of 0.349, which is greater than the level of significance of 0.05. The null hypothesis that proves that there is no difference between the model with only a constant and the model with independent variables was rejected. The existence of a relationship between the independent variables and the dependent variable was supported and found to be significant at the .10 level.

Multicollinearity in the logistic regression solution is detected by examining the standard errors for the b coefficients (Univerisity of Texas at Austin, n.d.). A standard error larger than 2.0 indicates numerical problems, such as multicollinearity among the independent variables (Univerisity of Texas at Austin, n.d.). The logistic regression model showed that none of the independent variables in this analysis had a standard error larger than 2.0. The Hosmer and Lemeshow Test was the preferred test of goodness-of-fit

(Starkweather PhD & Herrington PhD, 2014). As with most chi-square based tests however, the Hosmer and Lemeshow Test is prone to inflation as sample size increases (Starkweather PhD & Herrington PhD, 2014). The model fit was acceptable χ^2 (8) = 10.10, p = 0.258 and indicated the model predicts values not significantly different from what was observed. A key piece of information obtained from the classification table in the binomial logistic regression is the overall percentage. This showed how well the full model correctly classified cases based upon the overall percentage (with all predictors & the constant). The overall percentage was 87.2% accurate, which was excellent.

The proportional by chance accuracy rate was computed by first calculating the proportion of cases for each group based on the number of cases in each group in the classification table at Step 0. The proportion in the "yes" group was 156/179 = 0.872. The proportion in the "no" group was 23/179 = 0.128. Then, the proportion of cases in each group was squared and summed ($0.872^2 + 0.128^2 = 0.776$). The proportional by chance accuracy rate was 0.776. The accuracy rate computed by SPSS was 87.2% that was less than the proportional by chance accuracy criteria of 97% (1.25 x 77.6% = 97.0%). The criteria for classification accuracy were not satisfied in this model.

This research and statement of the hypotheses was designed to reject the null hypotheses, thus accepting by default the alternative hypotheses. In this study the binomial logistic regression helped support the validity of the hypotheses. In which, all three of the null hypotheses (H_0) were rejected and the alternative hypotheses were accepted (H_1). The majority of the survey population stated that they have heard of breast cancer. The first H_0 was rejected with 87.15% of the sample indicating that they have heard of breast cancer supporting the H_1. Additionally the age range of the participants

was a significant predictor in the binomial logistic regression model (p-value = 0.084). The age range of the participants increased the likelihood of the participant having heard of breast cancer increases the odds by 1½ times. The reported levels of highest educational attainment increased the likelihood of the participants having heard of breast cancer decreased the odds by ¾ times and was statistically significant with a p-value of 0.064. These statistic helped support the H_1, that the participants' age range and highest level of education attainment would be a significant predictor. Furthermore the health belief model constructs were also significant predictors in the binomial logistic regression model. In which the null hypothesis was rejected in the alternative hypothesis was supported for the third hypothesis. This was specific for the last construct of the HBM, "cues to action" and "self-efficacy" that was statistically significant with a p-value of 0.086. The HBM construct "cues to action" and "self-efficacy" increased the likelihood of the participants having heard of breast cancer decreased the odds by ⅔ times. Overall, the hypotheses were valid in this study.

The reported levels of highest educational attainment increased the likelihood of the participants having heard of breast cancer decreased the odds by ¾ times and was statistically significant with a p-value of 0.064. The most common race of the participants was Caucasian and the majority age range was 45-54 years of age. The gender of the sample was predominately female. The bulk of the participants had high levels of educational attainment primarily consisting of a Masters degree. The majority of the sample indicated that they have heard of breast cancer but there were some participants who stated that they have not heard of breast cancer. Additionally, the majorities of the participants have not been diagnosed with breast cancer or have had any family members

diagnosed with breast cancer. Overall, the factor analysis with a Varimax (orthogonal) rotation suggested that the sample was factorable based upon the Kaiser-Meyer Olkin measure of sampling adequacy (KMO = 0.74). Statistical significance was found in the controls model among having heard of breast cancer and HBM construct "cues to action and self-efficacy" (*OR* 0.67; $p < .10$), age (*OR* 1.40; $p < .10$), and highest level of education (*OR* 0.74; $p < .10$). The *OR* increases in comparison to students and faculty members who are older and have higher levels of education attainment, the older the students or faculty members were and with higher levels of education attainment were more likely to have heard of breast cancer. Furthermore, the findings of statistical significance indicate that those who have had heard of breast cancer are in the advanced stages of the HBM where the individual views breast cancer is a negative health consequence, desires to avoid breast cancer, and are motivated into practicing breast self-awareness as well as being proactive and educated in their breast health. More importantly these statistical results support the HBM by proving that modifying factors (age, race, highestedu) can help shape individual beliefs (self-efficacy and cues to action) and resulting action (health behavior). There was no evidence of numerical problems in binary logistic regression. Moreover, the classification accuracy did not surpass the proportional by chance accuracy criteria; therefore the utility of the model was not supported. The results of this study indicate that there is a need for further research and investigation of breast health knowledge and breast cancer awareness.

Discussion

The purpose of this study is to investigate if the Health Belief Model (HBM) in regard to an individual's awareness of breast cancer and breast health practices can help

to predict levels of breast health education and awareness in self-reported frequencies. The HBM and its constructs represent an attitude towards health beliefs, in this study specifically that of breast cancer, breast health, breast education, and breast self-awareness. In the literature review, some articles discuss: an overview of breast cancer; theoretical framework of the HBM; population at risk (including breast cancer in men); risk factors: modifiable and non-modifiable; breast cancer awareness, knowledge, and prevention sources; perceptions, attitudes, and beliefs; breast self-awareness; misconceptions among youths regarding breast cancer health, cause, and prevention; young women's breast health education and awareness legislation; gaps and limitations in breast cancer research; and summary of the literature review. The results of this study showed that the most common race of the participants was Caucasian and the majority age range was 45-54 years of age. Females were the dominant gender of the participants. The bulk of the participants had a high level of education consisting of a Master's degree. While the majority of participants have heard of breast cancer, the majorities of the participants have not been diagnosed with breast cancer or have had any family members diagnosed with breast cancer.

By pairing the factor analysis component regressions with select sociodemographic variables, the relationships and probabilities of the dependent and independent variables were examined. The data concluded if the participants had heard of breast cancer and determined what factors contributed among a university sample. The sample proved to have strong breast cancer health beliefs that were reflective of their levels of breast health education and awareness via a university sample including both students and faculty members. Post participation in the study, the sample might be more

likely to engage in proactive breast health practices and become more aware of their breast health and enable participation in breast cancer screenings, new habits of breast self awareness, greater educational levels, and personal risk awareness and reduction. This research can assist health professionals in developing more successful health programs for younger generations, by targeting youth and young adult populations. Programs promoting breast health education and breast self-awareness are successfully in raising awareness, promoting early detection and preventive health measures that could potentially assist in combating the breast cancer epidemic and late stage diagnosis with greater awareness and involvement in one's breast health.

