



Health belief model and its application to mammography screening in a k-12 school district employee wellness program
by Kimberly Ann Hartman

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Health and Human Development
Montana State University
© Copyright by Kimberly Ann Hartman (2002)

Abstract:

Regular mammogram screenings for women are the most effective method for early detection of breast cancer. The objective of this study was to examine factors associated with the Health Belief Model (HBM) that influence a woman's decision to receive mammogram screenings within the Bozeman School District #7. More specifically, this study examined the following questions: 1) Are women (35 years and older) with higher cues to action more likely to receive a mammogram screening than women with lower cues to action? 2) Are women (35 years and older) with higher perceived benefits more likely to receive a mammogram screening than women with lower perceived benefits? 3) Are women (35 years and older) with lower perceived barriers more likely to receive a mammogram screening than women with higher perceived barriers? and, 4) Are women (35 years and older) with higher perceived susceptibility more likely to receive a mammogram screening than women with lower perceived susceptibility? The convenience sample consisted of 269 women 35 years of age or older and were employees of the Bozeman School District #7. Survey booklets were distributed via in-school mail and contained questions related to health beliefs, mammography screening behaviors, and demographics. The response rate was 66%. Regression analysis indicated a significantly strong association between two of the HBM components, cues to action and perceived benefits, and prior mammography screening behavior. Additionally, perceived barriers played a moderate role in explaining prior mammography screening behavior. That is, women who participated in prior mammography screenings were significantly more likely to perceive greater benefits, greater cues to action, and fewer barriers to mammography than those who did not participate. No support was found for perceived susceptibility as a predictor of prior mammography screening behavior. Based on these results, individualized interventions designed to foster an employee's self-care motivation toward increased participation in mammography screenings can be developed. Practical implications for an employee wellness program were suggested.

HEALTH BELIEF MODEL AND IT'S APPLICATION TO MAMMOGRAPHY
SCREENING IN A K-12 SCHOOL DISTRICT
EMPLOYEE WELLNESS PROGRAM

by

Kimberly Ann Hartman

A thesis submitted in partial fulfillment
of the requirements for the degree

of

Master of Science

in

Health and Human Development

MONTANA STATE UNIVERSITY-BOZEMAN
Bozeman, Montana

July 2002

© COPYRIGHT

by

Kimberly Ann Hartman

2002

All Rights Reserved

N378
H2557

APPROVAL

of a thesis submitted by

Kimberly Ann Hartman

This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

Dr. Tim Dunnagan

(Signature)

(Date)

Approved for the Department of Health and Human Development

Dr. Ellen Kreighbaum

(Signature)

(Date)

Approved for the College of Graduate Studies

Dr. Bruce McLeod

(Signature)

(Date)

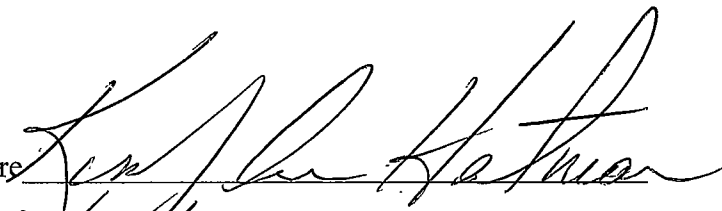
STATEMENT OF PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a master's degree at Montana State University, I agree that the Library shall make it available to borrowers under rules of the Library.

If I have indicated my intention to copyright this thesis by including a copyright notice page, copying is allowable only for scholarly purposes, consistent with "fair use" as prescribed in the U.S. Copyright Law. Requests for permission for extended quotation from or reproduction of this thesis in whole or in parts may be granted only by the copyright holder.

Signature

Date


7/19/02

ACKNOWLEDGMENTS

I would like to thank my committee chair, Dr. Tim Dunnagan for continuously keeping me focused on the goals of this research and for the belief in my ability to complete this task properly. Additionally, I would like to give a heart-felt thank you to Dr. Tim Dunnagan for the, guidance, expertise, and opportunities he has given me throughout my program. Dr. George Haynes, I cannot thank enough for the support, guidance, and assistance with my statistical analyses. To Dr. Craig Stewart I would like to extend my thanks and appreciation for his expertise and constructive feedback in getting this project into its final form.

I would like to express my sincere appreciation to the employees of the Bozeman School District who participated in the focus group sessions and completed the survey. A special thanks goes to Bruce Colton, Steve Johnson, and Alberta Fredrickson, whose support and funding made this research project possible.

A special thank you goes to Mary Bolhuis, a dear friend and colleague, who was always there to listen to me and had faith in me when I had lost all faith in myself. My heartfelt appreciation goes to the wonderful friends and colleagues for always showing me they cared. A final thank you to my family who provided me with love, understanding, and support throughout my graduate program.