Implications

With the results of this research, implications can be made that the variables can help to predict breast health behaviors and beliefs. Initially from this research it can be determined that the majority of Mahoning County residents are aware of the statistically significant breast cancer mortality rate. So this leads to the question why are so many aware but not willing to take proactive and preventive measures to lessen the significant death rate associated with breast cancer? Surprisingly more than half of the participants were individuals with high levels of educational attainment including masters and doctoral degrees (56.4%). Also nearly 90% of the sample stated that they have heard of breast cancer while only 12.8% of participants stated that they have not heard of breast cancer. Prior to analyzing the results it was expected for the number of participants who have not heard of breast cancer to be equal to zero. This was expected even more so, since more than half of the participants reported high levels of educational attainment.

It was expected that the majority of the sample would be female participants. In this study there were a total of 149 women compared to the 29 male participants. The majority of the sample indicated that they were aware of the breast cancer risk factors by having responded that they agree or strongly agree with the statement "age, family history, obesity, and physical inactivity can increase the chance of developing breast cancer". This begs the question, if almost all 92.8% of the participants are knowledgeable of the breast cancer risk factors why does Mahoning County have a statistically significant breast cancer mortality rate? Could it be because a total of 69 (38.6%) participants responded that they agree or strongly agree that being active in their breast health would require starting new habits that would be difficult and only 56 (31.3%) participants disagreed? However, more than three quarters (78.2%) of the sample responded that they felt that they are educated in their breast health.

The majority of the sample also indicated that they frequently do things to improve their health and implied that the sample showed strong signs of cues to action according to the HBM. Additionally this is supported by the other variables that correlate with the health belief model constructs accused action including that the majority of the participants felt that they are educated in the breast health for a total of 78.2% and have received educational information about their breast health before for total of 75.4%. The sample that has heard of breast cancer indicated a strong tendency and awareness of breast cancer based on the self-efficacy and cues to action combined construct (FAC1_2).

Furthermore the results of the study showed that the sample indicated a strong awareness of breast cancer and that most participants were knowledgeable and literate in

their breast health. However since this study proves that the majority of the sample is aware of breast cancer and knowledgeable in their breast health, then why does Mahoning County have a statistically significant breast cancer mortality rate? Could it be that the positive results are due to the majority of the sample having high levels of educational attainment?

The study results could also differ if the sample included a greater number of individuals who had or have breast cancer since the majority of the participants in this study did not have breast cancer. The results may differ if the sample included a greater number of respondents with lower levels of educational attainment or young adults resulting in lower age ranges participating in the study. Being that the majority of the sample had attained high levels of education, it is probable that if the sample included a greater number of participants with attained lower levels of education, the results would be different than what is presented in this study. It seems that those who are at the most risk for breast cancer in Mahoning County were not reached through this study. Overall, the majority of the sample identified as being white or of Caucasian decent and middle-aged. More than half of the participants were between the ages of 45 to 54 years and 55 to 64 years with a total of 49 respondents in each range and included 54.8% of the sample.

To answer the first research question “will the subjects be aware of the statistically significant breast cancer mortality rate in Mahoning County” The results from an independent variable concentrating on the awareness of the statistic were examined. The majority of the sample, 74 (41.3%) of respondents agreed with the statement, “In Mahoning County the death rate from breast cancer is estimated at 35

women per 100,000. This is significantly greater than the national average death rate from breast cancer that is estimated at 24 women per 100,000". Followed by 68 (38%) participants selected the "neutral" option that they neither agree nor disagree with the aforementioned statement. Overall, the majority of the sample proved that they are, in fact aware of the statistically significant breast cancer mortality rate in Mahoning County, based upon the 110 (60.9%) respondents who selected that they agree or strongly agree with the statement.

The second research question sought to answer, "Will the subjects be knowledgeable and aware of breast health education and breast cancer". Examining the variables involving the constructs of the health belief model and the respondents self-reported perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. Proving that the majority of the sample, based upon the self-reported frequencies that they are knowledgeable and aware of their breast health education and breast cancer risk.

The third research question asked, "Will the subjects support a youth engagement program that would empower young women and promote breast health education and awareness?" To arrive at whether or not a breast health promotion and awareness program is supported the combination of two variables can help answer this research question. The majority of respondents indicated that they agree (67, 37.4%) and strongly agree (103, 57.5%) with a youth engagement program to empower young women and promote breast health education and awareness according to the health belief model. Furthermore the majority of respondents indicated that they would allow their child to participate in a youth programs that promote breast health education and awareness at

school, where the majority of respondents indicating that they agree (71, 39.7%) and strongly agree (96, 53.6%).

The final research question sought to determine "Will the subjects show signs of breast self-awareness and being proactive in their breast health". Overall, the majority of the sample indicated that they are proactive in their breast health and show signs of breast self awareness.

Limitations

This section will discuss the limitations of the research. This research was limited by the response rate of the study participants compared to the entire surveyed population. Another limitation of this survey or survey questioneers in general, is the element of self-selection bias, volunteerism, the willingness of subjects participating in the study. This study was also limited because the accuracy of the survey answers is uncertain due to the survey design in which the investigator had to rely on the truthfulness of the participants. It is considered that with an anonymous survey, participants are more likely to respond truthfully without subject identification, but since the subject's truthfulness was uncertain the study was limited. This study was also limited due to the participant's possible misinterpretation of breast health practices, or even a misunderstanding of the survey questions, even though they were unambiguous and clearly stated.

Although there were two different methods of dissemination with the survey, both were representative of a convenience sample, which is a sample acquired by volunteers, or acquired by availability. Both disseminations were kept in the final results to represent the health beliefs of a greater sample. Another plausible limitation of the study could be attributed to the method of participation recruitment, the recipient may have immediately

deleted the email or it may be filed as junk mail by the e-mail program, among other unknown reasons for non-participation.

Furthermore, the results of the binary logistic regression did not generate statistically significant p-values at the 0.05 levels. A larger sample might have produced a higher level of confidence with p-values less than 0.05 or 0.01. However, the model did show significance at the .10 levels, indicating that some factors had great probability in predicting if a factor increased or decreased the probability of the participant having heard of breast cancer. These factors specifically included the variables FAC1_2, age, and highestedu. The accuracy rate computed by SPSS was 87.2% that was less than the proportional by chance accuracy criteria of 97% (1.25 x 77.6% = 97.0%). The criteria for classification accuracy were not satisfied in the binary logistic regression model.

In conclusion, the results of this study are also limited by the sample characteristics. Specifically, the majority of the participants in this study did not have breast cancer. It is likely that the results would differ if the sample included a greater proportion of individuals who had or have breast cancer. Additionally, the majority of the sample had attained high levels of education. It is also probable that if the sample included a greater number of participants with attained lower levels of education, the results would be different than what is presented in this study. Overall, those who are at the most risk for breast cancer in Mahoning County were not reached through this study. The participants at the most risk for breast cancer in Mahoning County can be described as women who have low levels of educational attainment, low-income. For example, lower levels of education may indicate low socioeconomic status. Those who have breast cancer in Mahoning County may be low-income, uninsured or underinsured, and likely to

have low levels of educational attainment. It could also be assumed that those in Mahoning County with breast cancer are 40 years or older since women who are 40 years of age and older comprise half of the entire female population in Mahoning county. Those surveyed were of this older age group but had higher SES status than those with breast cancer in Mahoning County. In Mahoning county, African American women are diagnosed at a much lower rate than Caucasian women but their mortality rates are near equal (Komen NEO, 2011). Minority populations may be at a higher risk for breast cancer because of low SES association but it seems that Caucasians are at an increased risk for breast cancer as well. This is because in Mahoning County 79.5% of the entire female population is Caucasian while only 16.9% are African American and less than 4% belong to other minorities (Komen NEO, 2011). Therefore one can assume that those who have breast cancer in Mahoning County are likely to be of low SES status, have low-incomes, who are 40 years of age and older, who are uninsured or underinsured, and who also have low levels of educational attainment.