TABLE OF CONTENTS

1. INTRODUCTION	1
RESEARCH OBJECTIVE	2
SIGNIFICANCE OF THE STUDY	3
DEFINITION OF TERMS	4
DELIMITATIONS	6
LIMITATIONS.....	7
ASSUMPTIONS	7
2. REVIEW OF LITERATURE	8
A HISTORICAL VIEW OF WHP	8
EVALUATION TECHNIQUES AND STRATEGIES	10
Evaluation Techniques.....	10
BREAST CANCER.....	11
THE HEALTH BELIEF MODEL AND IT'S APPLICATION TO MAMMOGRAPHY	12
HBM and Breast Cancer Screenings.....	15
CONCLUSION.....	16
3. METHODS	18
PURPOSE	18
HUMAN SUBJECTS COMMITTEE	19
DATA	19
Subjects.....	19
Instrumentation	20
Survey Development.....	22
Demographic and Socioeconomic Status.....	22
BRFSS Questions.....	23
HBM Components	24
Survey Pilot.....	26
Survey Construction.....	27
Survey Distribution.....	28
Code Book	28
Statistical Analysis.....	28
Linear Regression	29
Descriptive Statistics: Two by Two Tables	31
Hypothesized Relationships.....	33
4. RESULTS	35
SURVEY RESPONDENT INFORMATION	35
DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS	35
MAMMOGRAPHY SCREENING BEHAVIOR.....	37

MAMMOGRAM SCREENING BEHAVIOR COMPARED TO THE STATE OF MONTANA	
POPULATION	38
HEALTH BELIEF MODEL COMPONENTS.....	39
Cues to Action.....	39
Perceived Susceptibility.....	40
Perceived Benefits	40
Perceived Barriers.....	41
LINEAR REGRESSION RESULTS	41
Cues to Action Model	43
Perceived Benefits Model.....	44
Perceived Barriers Model	46
Perceived Susceptibility Model	47
Full Model.....	48
Regression Summary	48
DESCRIPTIVE STATISTICS: BENEFITS, BARRIERS, AND CUES TO ACTION	50
Summary of Two by Two Tables	52
5. DISCUSSION	53
MAMMOGRAPHY SCREENING BEHAVIOR	54
CUES TO ACTION	55
PERCEIVED BENEFITS.....	57
PERCEIVED BARRIERS	58
PERCEIVED SUSCEPTIBILITY	59
SUMMARY	60
LIMITATIONS.....	60
REFERENCES CITED.....	62
APPENDICES	66
APPENDIX A - Questionnaire.....	67
APPENDIX B - Human Subjects Committee Letter	75

LIST OF TABLES

Table	Page
1. Demographic and Socioeconomic Characteristics of Survey Respondents Compared to the BSD Population.....	36
2. Percent and Number of Mammogram Screening Behavior.....	38
3. Mammography Screening Rates of Survey Respondents to the State of Montana Population with 95% confidence intervals (MT BRFSS, 2001).....	39
4. Percent and number of cues to action.....	40
5. Determinants of Mammography Screening.....	43
6. Multiple Linear Regression Cues to Action Model Analysis Dependent Variable=Mammogram Screening.....	44
7. Multiple Linear Regression Benefits Model Analysis Dependent Variable=Mammogram Screening.....	45
8. Multiple Linear Regression Barriers Model Analysis Dependent Variable=Mammogram Screening.....	46
9. Multiple Linear Regression Susceptibility Model Analysis Dependent Variable=Mammogram Screening.....	47
10. Multiple Linear Regression Full Model Analysis Dependent Variable=Mammogram Screening.....	49
11. Mammogram Screening Behavior with Benefits and Barriers.....	51
12. Mammogram Screening Behavior with Benefits and Cues to Action.....	51
13. Mammogram Screening Behavior with Barriers and Cues to Action.....	52

ABSTRACT

Regular mammogram screenings for women are the most effective method for early detection of breast cancer. The objective of this study was to examine factors associated with the Health Belief Model (HBM) that influence a woman's decision to receive mammogram screenings within the Bozeman School District #7. More specifically, this study examined the following questions: 1) Are women (35 years and older) with higher cues to action more likely to receive a mammogram screening than women with lower cues to action? 2) Are women (35 years and older) with higher perceived benefits more likely to receive a mammogram screening than women with lower perceived benefits? 3) Are women (35 years and older) with lower perceived barriers more likely to receive a mammogram screening than women with higher perceived barriers? and, 4) Are women (35 years and older) with higher perceived susceptibility more likely to receive a mammogram screening than women with lower perceived susceptibility? The convenience sample consisted of 269 women 35 years of age or older and were employees of the Bozeman School District #7. Survey booklets were distributed via in-school mail and contained questions related to health beliefs, mammography screening behaviors, and demographics. The response rate was 66%. Regression analysis indicated a significantly strong association between two of the HBM components, cues to action and perceived benefits, and prior mammography screening behavior. Additionally, perceived barriers played a moderate role in explaining prior mammography screening behavior. That is, women who participated in prior mammography screenings were significantly more likely to perceive greater benefits, greater cues to action, and fewer barriers to mammography than those who did not participate. No support was found for perceived susceptibility as a predictor of prior mammography screening behavior. Based on these results, individualized interventions designed to foster an employee's self-care motivation toward increased participation in mammography screenings can be developed. Practical implications for an employee wellness program were suggested.

CHAPTER 1

INTRODUCTION

Over the last two decades, health promotion programs have gained popularity in worksite settings. Initially, these programs were offered as a benefit or “perk” to employees. Today, they have evolved into a more comprehensive approach. For example, programs may consist of a single component (i.e. Health Risk Appraisal, tobacco control, etc.) or may include multiple strategies and interventions such as stress management, blood pressure, physical activities, and weight control. Along with this evolution of expanding programs, a focus on the financial and health value associated with these programs has emerged.

However, most health promotion programs do not have sufficient resources to assess program effectiveness. Consequently, evaluation efforts are often simplistic or nonexistent. Nevertheless, an essential piece in worksite wellness programming is evaluation. The Bozeman Public School Employee Wellness Program (BPSEWP) is an example of a health promotion program that has limited resources. The program director is a full time teacher that is paid a stipend for his work in the wellness program. Consequently, the program has been in existence for eleven years and a formal evaluation has never been administered.

The BPSEWP serves over one thousand employees, retirees, spouses, and dependents. The goals of the program focus on the prevention, protection, and

maintenance of the employees and their spouses. Therefore, programs are established with education, activity, and the family in mind. The main thrust of energy and resources are put toward the Annual Health Fair. In addition to the Health Fair, the BPSEWP offers mammogram screenings. The Employee Benefits Clerk indicated that the incidences of breast cancer were high and utilization of the mammogram screenings was low. Therefore, a need existed to examine and enhance the rate of mammogram screenings within the Bozeman School District.

Several research studies have been conducted to determine theory-based explanations of mammography screening usage (Champion, 1995; Champion & Miller, 1996; Lauver, Nabholz, Scott, & Tak, 1997; Holm, Frank, & Curtin, 1999). The Health Belief Model (HBM) has been widely used as a guide for explaining or predicting breast cancer screening behavior. Results have been mixed, however, there was some evidence to support that women with perceptions of 1) enhanced susceptibility, 2) fewer barriers, 3) more benefits, and cues to action (i.e. physician) are more likely to participate in breast cancer screening.

Research Objective

The objective of this study was to examine factors associated with the Health Belief Model that influence a woman's decision to receive mammogram screenings within the Bozeman School District #7. More specifically, this study will examine the following research questions: 1) Are women (35 years and older) with higher cues to action more likely to receive a mammogram screening than women with lower cues to

action? 2) Are women (35 years and older) with higher perceived benefits more likely to receive a mammogram screening than women with lower perceived benefits? 3) Are women (35 years and older) with lower perceived barriers more likely to receive a mammogram screening than women with higher perceived barriers? and, 4) Are women (35 years and older) with higher perceived susceptibility more likely to receive a mammogram screening than women with lower perceived susceptibility?

Significance of the Study

Breast cancer is the second leading cause of cancer death for women in the United States. The American Cancer Society (ACS, 2002) projects 203,500 new cases of breast cancer and 40,000 deaths in the United States in 2002. Currently, the method of prevention of breast cancer is unknown. However, early detection through breast cancer screening can be an effective way to significantly decrease the mortality rate. In fact, the survival rate is as high as 95%, if the cancer is detected early (National Cancer Institute, 2001). One preventative health practice, screening mammography, has been found to dramatically reduce mortality associated with breast cancer. A goal of Healthy People 2000 included increasing the percentage of women age 50 and older to have a mammogram every one to two years to 60% (U.S. Department of Health and Human Services, 1995).

Despite its life-saving potential, mammography remains underused. Only half of the women in the age group of 50 and older have received a mammogram in the preceding one to two years (U.S. Department of Health and Human Services, 1995;

Lauver, Nabholz, Scott, & Tak, 1997). Moreover, even when physicians recommend a mammogram to women, more than one-third do not follow through with the actual screening (Dolan, Reifler, McDermott, & McGaghie, 1995).

Definition of Terms

For the purpose of this study these terms were operationally defined as:

Worksite Health Promotion (WHP). Programs designed to offer a wide variety of health, fitness, nutrition and life style choices to the employee population. The programs' purpose is to provide life style awareness through education and communication.

Health Status. The level of risk or exposure to life threatening diseases.

Preventative Health Behaviors. Practices or behavioral patterns under volitional control that are consistent over time and typically have positive health consequences. The behaviors included in this study are: mammography, clinical breast exams, and Pap smear tests.

Mammogram. An x-ray of the breast.

Screening Mammography. A method used to look, through an x-ray, for breast disease in women who are asymptomatic, that is, they appear to have no breast problems.

Clinical Breast Examination. A manual examination of the breasts by a health professional, such as a physician, nurse practitioner, nurse, or physician assistant.

Health Belief Model. A theoretical framework for "explaining change and maintenance of health behavior" that is used "as a guiding framework for health behavior interventions". Individuals' personal perceptions of susceptibility, severity, benefits,

barriers, cues to action, and self-efficacy towards disease will reflect their course of action or behavior.