Recommendations for Future Research

It is recommended that further investigation is necessary to reveal the cause for the elevated breast cancer mortality rate in Mahoning County. Recommendations for future research include the application of the findings to the college environment. Educating students in this format with tools for measuring success can determine if the model is effective as the results indicate it may be. With the knowledge that results were obtained from a single university, health professionals can adapt this concept, as needed to other university environments for application. It would be possible to replicate the study in the same environment with greater out reach and recruitment of participants with

lower levels of educational attainment specifically that of undergraduate students and incoming freshmen. The study could be replicated in the future by other colleges or universities or even by the local health department. Local school districts may even incorporate the utilization and replication of this study by distributing it to high school and middle school students. This could lead to the development and implementation of a youth targeted breast health education and awareness program for adolescents and young adults.

Offering a classroom session on breast health and breast cancer topics ranging from general wellness information, breast cancer risks, breast self awareness, and dispelling myths and fears associated with proactive breast practices could be extremely valuable. In which the health promotion program will help students understand their breasts and know what is normal for them, which can help them in the future readily identify any abnormal changes. Continual participation in the youth engagement program can help alleviate anxiety and fears that young women may develop about their breasts. Early education strategies such as the youth engagement program will serve to instill proactive breast health and wellness habits. The youth engagement program could also have an interactive online component that allows the program to function as a hybrid, both in the classroom and online. Furthermore, this provides an opportunity for mothers and other female relatives of the student to be engaged in learning about breast health, developing breast self-awareness, and practice proactive breast wellness habits. Take home packages could be distributed to participants involved in the youth breast health education and awareness promotion program to reiterate discussed topics and to share

pertinent breast health information with mothers or other female relatives, overall engaging the community.

Health promotion programs, including comprehensive health promotion initiatives are effective in settings such as workplaces, community, and in schools. In which, the school-based setting are very effective and offer opportunities for health promotion initiatives to be directed at individual health behavior change, as well as environmental change to achieve improved health outcomes for school-aged youth, school administrators, and school staff. In addition, by using a settings approach to adolescent health promotion provides an all-inclusive framework within which to work, encourages multi-stakeholder ownership of health, and is suitable for collaborations between universities, public school districts, and individual schools (Butler, Fryer, Reed, & Thomas, 2011).

Great opportunities lie within researching specific breast health behaviors and belief on a qualitative basis. Using the HBM one can realize how modifying factors, individual beliefs, and consequent actions lead to an individual's overall health beliefs. Over the years, the HBM has been used extensively to determine relationships between health beliefs and health behaviors, as well as to inform interventions (Champion & Skinner, 2008). It is the relationships that exist among the HBM constructs that help determine relationships among health beliefs and interventions that often lead to the development of successful interventions. Knowledge and socioeconomic factors have great potential to influence health perceptions. With this research being based on self-reported data, future research can involve comparing findings with actual observation of breast health education, beliefs, and behaviors in a more controlled environment.

Determining the best suited method for application of findings and testing effectiveness on a larger scale can be achieved by continuing to seek research avenues for health promotion interventional programming for breast health education and awareness. As the epidemic of breast cancer exists and a cure does not… preventive measures are of the utmost importance; continuous research is highly recommended.

Conclusion

It is appropriate for the results of this study to be applied to the surveyed college environment for health behavior intervention and testing for results. If applied, knowledge obtained from the sample may help by aiding in reducing the breast cancer mortality rate in Mahoning County. This could have the potential to benefit the university population as well as the local community by involving adolescent and young adult populations. If breast health education and awareness are taught and promoted in the university environment, more students can learn and adapt healthier behaviors, in which may become life-long habits. Programs promoting breast health education and breast self-awareness could be successful in raising awareness, promoting early detection, and encouraging preventive health measures that could potentially assist in combating the breast cancer epidemic and late stage diagnosis through greater awareness and involvement in one's breast health. This research can also be applied to younger students in the community including those students in middle school and high school. The fight against breast cancer is strengthened with breast health education and the promotion of breast self-awareness. Early detection leads to better protection against breast cancer; the reason as to why we must encourage the adolescents and young adults to be engaged in their breast health. If young women and men become more aware of what changes are

normal their breasts, they will also become more informed and apt to detect abnormal changes. The opportunity for adolescents and young adults to gain exposure to age appropriate and up to date breast health information while actively learning how to become proactive in their breast health cannot be missed.

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APPENDIX A

Institutional Review Board Letter

Youngstown
STATE UNIVERSITY

One University Plaza, Youngstown, Ohio 44555
Office of Grants and Sponsored Programs
330.941.2377
Fax 330.941.2705

March 31, 2015

Dr. Joseph Lyons, Principal Investigator
Dr. Ronald Chordas, Co-investigator
Dr. Keisha Robinson, Co-investigator
Ms. Krystle Finley, Co-investigator
Department of Health Professions
UNIVERSITY

RE: HSRC PROTOCOL NUMBER: M108-2015
TITLE: Evaluating Breast Health Education and Awareness in the College Environment Using the Health Belief Model

Dear Dr. Lyons, et. al.:

The Human Subjects Research Committee has reviewed the modifications you have requested to the above-mentioned protocol. The modifications do not increase the risk associated with your project, therefore, your project continues to meet the condition of minimal risk and is fully approved.

Any other changes in your research activity should be promptly reported to the Institutional Review Board and may not be initiated without IRB approval except where necessary to eliminate hazard to human subjects. Any unanticipated problems involving risks to subjects should also be promptly reported to the Institutional Review Board.

The HSRC would like to extend its best wishes to you in the conduct of this study.

Sincerely,

[redacted]

Dr. Scott Martin
Interim Associate Dean for Research
Authorized Institutional Official

Youngstown STATE UNIVERSITY 100 Years A PROUD PAST A PROMISING FUTURE

cc: Mr. Joseph Mistovich, Chair
Department of Health Professions

From: **YSUIRB** YSUIRB@ysu.edu
Subject: YSU IRB Protocol #108-15, ltr
Date: February 25, 2015 at 1:44 PM
To: Joseph P Lyons jplyons@ysu.edu, Krystle S Finley ksfinley@student.ysu.edu, Ronald K Chordas rkchordas@ysu.edu, Keisha Tyler Robinson ktrobinson@ysu.edu
Cc: Cheryl K Coy ckcoy@ysu.edu

Dear Investigators,
Your project "Evaluating Breast Health Education and Awareness in the College Environment" has been reviewed by the YSU IRB. Your project meets the criteria of exemption for minimal risk survey research. Please know that the human subject protections training that Investigator Finley completed is not the one required for human subject research. She completed the responsible conduct of research training instead. Because that training has a module on human subject research and your project is exempt we are able to accept this training. We would not be able to accept it if the project had not been exemptible.