Perceived susceptibility is the assessment of an individual's belief that they are at risk (susceptible) to a health condition (Strecher and Rosenstock, 1997). Strecher and Rosenstock stated that this component may contain two elements: first, that the individuals' opinions about contracting a health condition are realistically possible for them and, second, that the individuals' acceptance of the diagnosis in the absence of all symptoms. For example, a woman's belief that she may develop breast cancer is a realistic possibility.

Perceived severity addresses the seriousness of a health condition (Strecher and Rosenstock, 1997). Again, the individuals' perception of the medical, clinical, and social consequences of the risk and the health condition are included. For instance, in most cases of cancer, individuals view the condition as very serious.

Perceived benefits relate to the acceptance of an individual's susceptibility to a serious condition, which leads to a behavior. The behavioral action depends upon the individual's beliefs about the effectiveness of reducing the threat or the seriousness of disease (Janz and Becker, 1984). For example, an individual will have a mammogram to please a family member. This action will also decrease the chances of the cancer metastasizing.

Perceived barriers are the individual's opinion of the cost of the behavioral action. These may be negative psychological or tangible aspects as a result of the health

action (Strecher and Rosenstock, 1997). For instance, an individual could perceive going in for a mammogram as costly, time consuming, painful, and embarrassing.

Cues to action are stimuli that trigger the decision-making process in an individual to engage in a desired behavior (Strecher and Rosenstock, 1997). These "cues to action" may be external or internal stimuli. An example of an external cue or trigger might be an informational flyer about mammograms whereas an internal cue would be finding an irregular lump in the breast area.

Self-efficacy can be defined as "the conviction that one can successfully execute the behavior required to produce the outcomes" (Bandura, 1977, p. 201). Lack of self-efficacy can be viewed as a perceived barrier to following through with an advised behavioral action (Strecher and Rosenstock, 1997). Preventative health behaviors (i.e. screenings, check-ups, or immunizations) are simple actions often occurring annually. Therefore, the skills needed to carry out such actions are minimal. However, changes in lifelong habits of eating, exercising, and smoking require the confidence that one can alter such lifestyles.

Delimitations

- 1) The study was limited to female employees 35 years of age or older of the Bozeman School District.
- 2) Measures used in the study were limited to questions included in the survey (Appendix A).
- 3) Information on background characteristics of subjects was limited to those included in the survey (Appendix A).

Limitations

Limitations of the study are: 1) The investigator only analyzed self-reported data on thoughts, feelings, and ideas about mammography. Individuals' perceptions of such behaviors may differ from reality. 2) Results are generalizable only to the population of Bozeman School District #7 employees.

Assumptions

Assumptions in the study were: 1) all subjects (employees) completed the questionnaire honestly and correctly and 2) all subjects (employees) answered focus group questions honestly and correctly.

CHAPTER 2

REVIEW OF LITERATURE

Worksite health promotion programs (WHP), in existence for over 25 years, has been justified in theory and supported by research (Reardon, 1998). Over time, these programs have reflected a gradual shift in responsibility for health care from government agencies to individual companies and from the health care industry to its consumers (Reardon, 1998). Most (over 80%) companies with 50 or more employees offer WHP programs. Worksites with an employee base of 750 or more almost exclusively offer resources aimed at improving worker health (Office of Disease Prevention and Health Promotion, 1992). As the complexity of WHP programs grew, so did the need for a clear demonstration of a positive relationship to the corporate bottom line. For organizational purposes, the literature is presented under (1) a historical view of WHP, (2) evaluation techniques and strategies, (3) breast cancer, and (4) the Health Belief Model and its application to mammography.

A Historical View of WHP

Originally, WHP programs were an extension of the benefits offered to employees and were limited to only those companies that held a view that strongly supported employees (Aldana, 1998). A natural evolution of most programs has been to move from an employee "perk" to a more comprehensive program that is specifically designed to address a variety of important organizational outcomes.

Willis Goldbeck (1984) suggested that the development of WHP could be categorized into "Four Generations". The first generation involved health-relevant policies for reasons related to safety and quality control procedures. The second generation of WHP, occurring in the 1970s, developed with a deliberate health focus. Employees with at-risk behavior were targeted and encouraged to change their behavior that increased their susceptibility to disease or illness. In the third generation, it was recognized that employees might have several at-risk behaviors. This led to an even higher chance of disease or illness. Consequently, the expansion of WHP programs was supported. The fourth generation of WHP was one that incorporated health improvement along with disease management. This concept involved creating and promoting a health corporate culture. More recently, Stokols (1996) suggested that worker health had both individual and environmental etiologies at the physical, psychological, and social levels. As we move into the twenty-first century, greater emphasis will be placed on workforce productivity (Goetzel & Ozminkowski, 2000). Workforce productivity is an area that will seek to improve the individual and organizational health so that increased profitability can be achieved.