The principal investigator will receive a signed letter of exemption for this project via inter-office mail. While waiting for this letter, you may begin recruitment and data collection. If the co-investigator/s need the signed letter for their records, they should contact the principal investigator for a copy. Please reference protocol #108-15 on all future communications about this project.

Best wishes for the successful completion of your research.

Cathy Bieber Parrott
Chair, YSU IRB
IRB Office: 330 941 2377
Email: YSUIRB@ysu.edu

From: Cheryl K Coy
Sent: Wednesday, February 25, 2015 1:33 PM
To: Joseph P Lyons
Cc: YSUIRB
Subject: IRB Training Certificates

Hi Dr. Lyons,

I have received Krystle Finley's Exempt protocol form and logged it in as 108-15. FYI, when I checked her CITI training certificate, she has taken the Responsible Conduct of Research Social and Behavioral Course. Since there has been some confusion over this course, we will accept this training at this time, but please let your students know that in the future we will not accept this training course. It is intended for researchers as an overall ethics course who are submitting federal grant applications required by NSF and gives PIs an overview that includes animal research, conflicts of interest, authorship, etc., with only one module on human subjects research. For IRB purposes, the Investigators need the more in depth knowledge of human subjects research course under the Human Subjects Research heading in CITI. The website has been changed to include this very specific information.

Thanks for your help,

From: **Joseph P Lyons** jplyons@ysu.edu
Subject: Re: IRB Amendment #108-15 Mod, ltr
Date: March 31, 2015 at 10:59 AM
To: Krystle S Finley ksfinley@student.ysu.edu, Keisha Tyler Robinson ktrobinson@ysu.edu, Ronald K Chordas rkchordas@ysu.edu
Cc: Joseph P Lyons jplyons@ysu.edu

JP

Krystle,

Congratulations you made in through the YSU-IRB which is necessary but often very tough as it has been in your case.
ASAP please send a note to Steve Katros with a copy to Dr Tammy King requesting that he send out your revised survey(attached) along with your informed consent document (attached) and your survey link (included in your request).
Please copy all committee members on your request.

Dr. J

Joseph P. Lyons Sc.D.

Director,

Master of Health and Human Services Program
(O) 330 941 3658, (H) 570 287 4004

From: YSUIRB
Sent: Tuesday, March 31, 2015 6:54 AM
To: Krystle S Finley; Keisha Tyler Robinson; Ronald K Chordas; Joseph P Lyons
Cc: Cheryl K Coy
Subject: FW: IRB Amendment #108-15 Mod, ltr

Dear Investigators,
Thank you for responding in your email below your choice to leave all questions as required fields and for the revised consent document attached to this email. Both will be printed and appended to your original IRB submission material. The revised consent document meets requirements of the IRB. The review of your modification request is now complete. The modifications to the survey questions, addition of a gift card, and administration of the survey via electronic format using all questions as required fields have all been approved with the condition that only the final approved consent wording is used to fully inform participants. Potential emotional/psychological harm associated with your more sensitive survey questions is minimized by providing the health resource information and the consent document fully informs what is voluntary and what is not, minimizing perception of coercion to participate. The ability to minimize harms allows you project to continue to meet the criteria of exemption for minimal risk survey research.

The principal investigator will receive a signed letter of continued exemption for the modified project via inter-office mail. While waiting for this letter, you may begin recruitment and data collection. If the co-investigators need the signed letter for their records, they should contact the principal investigator for a copy. Please reference protocol #108-15 on all future communications about this project.

Best wishes for the successful completion of your research.

Cathy Bieber Parrott
Chair, YSU IRB
IRB Office: 330 941 2377
Email: YSUIRB@ysu.edu

From: Krystle S Finley
Sent: Monday, March 30, 2015 4:46 PM
To: YSUIRB
Cc: Keisha Tyler Robinson; Ronald K Chordas; Joseph P Lyons; Cheryl K Coy
Subject: Re: IRB Amendment #108-15 Mod

Dear IRB,

The student investigator has decided to select choice 2.

2. Leave the required fields requirement on the survey software for all questions but revise the consent document. Inform respondents that participation is voluntary but once a choice is made to participate, all questions must be answered or they are not able to submit the survey and they will not be eligible for the incentive $25 gift card.

Attached is the revised consent document Revisions are in red text

APPENDIX B

CITI Training for Research with Human Participants

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name** Krystle Finley (D: 4603755)
- **Email** ksfinley@student.ysu edu
- **Institution Affiliation** Youngstown State University (D: 2520)
- **Institution Unit** Health and Human Services

- **Curriculum Group** Students conducting no more than minimal risk research
- **Course Learner Group** Students - Class projects
- **Stage** Stage 1 - Basic Course
- **Description** This course is appropriate for students doing class projects that qualify as "No More Than Minimal Risk" human subjects research.

- **Report ID** 15521054
- **Completion Date** 01/19/2015
- **Expiration Date** 01/18/2018
- **Minimum Passing** 80
- **Reported Score*** 90

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name** Krystle Finley (D: 4603755)
- **Email** ksfinley@student.ysu.edu
- **Institution Affiliation** Youngstown State University (D: 2520)
- **Institution Unit** Health and Human Services

- **Curriculum Group** Students conducting no more than minimal risk research
- **Course Learner Group** Students - Class projects
- **Stage** Stage 1 - Basic Course
- **Description** This course is appropriate for students doing class projects that qualify as "No More Than Minimal Risk" human subjects research.

- **Report ID** 15521054
- **Report Date** 03/10/2015
- **Current Score**** 90

APPENDIX C

Tables

Table 1
Breast Cancer Statistics

	Female Population Incidence	Prevalent Cases of Breast Cancer	Mortality Rate from Breast Cancer
United States	**119**	**445**	**24**
Ohio	**116**	**436**	**28**
Northeast Ohio Counties			
1) Harrison	145	545	42
2) Jefferson	136	513	40
3) Mahoning	**106**	**401**	**35**
4) Cuyahoga	136	511	32
5) Richland	138	520	31

Note: Breast cancer incidences and mortality rates are estimated per 100,000. Boldface numbers are the focus of this study.
Source: Komen Northeast Ohio Community Profile Report 2011-2012 (2009)

Table 2
Variable Definitions (n= 179)

Variable	In-Text Reference	Definition
Race	Race	The race of the participant: Caucasian/White, African American/African/Black/Caribbean, American Indian, Pacific Islander/Asian, Hispanic/Latino, Other and Prefer not to answer.
Age	Age range	The age range of the participant: 18-24 years, 25-34 years, 35-44 years, 45-54 years, 55-64 years, and 65 + years.
Gender	Gender	The gender of the participant: male, female, and prefer not to answer.
Highestedu	Highest Level of Education	The highest level of education obtained: High School/GED, Some college, 2 year college degree (Associate's Degree), 4 year college degree (Bachelor's Degree), Masters degree, Doctoral degree, Professional degree (MB, DO, MD), and Prefer not to answer.
HeardofBC	Heard of Breast Cancer	The participant has heard of breast cancer: yes or no.
HasBC	Has/Had Breast Cancer	The participant has/had breast cancer: yes or no.
FamBC	Family Member w/Breast Cancer	The participant has/had a family member with breast cancer: yes or no.
HBM		
Selfriskgreat	Chances for getting breast cancer are great	The Likert scale of the participants perceived susceptibility and chances for getting breast cancer are great. Choices ranged from Strongly Disagree (1) to Strongly Agree (5).
Physicalhealthrisk	Physical health makes it more likely to get breast cancer	The Likert scale of the participants perceived susceptibility and physical health increases breast cancer risk. Choices ranged from Strongly Disagree (1) to Strongly Agree (5).