Over the last two decades, WHP has evolved from a single intervention or strategy for individual employees to a comprehensive approach that involves multiple strategies and interventions targeting individual high-risk health behaviors. The attention of WHP has expanded to include the health of the individual employee, the employees' immediate family, the retired employee, and the cultural environment of the organization.

Evaluation Techniques and Strategies

Program evaluation is "a fundamental and essential component of any WHP program" (Dunnagan, Peterson, & Wilson, 1997, p. 205). Documentation of a programs' effectiveness must meet the "needs of funding sources, policy makers, program staff, and the program participants" (Dunnagan, Duncan, & Paul, 2000, p. 125). However, the evaluation of WHP programs can be problematic. An area often sacrificed is internal validity since research is conducted in real world settings (Dunnagan, Peterson, & Wilson, 1997; Aldana, 1998). The issue associated with internal validity is randomization. For example, randomization of program participants is not always possible because most WHP programs are part of an employee benefit package. Consequently, all employees must be offered the benefit, due to the organization's policies, thus eliminating the possibility of a control group.

In addition to these methodological concerns, WHP program administrators seldom have sufficient resources, knowledge, or skills to conduct program evaluations (Dunnagan, Peterson, & Wilson, 1997). Consequently, evaluation efforts are often simplistic. For example, participants who sign up for a screening or an activity are counted. These evaluations do little in providing effective program feedback in such areas as knowledge, changes of behavior, health status, or medical care costs.

Evaluation Techniques

Evaluation techniques can be divided into two categories, quantitative or qualitative. Quantitative techniques involve the collection of data that is based on

standardized measures that are easily categorized (Patton, 1990). Quantitative techniques permit the researcher to obtain data from a large sample of subjects. For example, areas of exercise frequency, resting heart rate, blood pressure, body composition, and cholesterol levels can be statistically manipulated and generalized through quantitative techniques. This method can help the researcher explain what kind of changes has occurred in a WHP program.

In contrast, qualitative techniques involve the collection of data through interviews, focus groups, and direct observations. Qualitative techniques provide greater detailed information (data) from a smaller sample size. Again, this method can help the researcher explain why and how changes have occurred in a WHP program. Given the limitations of conducting research within worksite settings, Dunnagan, Peterson, & Wilson (1997) suggested that a combined use of these two techniques could provide a stronger, more effective program evaluation.

Evaluation of WHP programs remains critical as the demand for dependable documentation of a program's impact increases. Providing *user-friendly* results to the diverse sources of accountability is an important aspect of program longevity. Through the use of theoretically sound tools and both qualitative and quantitative strategies, program evaluation can be purposeful and meaningful (Dunnagan, et al., 1997).

Breast Cancer

Breast cancer is the third most common cancer among women, and it is the second leading cause of cancer death in the United States. The American Cancer Society

(2002) projected 203,500 new cases of breast cancer and 40,000 deaths in the United States in 2002. For women in the United States, this corresponds to a lifetime risk of one in eight women developing breast cancer. Currently, the method of prevention of breast cancer is unknown. However, early detection through breast cancer screening can be an effective way to significantly decrease the mortality rate. The survival rate is as high as 95%, if the cancer is detected early (National Cancer Institute, 2001).

The development and acceptance of mammography screening was described by Silverstein (1994, p. 640) as "the most profound impact" in the field of breast cancer. Updated guidelines provided by the American Cancer Society (2002) have recommended that women aged 40 and older should have a screening mammogram and a clinical breast examination every year. Women between the ages of 20 and 39 should have a clinical breast examination every three years (ACS, 2002).

The Health Belief Model and its application to Mammography

The Health Belief Model (HBM) has been one of the most widely used conceptual frameworks in health behavior. Specifically, HBM appeared most frequently in the literature explaining breast cancer screening (Champion, 1995; Champion and Miller, 1996; Champion and Menon, 1997; Yarbrough and Braden, 2001). The HBM, originating in the public health domain, was developed in the 1950's to explain the failure of participation in disease prevention or detection programs such as tuberculosis (TB) screenings (Strecher and Rosenstock, 1997). Kirscht (1974) expanded the use of the HBM to include people's responses to symptoms. Specifically, symptoms represent a

health threat to an individual that leads to an action (i.e. seek medical advise) (Kirscht, 1974). In addition, Janz and Becker (1984) reviewed results that used the HBM to predict behavior in response to a diagnosed illness. Specifically, results included *sick-role behavior* compliance with regimens in cases of antihypertension, diabetes, and weight loss (Janz and Becker, 1984).

Six major components formulate the HBM: 1) perceived susceptibility, 2) perceived severity, 3) perceived benefits, 4) perceived barriers, 5) cues to action, and 6) self-efficacy. The six components are:

Perceived susceptibility is the assessment of an individual's belief that they are at risk (susceptible) to a health condition (Strecher and Rosenstock, 1997). The researchers stated that this component may contain two elements: first, that the individuals' opinions about contracting a health condition are realistically possible for them and, second, that the individuals' acceptance of the diagnosis in the absence of all symptoms. For example, a woman's belief that she may develop breast cancer is a realistic possibility.