BCriskfactors	Age, family history, obesity, and physical inactivity can increase the chance of developing breast cancer	The Likert scale of the participants perceived severity and awareness of factors such as age, family history, obesity, and physical inactivity can increase the chance of developing breast cancer. Choices ranged from Strongly Disagree (1) to Strongly Agree (5).
ValueBHBSA	A lot is to be gained by being educated in my breast health and by practicing breast self-awareness	The Likert scale of the participants perceived benefits and value of breast health education and by practice of breast self-awareness. Choices ranged from Strongly Disagree (1) to Strongly Agree (5).
BSApreventefforts	Being aware and hands-on in one's breast health can help prevent future problems	The Likert scale of the participants perceived benefits and being aware and hands-on in one's breast health can help prevent future problems. Choices ranged from Strongly Disagree (1) to Strongly Agree (5).
Youthpromotion	Educating the youth about their breast health and encouraging awareness can help instill lifelong healthy habits	The Likert scale of the participants perceived benefits and supporting education for the youth about their breast health to encourage awareness can help instill lifelong healthy habits through adulthood. Choices ranged from Strongly Disagree (1) to Strongly Agree (5).
Activediff	Being active in one's breast health would require starting new habits, which is difficult.	The Likert scale of the participants perceived barriers and being active in one's breast health would require starting new habits, which would be difficult. Choices ranged from Strongly Disagree (1) to Strongly Agree (5).
MCstat	In Mahoning County the death rate from breast cancer is estimated at 35/100,000 women. This is significantly greater than the national average death rate from breast cancer that is estimated at 24/100,000 women.	The Likert scale of the participants perceived barriers and awareness of the statistically significant breast cancer mortality rate in Mahoning County. Choices ranged from Strongly Disagree (1) to Strongly Agree (5).

EduBH	Educated in one's breast health	The Likert scale of the participants' cues to action and having breast health education knowledge. Choices ranged from Strongly Disagree (1) to Strongly Agree (5).
PriorBHedu	Received educational information about one's breasts	The Likert scale of the participants' cues to action and previous breast health education. Choices ranged from Strongly Disagree (1) to Strongly Agree (5).
Imphealth	Frequently does things to improve one's health	The Likert scale of the participants cues to action and frequently does things to improves one's health. Choices ranged from Strongly Disagree (1) to Strongly Agree (5).
Screentest	Rely on screening tests for breast cancer	The Likert scale of the participants' self-efficacy and use of preventative measure via breast cancer screening methods. Choices ranged from Strongly Disagree (1) to Strongly Agree (5).
ConfidentBSA	Understands how one's breasts normally feel and look and able to notice any unusual changes	The Likert scale of the participants self-efficacy and confidence and understanding in one's breasts normal feel and look and ability to notice unusual changes. Choices ranged from Strongly Disagree (1) to Strongly Agree (5).
Childpart	Permission for minor to participate in a youth program that promotes breast health education and awareness at school	The Likert scale of the participants' self-efficacy and support and willingness to provide permission for a minor to participate in a youth program that promotes breast health education and awareness at school. Choices ranged from Strongly Disagree (1) to Strongly Agree (5).
FAC1_2	COMPONENT 1-FAC1_2: Regression Factor Score	Numeric Regression factor score for 6 HBM variables: valueBHBSA, eduBH, priorBHedu, imphealth, screentest, and confidentBSA. Labeled as HBM constructs cues to action and self-efficacy.
FAC2_2	COMPONENT 2-FAC2_2: Regression Factor Score	Numeric Regression factor score for 5 HBM variables: valueBHBSA, BSApreventefforts, youthpromotion, screentest, and childpart. Labeled as HBM construct perceived benefits.
FAC3_2	COMPONENT 3-FAC3_2: Regression	Numeric Regression factor score for 4 HBM variables: selfriskgreat, physicalhealthrisk,

	Factor Score	activediff, and imphealth. Labeled as HBM construct perceived susceptibility.
FAC4_2	COMPONENT 4-FAC4_2: Regression Factor Score	Numeric Regression factor score for 2 HBM variables: BCriskfactors and activediff. Labeled as HBM construct perceived barriers.
FAC5_2	COMPONENT 5-FAC5_2: Regression Factor Score	Numeric Regression factor score for 1 HBM variable: MCstat. Labeled as HBM construct perceived severity.

Table 3

Frequency Distribution of Participant Socio-demographics (n=179)

	Frequency	Percent
Race		
(1) Caucasian/White	157.0	87.7%
(2) A.American/Black/Caribbean	10.0	5.6%
(3) American Indian	0.0	0.0%
(4) Pacific Islander/Asian	4.0	2.2%
(5) Hispanic/Latino	5.0	2.8%
(6) Other	2.0	1.1%
(7) Prefer not to answer	1.0	0.6%
Total	179.0	100.0%
Age		
(1) 18-24	15.0	8.4%
(2) 25-34	22.0	12.3%
(3) 35-44	40.0	22.4%
(4) 45-54	49.0	27.4%
(5) 55-64	49.0	27.4%
(6) 65 +	4.0	2.2%
Total	179.0	100.0%
Gender		
(1) Male	29.0	16.20%
(2) Female	149.0	83.24%
(3) Prefer not to answer	1.0	0.56%
Total	179.0	100.0%
HighestEDU		
(1) High School/GED	5.0	2.8%
(2) Some college	18.0	10.1%
(3) 2 year college degree	12.0	6.7%
(4) 4 year college degree	38.0	21.2%
(5) Masters degree	63.0	35.2%
(6) Doctoral degree	39.0	21.8%
(7) Professional degree	3.0	1.7%
(8) Prefer not to answer	1.0	0.6%
Total	179.0	100.0%

Source: Evaluating Breast Health Education in the College Environment Using the Health Belief Model Electronic Survey 2015

Table 4

Frequency Distribution of Participant Breast Cancer Knowledge and History (N=179)

	Frequency	Percent
Have you ever heard of breast cancer?		
(1) Yes	156.0	87.2%
(2) No	23.0	12.9%
Total	179.0	100.0%
Have you ever been told that you have breast cancer?		
(1) Yes	8.0	4.5%
(2) No	171.0	95.5%
Total	179.0	100.0%
Has a member of your family ever been told that they have breast cancer?		
(1) Yes	74.0	41.3%
(2) No	105.0	58.7%
Total	179.0	100.0%

Source: Evaluating Breast Health Education in the College Environment Using the Health Belief Model Electronic Survey 2015

Table 5
Factor Loadings for Exploratory Factor Analysis with Varimax Rotation of Health Belief Model Variables (N=179)