Perceived severity addresses the seriousness of a health condition (Strecher and Rosenstock, 1997). Again, the individuals' perception of the medical, clinical, and social consequences of the risk and the health condition are included. For instance, in most cases of cancer, individuals view the condition as very serious.

Perceived benefits relate to the acceptance of an individual's susceptibility to a serious condition that leads to a behavior. The behavioral action depends upon the individual's beliefs about the effectiveness of reducing the threat or the seriousness of disease (Janz and Becker, 1984). For example, a woman gets a mammogram to reduce

worry or anxiety about breast cancer. Also, non-health related benefits can factor into the behavior. For instance, a woman may get a mammogram to please a family member.

Perceived barriers are the individual's opinion of the cost of the behavioral action. These may be negative psychological or tangible aspects as a result of the health action (Strecher and Rosenstock, 1997). For instance, an individual could perceive going in for a mammogram as costly, time consuming, painful, and embarrassing.

Cues to action are stimuli that trigger the decision-making process in an individual to engage in a desired behavior (Strecher and Rosenstock, 1997). These "cues to action" may be external or internal stimuli. An example of an external cue or trigger might be an informational flyer about mammograms whereas an internal cue would be finding an irregular lump in the breast area.

Self-efficacy is defined as "the conviction that one can successfully execute the behavior required to produce the outcomes" (Bandura, 1977, p. 201). Lack of self-efficacy is viewed as a perceived barrier to following through with an advised behavioral action (Strecher and Rosenstock, 1997). Preventative health behaviors (i.e. screenings, check-ups, or immunizations) are simple actions often occurring annually. Therefore, the skills needed to carry out such actions are minimal. However, changes in lifelong habits of eating, exercising, and smoking require the confidence that one can alter such lifestyles (Strecher and Rosenstock, 1997).

Premise of the HBM postulates that if individuals are to take disease prevention measures, they must feel susceptible to the disease and believe that occurrence of the disease would have a serious impact on their life. Also, they must judge that the

preventive measure(s), such as screenings, are beneficial and outweigh the barriers involved in taking such measures. Finally, cues from the environment affect one's views about barriers or benefits (Strecher and Rosenstock, 1997).

HBM and Breast Cancer Screenings

Researchers have found that the Health Belief Model is significant in that it is a "salient framework for describing breast cancer screening" (Yarbrough & Braden, 2001, p. 679). The model enables the practitioner to examine and understand why individuals do or do not engage in preventative health and screening behaviors (Janz & Becker, 1984). The perceived barriers component was the strongest predictor of behavior across all health related studies. However, perceived susceptibility was a stronger predictor of preventative health behavior.

Champion & Miller (1996) found a significant positive correlation between participation in screening mammography and the HBM constructs of perceived susceptibility and perceived benefits of screening. Conversely, a significant negative correlation between mammography screening and perceived barriers was identified. These findings were supported by other researchers (Aiken, West, Woodward, & Reno, 1994; Bernstein Hyman, Baker, Ephraim, Moadel, & Philip, 1994; Holm, Frank, & Curtain, 1999). Furthermore, the cues to action construct, especially physician support, for mammography adherence has been shown to be a significant factor (Stein, Fox, Murata, & Morisky, 1992; Aiken, West, Woodward, & Reno, 1994; Bernstein Hyman, Baker, Ephraim, Moadel, & Philip, 1994; Champion & Miller, 1996).

Sixteen published descriptive studies employing the HBM as a guide for explaining or predicting breast cancer screening behaviors was conducted by Yarbrough & Braden (2001). In an integrative review, the researchers found that some description of the values, beliefs, and behaviors of middle-aged women was provided. However, the ability to predict screening behaviors was low, 15% to 27%, excluding socioeconomic status.

Conclusion

In the 1970's, organizations introduced WHP programs because it was the right thing to do. In the 1980's, the primary reason for the implementation of WHP and disease prevention programs centered on the containment of health care costs. In the 1990's, practitioners expanded the scope of offerings to include health and disease management of the individual employee and the organization.

Evaluation of WHP programs is a fundamental and essential component of effective programming. However, financial resources, for this task, are often limited. Therefore, the selection of an evaluation strategy is important. Because real world settings pose problems with internal validity, a combination of qualitative and quantitative techniques has been suggested to control for these factors. The results of this combination can provide meaningful and purposeful information for WHP practitioners.

It has been estimated that in the United States alone, 203,500 women will be diagnosed with breast cancer in 2002. There is no known cure for breast cancer. However, early detection, through breast cancer screenings, can greatly reduce the

mortality rate. Therefore, health promotion strategies that can positively affect screening behavior could have a profound effect on morbidity and mortality in the United States.

The evaluation of an existing WHP program can provide needed information related to the efficacy of applying the HBM to increase mammography-screening rates. The HBM has been widely utilized as a theoretical guide for predicting breast cancer screening and therefore for guiding intervention studies. According to the assumptions of this model, persons engage in health promoting activities because they value health, define disease as a threat with serious avoidable consequences, and expect positive outcomes from assertive activities.