	FAC1_2	FAC2_2	FAC3_2	FAC4_2	FAC5_2
selfriskgreat	.27	-.06	**.74**	-.02	.00
physicalhealthrisk	-.13	.31	**.70**	-.01	.12
BCriskfactors	-.08	.32	.16	**.76**	.22
valueBHBSA	**.41**	**.66**	.05	.06	-.19
BSApreventefforts	.33	**.64**	.18	.08	-.28
youthpromotion	.02	**.69**	.05	.08	.24
activediff	-.22	.14	**.33**	**-.67**	.24
MCstat	.23	.13	.04	.02	**.78**
eduBH	**.75**	-.03	.05	.24	.24
priorBHedu	**.85**	.06	.13	.11	.14
imphealth	**.37**	.28	**-.48**	.07	.22
screentest	**.68**	**.39**	-.04	-.08	-.17
confidentBSA	**.63**	.21	-.14	-.14	.08
childpart	.06	**.66**	-.07	.01	.27
Eigenvalues	3.67	1.71	1.32	1.09	1.00
Percentage of total variance	26.18	12.18	9.42	7.77	7.16
Number of test measures	6	5	4	2	1

Note. Factor Loadings > .30 are in boldface. FAC1_2 = HBM construct "Cues to Action and Self-Efficacy"; FAC2_2 = HBM construct "Perceived Benefits"; FAC3_2 = HBM construct "Perceived Susceptibility"; FAC4_2 = HBM construct "Perceived Barriers"; FAC5_2 = HBM construct "Perceived Severity"

Table 6
Binary Logistic Regression Analysis for Having Heard of Breast Cancer (N=179)

Predictor	B	*SE*	*OR*	*p*
FAC1_2	- 0.40	0.23	0.67	0.086*
FAC2_2	0.15	0.25	1.16	0.552
FAC3_2	0.07	0.24	1.07	0.777
FAC4_2	0.27	0.27	1.31	0.305
FAC5_2	- 0.11	0.24	0.90	0.650
age	0.34	0.19	1.40	0.084*
highestedu	- 0.30	0.16	0.74	0.064*
race	0.27	0.20	1.31	0.186
Constant	- 2.29	0.99	0.10	0.020**
x^2		8.92		
df		8		
% heardofBC		87.2		

Note. *$p < .10$. **$p < .05$. FAC1_2 = HBM construct "Cues to Action and Self-Efficacy"; FAC2_2 = HBM construct "Perceived Benefits"; FAC3_2 = HBM construct "Perceived Susceptibility"; FAC4_2 = HBM construct "Perceived Barriers"; FAC5_2 = HBM construct "Perceived Severity"

APPENDIX D

Figures

Figure 1

Health Belief Model Components and Linkages

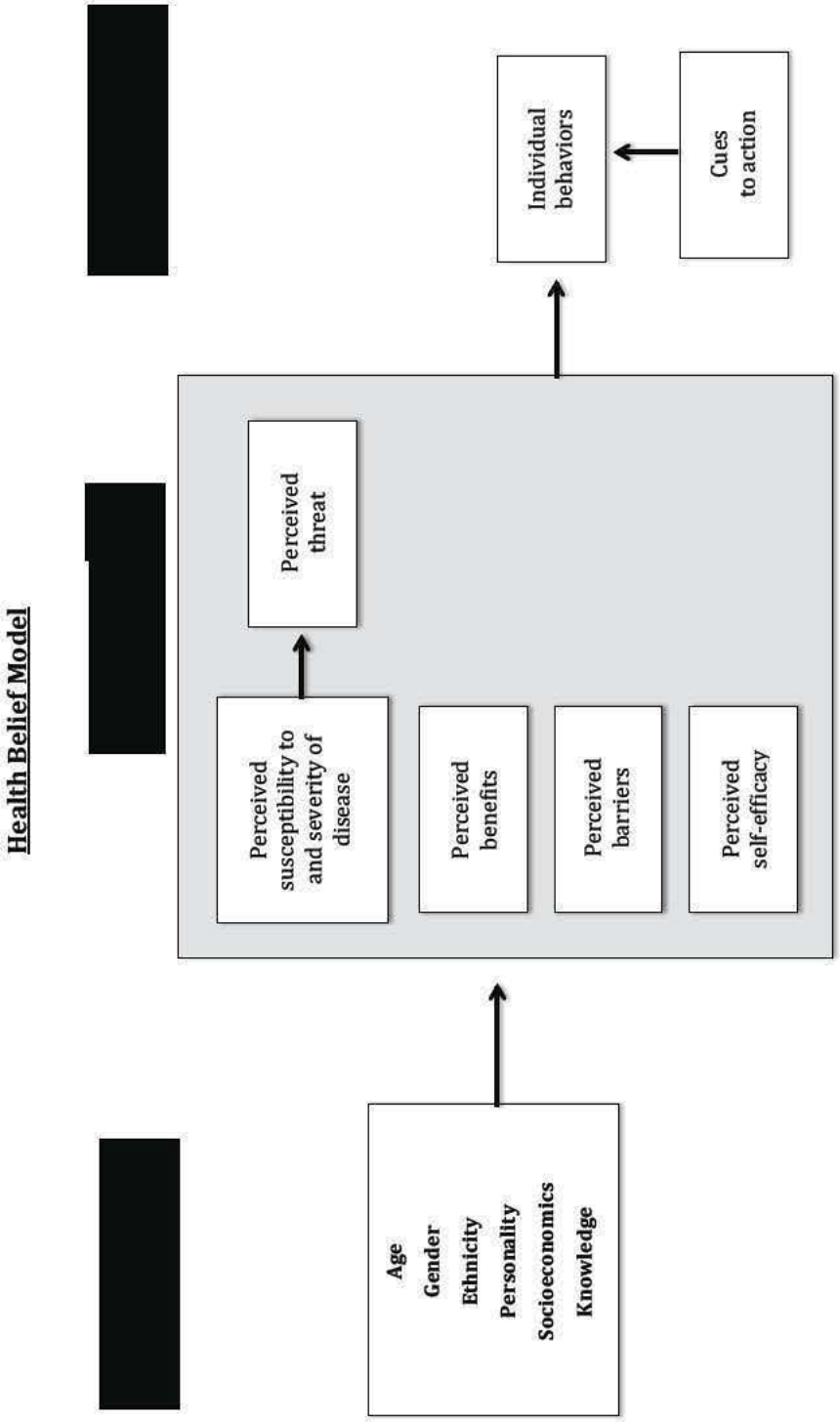
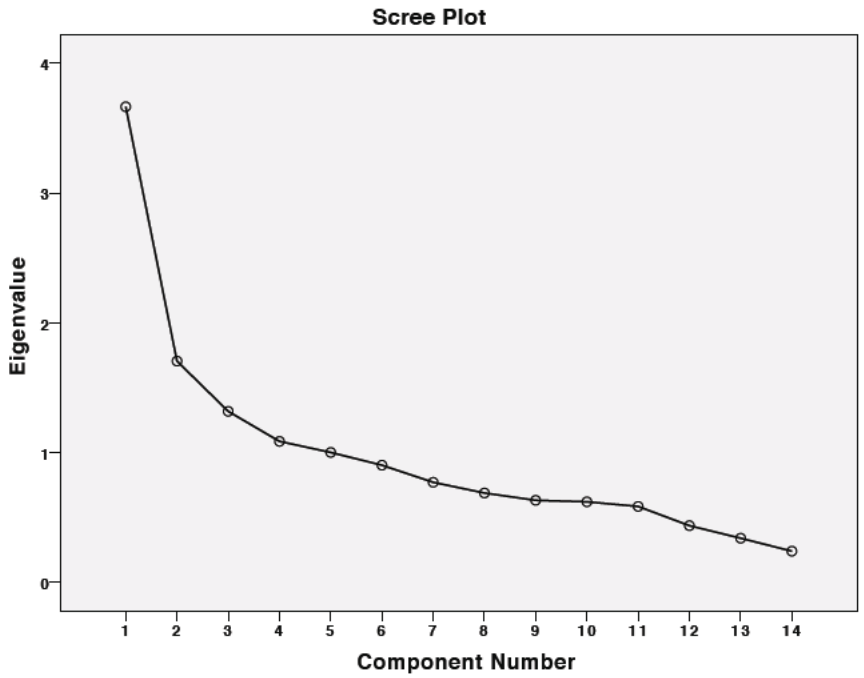


Figure 2

Eigenvalue Scree Plot



Note: There is a drop to the seventh factor eigenvalue.