CHAPTER 3

METHODS

Purpose

The research objective of this study was to examine factors associated with the Health Belief Model that influence a woman's decision to receive mammogram screenings within the Bozeman School District #7. More specifically, this study will examine the following research questions: 1) Are women (35 years and older) with higher cues to action more likely to receive a mammogram screening than women with lower cues to action? 2) Are women (35 years and older) with higher perceived benefits more likely to receive a mammogram screening than women with lower perceived benefits? 3) Are women (35 years and older) with lower perceived barriers more likely to receive a mammogram screening than women with higher perceived barriers? 4) Are women (35 years and older) with higher perceived susceptibility more likely to receive a mammogram screening than women with lower perceived susceptibility?

This chapter presents information on the study procedures. Included are details on subject selection, instrumentation design and content, study design, and methods of statistical analysis.

Human Subjects Committee

The Montana State University Human Subjects Committee was contacted for research approval on February 6, 2002. The Human Subject's form explained the purpose of the research and gave a detailed description of the investigation procedures. Areas reviewed by the committee included focus group and questionnaire techniques. Participation in the study was voluntary, and exemption from the requirement of review by the full committee was granted on February 8, 2002 (Appendix B).

Data

Subjects

Participants for the study included all full time and part time female employees of the Bozeman School District #7. Retirees, spouses, and dependents were excluded from the study. The Bozeman School District consisted of 671 employees. Of these 671 employees, 180 were males and 491 were females. Twelve sites were included in the district, six elementary schools, two middle schools, two high schools, an administrative building, and a support services building. These sites housed approximately 394 certified (i.e. teachers, counselors, librarians), 243 classified (i.e. secretaries, custodians, food servers, classroom aides, support services), 23 administrative (i.e. superintendents, principals, positions that over see the other three classifications), and 11 professional employees (i.e. psychologists, school nurse, audiologists, hearing specialist, etc). The age range of the employees was 20-77 years.

Instrumentation

A focus group is a planned discussion designed to collect information on a specific area of interest. Generally, the sessions last about one hour and are guided by a moderator. The purpose of these data collection efforts was to see if new questions needed to be added to the questionnaire.

A focus group screening questionnaire was used to identify subjects for three focus group sessions. The questionnaire asked the women about their age, job classification, building location and interest in the discussion of mammography. Two days prior to each focus group session, a confirmation letter was sent via in school mail to all employees who agreed to attend a focus group session. Participation was conditional on the person signing a consent form that indicated that she would be asked to answer questions designed to understand her thoughts, feelings, attitudes, and experiences as they relate to mammography. Participants knew that if they chose to be involved in the focus group session that they could withdraw from the session at anytime.

Focus group questions were generated based on open-ended elicitation interviewing techniques described by Montañño and Taplin (1991) and on Richard A. Krueger's (1998) processes for developing focus group questions. Each focus group session consisted of a homogenous sample of eight female employees from the Bozeman School District and lasted approximately one hour. A moderator facilitated and recorded the focus group sessions through a series of questions. Ten questions were used in the focus group sessions. The questions were: 1) When you hear the word mammogram,

what comes to mind? 2) What are the benefits or positive attributes of having a mammogram? 3) Suppose you were trying to encourage a friend to have a mammogram. What would you say? 4) What are the barriers or roadblocks to having a mammogram? 5) You have recently been made Head of Mammogram Screenings at the Bozeman Deaconess Hospital. Could you describe the environment for a best - case scenario? 6) What people or groups would you listen to about getting a mammogram? 7) What factors make it easy to get a mammogram? 8) What factors make it difficult to get a mammogram? 9) How do you feel about the idea of getting a mammogram? and, 10) Is there anything else that you would like to talk about?

The recordings were transcribed through a coding system that eliminated the respondents name from the transcriptions. A master key with the codes and names was developed where the names were converted into coded terms (i.e. subject #1, subject #2, subject #3, etc.). The investigator had sole access to the master key and kept the data secured in a locked box.

The thirty-one female employees 35 years of age or older who expressed interest in mammography were contacted via telephone or email and asked to participate in a focus group session. Twenty-four women, eight at each of the three sessions, participated in the data collection effort. All participants signed the consent form and fully participated in the session.

Based on the findings of these focus group sessions, six questions were added to the questionnaire. Specifically, the questions added were: 1) How many mammogram(s) have you experienced in your life? 2) Was your last mammogram done as part of a

routine checkup, because of a breast problem other than cancer, or because you've already had breast cancer? 3) The Employee Wellness summer time mammogram screening is difficult to fit into my schedule (strongly agree to strongly disagree), 4) What is your primary health insurance source? 5) Who would you listen to about getting a mammogram? 6) What is your primary choice for mammogram screening (EWP or other)?

Survey Development

A 37-item questionnaire was developed to measure the relevant constructs associated with the analysis and is provided in Appendix A. The questionnaire was divided into three sections: 1) demographic and socioeconomic information, 2) Behavioral Risk Factor Surveillance System (BRFSS), and 3) the Health Belief Model components of susceptibility, benefits, barriers, and cues to action for mammography screening.