APPENDIX E

Survey Instrument

Edit this form

Evaluating Breast Health Education and Awareness in the College Environment Using the Health Belief Model

Youngstown State University

* Requ red

Informed Consent

Dear Sir or Madam,

I am Krystle Finley, a graduate student at Youngstown State University, School of Graduate Studies and Research. I am working my Master s in Health and Human Services Thesis. I am conducting a research study to evaluate Breast Health Education and Awareness in the College Environment Using the Health Belief Model. Dr. Joseph P. Lyons, the Director of the Master in Health and Human Services Program is serving as my faculty advisor.

Early education and other new strategies are necessary to reduce the high breast cancer mortality rate, as Mahoning County has a higher death rate than the national average. Your involvement in this research project will be used to observe health behaviors and determine the need and support for a youth engagement program promoting breast health education and awareness. There are no anticipated risks associated with this study and the results will be handled in a professional manner. The information you provide is being collected without identifiers, so your identity cannot be linked to the results of the survey.

It will take about 5-7 minutes to complete the survey. Your participation in this research project is voluntary and you may withdraw from participating in the study by not accessing the electronic link, deleting the invitation email, or by not submitting a response. Please note that your participation in this study is voluntary, however, once the decision to participate is made, all questions must be answered in order to submit the survey and to be eligible for the $25 VISA gift card incentive. We understand your time is valuable. Your participation in this research project will help us determine the need for greater breast health promotion and educational efforts. Your participation and support with this study is greatly appreciated.

Please take a few minutes to complete the electronic survey by clicking on the link provided:
https://docs.google.com/forms/d/1zkt44J6qw8FfgmZVAtC2EthFSpDZIqMyUatsyGCOwuQ/viewform

By completing the questionnaire you agree that you are 18 years of age or older, have read the above description and voluntarily consent to participate in this research project.

I would like thank you in advance for your time and support to my research, to show my appreciation for contributing to the study, participants have the opportunity to enter a drawing for chance to win a $25.00 VISA gift card! While the odds of winning depend on how many people respond, based on the response rate target, you could be the grand prize winner! Please be aware that your name and personal information for entering the drawing is in no way linked to your survey results.

Thank you!
Krystle Finley

This survey asks personal questions about your health, and the topic is a very sensitive one for people who have, or know someone with breast cancer. If you would like to speak with someone about your health or breast cancer in general, you can contact Student Health Services located in Kilcawley House on YSU campus or by calling 330-941-3489. Student Health Services are free to YSU students and information is kept confidential.

If you have any questions regarding this research project please contact:
Dr. Joseph P. Lyons Sc.D
Director of Masters of Health and Human Services Program
Youngstown State University
One University Plaza
Youngstown, OH 44555
Phone: (330) 941-3658
Or, if you have questions about participating as a human subject in this project, you may contact Dr. Edward Orona, Director of Grants and Sponsored Programs at YSU (330-941-2377).

Please select your race/ethnicity. *

- ○ Caucas an/Wh te
- ○ Afr can Amer can/Afr can/B ack/Car bbean
- ○ Amer can nd an
- ○ Pac fic s ander/As an
- ○ H span c/Lat no
- ○ Prefer not to answer

◯ Other

Please select your age group: *

◯ 18-24 years
◯ 25-34 years
◯ 35-44 years
◯ 45-54 years
◯ 55-64 years
◯ 65 + years

What is your gender? *

◯ Ma e
◯ Fema e
◯ Prefer not to answer

What your highest level of education? *

◯ H gh Schoo /GED
◯ Some co ege
◯ 2 year co ege degree (Assoc ate's Degree)
◯ 4 year co ege degree (Bache or's Degree)
◯ Master's degree
◯ Doctora degree
◯ Profess ona degree (MB, DO, MD)
◯ Prefer not to answer

Have you ever heard of breast cancer? *

◯ Yes
◯ No

Have you ever been told that you have breast cancer? *

◯ Yes
◯ No

Has a member of your family ever been told that they have breast cancer? *

◯ Yes
◯ No

My chances for getting breast cancer are great. *

- ◯ Strong y D sagree
- ◯ D sagree
- ◯ Neutra
- ◯ Agree
- ◯ Strong y Agree

My physical health makes it more likely that I will get breast cancer. *

- ◯ Strong y D sagree
- ◯ D sagree
- ◯ Neutra
- ◯ Agree
- ◯ Strong y Agree

Age, family history, obesity, and physical inactivity can increase the chance of developing breast cancer. *

- ◯ Strong y D sagree
- ◯ D sagree
- ◯ Neutra
- ◯ Agree
- ◯ Strong y Agree

I have a lot to gain by being educated in my breast health and by practicing breast self-awareness. *

- ◯ Strong y D sagree
- ◯ D sagree
- ◯ Neutra
- ◯ Agree
- ◯ Strong y Agree

Being aware and hands-on in my breast health can help prevent future problems. *

- ◯ Strong y D sagree
- ◯ D sagree
- ◯ Neutra
- ◯ Agree
- ◯ Strong y Agree

Educating the youth about their breast health and encouraging awareness can help instill lifelong healthy habits through adulthood. *

- ◯ Strong y D sagree
- ◯ D sagree

- ◯ Neutra
- ◯ Agree
- ◯ Strong y Agree

Being active in my breast health would require starting new habits, which is difficult. *

- ◯ Strong y D sagree
- ◯ D sagree
- ◯ Neutra
- ◯ Agree
- ◯ Strong y Agree

In Mahoning County the death rate from breast cancer is estimated at 35 women per 100,000. This is significantly greater than the national average death rate from breast cancer that is estimated at 24 women per 100,000. *

- ◯ Strong y D sagree
- ◯ D sagree
- ◯ Neutra
- ◯ Agree
- ◯ Strong y Agree

I feel that I am educated in my breast health. *

- ◯ Strong y D sagree
- ◯ D sagree
- ◯ Neutra
- ◯ Agree
- ◯ Strong y Agree

I have received educational information about my breasts. *

- ◯ Strong y D sagree
- ◯ D sagree
- ◯ Neutra
- ◯ Agree
- ◯ Strong y Agree

I frequently do things to improve my health. *

- ◯ Strong y D sagree
- ◯ D sagree
- ◯ Neutra
- ◯ Agree

Strong y Agree

I rely on screening tests for breast cancer (i.e. breast self exam, breast self awareness, clinical breast exam). *

A screen ng test s a preventat ve method used to find d seases, such as cancer, n peop e who do not have s gns or symptoms

Strong y D sagree
D sagree
Neutra
Agree
Strong y Agree

I feel confident that I understand how my breasts normally feel and look, I would be notice any unusual changes. *

Strong y D sagree
D sagree
Neutra
Agree
Strong y Agree

If I had or have a female child, I would allow them to participate in a youth program that promotes breast health education and awareness at school. *

Strong y D sagree
D sagree
Neutra
Agree
Strong y Agree

Thank you for your time and contribution to this research. You have completed the survey. If you have any questions on the research, please contact me at ksfinley@student.ysu.edu. WOULD YOU LIKE YOUR NAME ENTERED INTO A DRAWING FOR A CHANCE TO WIN A $25.00 VISA GIFT CARD? *

**YOUR NAME AND PERSONAL NFORMAT ON FOR ENTER NG THE DRAW NG S N NO WAY L NKED TO YOUR SURVEY RESULTS Kryst e S F n ey, RDMS Graduate Student Masters Program n Hea th and Human Serv ces

YES
NO

Please enter your information below to be entered into the drawing for the $25.00 VISA gift card! Please include your: NAME (first & last)_____ EMAIL _____ PHONE #_____

**YOUR NAME AND PERSONAL NFORMAT ON FOR ENTER NG THE DRAW NG S N NO WAY L NKED TO YOUR SURVEY RESULTS

Submit

Never submit passwords through Google Forms.

Evaluating Breast Health Education and Awareness in the College Environment Using the Health Belief Model

Your response has been recorded. Thanks again for choosing to participate in this study. Your participation is greatly appreciated.

*This survey asks personal questions about your health, and the topic is a very sensitive one for people who have, or know someone with breast cancer. If you would like to speak with someone about your health or breast cancer in general, you can contact Student Health Services located in Kilcawley House on YSU campus or by calling 330-941-3489. Student Health Services are free to YSU students and information is kept confidential.

APPENDIX F

Request for Electronic Survey Distribution

Youngstown STATE UNIVERSITY

Back to Home Tab

Office 365 E-mail | Calendar | Groups | YSU Home Page | Logout | Help

Personal Announcements

Number of announcements: 9

(displayed 5 per page)

<< < Page 1 of 2 > >>

Subject (click to display details)	Delivery Date ↓	Expiration Date	Author
Breast Health Education and Awareness in the College Environment Using the Health Belief Model	Apr 9, 2015	Apr 30, 2015	Steve F Katros
PAYO Collection	Apr 9, 2015	Apr 17, 2015	Jodi Clowes
Special Presentation by C-SPAN Documentarian on Monday, April 13 at 4:00	Apr 9, 2015	Apr 14, 2015	Mary F Hake
TALENTED SUCCESSFUL STUDENTS NEEDED	Apr 6, 2015	Apr 10, 2015	Cindy Korchnak
Akron Children's Hospital Toy Drive	Apr 3, 2015	Apr 30, 2015	Steve F Katros

Delete Refresh List

ID: 18162
Subject: Breast Health Education and Awareness in the College Environment Using the Health Belief Model
Date: Apr 9, 2015 1:41:23 PM

Student Initial Email Invite

Subject title: Enter for a chance to WIN a $25.00 VISA gift card for 5 minute Breast Cancer Awareness Survey!

Hi <student's first name>! Hope your Spring Semester 2015 has gotten off to a great start.

My name is Krystle Finley.
I am a Student in the Master of Health and Human Services Program at YSU, and a Registered Diagnostic Medical Sonographer. I am conducting a short **5-7 minute survey** through this email for my thesis research to unveil the level of breast health education and awareness among the YSU population.

Your responses could help improve YSU breast health promotion programs for students and the local community!

For filling out the survey, you can be entered into a drawing for a **$25.00 VISA gift card!** While the odds of winning depend on how many people respond, based on the response rate target, you could be the **grand prize winner.**

I thank you so much in advance for your time and support to my research **to benefit YSU students and the local community!!**

Sincerely,
Krystle S. Finley, RDMS

Click here for survey !
https://docs.google.com/forms/d/1zkt44J6qw8FfgmZVAtC2EthFSpDZIqMyUatsyGCOwuQ/viewform

Click here for Informed Consent Document!

Evaluating Breast Health Education and Awareness in the College Environment Using the Health Belief Model

From: **Steve F Katros** sfkatros@ysu.edu
Subject: RE: Request for Electronic Survey Distribution
Date: April 9, 2015 at 1 54 PM
To: Krystle S Finley ksfinley@student.ysu.edu

SF

Survey has been posted in the Channel Announcement area.

From: Krystle S Finley
Sent: Tuesday, March 31, 2015 11:54 AM
To: Steve F Katros
Cc: Tammy A. King; Joseph P Lyons; Keisha Tyler Robinson; Ronald K Chordas
Subject: Request for Electronic Survey Distribution

Dear Mr. Katros,

Hello, it is Krystle Finley and I am pleased to let you know that I have completed the IRB approval process. Today, I was granted permission to proceed with disseminating my research study, post final modification approval.

It would be greatly appreciated if you could send the survey invitation email to the entire YSU population at your earliest convenience.

This is my plan for the data collection period: I would like to have the survey open for a total of 3 weeks. After 10 days I will review the number of responses and will at that time request for the reminder email to be sent out. I hope that after 21 days that I will have at least 100 responses. If after 21 days, a minimum of 100 responses is not achieved, the survey will remain open for another 2 weeks. At that time, a final reminder email should be sent out on the 4th week of the data collection period.

I would like to thank you in advance for you time and assistance with the distribution of my research instrument for my Master's Thesis.

Here is the direct link to my electronic survey:
https://docs.google.com/forms/d/1zkt44J6qw8FfgmZVAtC2EthFSpDZIqMyUatsyGCOwuQ/viewform?usp=send_form

Also, I have included the following attachments:

1. Invitation Email

Student Initial Email Invite

Subject title: Enter for a chance to WIN a $25.00 VISA gift card for 5 minute Breast Cancer Awareness Survey!

Hi <student's first name>! Hope your Spring Semester 2015 has gotten off to a great start.

My name is Krystle Finley.
I am a Student in the Master of Health and Human Services Program at YSU, and a Registered Diagnostic Medical Sonographer. I am conducting a short **5-7 minute survey** through this email for my thesis research to unveil the level of breast health education and awareness among the YSU population.

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I thank you so much in advance for your time and support to my research **to benefit YSU students and the local community!!**

Sincerely,
Krystle S. Finley, RDMS

Click here for survey!
https://docs.google.com/forms/d/1zkt44J6qw8FfgmZVAtC2EthFSpDZIqMyUatsyGCOwuQ/viewform

Student Reminder Email Invite

Subject title: Reminder! 5 min. Breast Cancer Awareness survey, Win $25.00 VISA gift card!

Hello <student's first name>,

Just a reminder, if you haven't taken the opportunity, **participate in the short survey (details below) for a chance to win a $25.00 VISA gift card!!** Survey closes soon, don't miss out!!

You can click here for survey:
https://docs.google.com/forms/d/1zkt44J6qw8FfgmZVAtC2EthFSpDZIqMyUatsyGCOwuQ/viewform

Thank you,

Krystle Finley, RDMS