Demographic and Socioeconomic Status

The demographic and socioeconomic variables used in this questionnaire were age, race, gross income, marital status, number of dependents, level of education, primary source of health insurance, job classification, and job status (Appendix A). Marital status was determined through six classifications ranging from married to a member of an unmarried couple. Education was determined through five classifications ranging from an eighth-grade education to a college graduate or a graduate degree. Job classification was determined through four classifications that included classified (i.e. support services,

secretaries, custodians, food servers, classroom aides, etc.), certified (i.e. teachers, librarians, counselors, etc.), administrative (i.e. superintendents, principals, positions that over see the other three classifications, etc.), and professional (i.e. psychologists, school nurse, audiologists, hearing specialist, etc). Job status was determined as either full time (i.e. 7-8 hours per day) or part time (i.e. less than 7 hours per day). Race was based on six categories including White, Black, Asian, American Indian-Alaska Native, Spanish or Hispanic, and Other. Income was determined through nine frequency distributions ranging from less than \$10,000 to over \$100,000. Age was determined by the participant's last birthday. The number of dependents was determined by asking for the total number of dependents in each age category that included less than 6 years, 6-12 years, 13-17 years, 18-65 years, and over 65 years. A category for no dependents was also provided. Primary health insurance was determined by offering four categories (i.e. None, Bozeman School District #7, Medicaid/Medicare, and Other insurance source). Subjects were asked to mark all that apply. A final question was included to ask the participant's primary building assignment in the Bozeman School District #7.

BRFSS Questions

The investigator used selected questions from the BRFSS (Montana Department of Public Health and Human Services, 2001) to assess health indicators of Bozeman Public School District employees (Appendix A). Seven questions addressed previous women's health issues (mammogram, breast exam, and Pap smear). Three questions using a dichotomous yes/no response were asked if the participants had ever had a

mammogram, clinical breast exam, and a Pap smear. Three items used a five-point scale to ask for the number of years since the last mammogram, clinical breast exam, and Pap smear (up to and beyond the past 5 years). One question asked if the participant's last mammogram was a routine checkup, for a breast problem other than cancer, or because she already had breast cancer.

The BRFSS has been used to collect and report health-related data, annually, since 1984, thus, it is considered the "gold standard" for measuring prevalence rates in health-behavior across the United States (Montana Department of Public Health and Human Services, 2001). Two additional questions were included in this section of the survey. The investigator developed these questions based on the focus group process. The questions were: 1) How many mammogram(s) have you experienced in your life? 2) What is your primary choice for mammogram screening? The second question was asked to determine how many of the employees used the wellness-screening program and how many used screening programs outside of the district.

HBM Components

Survey questions addressing constructs of the HBM and breast cancer were also included. Six benefit questions and five barrier questions were used to measure mammography-screening behavior based on the work of Champion (1995). Suitable validity and reliability scores for the six benefit and five barrier questions were demonstrated based on the work of Champion (1995).

The six benefit questions (Champion, 1995) included, 1) When I get a recommended mammogram I feel good about myself, 2) When I get a mammogram I don't worry as much about breast cancer, 3) Having a mammogram or x-ray of the breast will help me find lumps early, 4) Having a mammogram or x-ray of the breast will decrease my chances of dying from breast cancer, 5) Having a mammogram or x-ray of the breast will decrease my chances of requiring radical or disfiguring surgery if breast cancer occurs, and 6) Having a mammogram will help me find a lump before it can be felt by myself or health professional.

The five barrier questions (Champion, 1995) included, 1) Having a routine mammogram or x-ray of the breast would make me worry about breast cancer, 2) Having a mammogram or x-ray of the breast would be embarrassing, 3) Having a mammogram or x-ray of the breast would take too much time, 4) Having a mammogram or x-ray of the breast would be painful, and 5) Having a mammogram or x-ray of the breast would cost too much money. One question was added by the investigator to the barrier construct based on the focus group process. The question was: The Employee Wellness summer time mammogram screening is difficult to fit into my schedule. A summated Likert format with six response options ranging from "strongly agree" to "strongly disagree" along with "I don't know" was used with the eleven questions.

Two questions were asked addressing cues to action and were based on the work of Stein, Fox, Murata, and Morisky (1992). The investigators showed that the questions were a valid measure for cues to action. However, no reliability scores were reported. The questions were 1) Has your physician talked to you about early detection of breast

cancer, and 2) Has your physician discussed mammography with you. Based on the focus group process and the recommendations of Champion (1995), three more questions were added by the investigator to expand the area of health care provider. The questions included, 1) Has a health professional, other than your physician, talked to you about early detection of breast cancer, and 2) Has a health professional, other than your physician, discussed mammography with you. Additionally, the investigator included a question that asked the subjects to rank in order of importance people or groups they would listen to about getting a mammogram.

One question addressed susceptibility (Stein et al., 1992). The question was: Has your mother, sister, grandmother, or any other blood relative had breast cancer. The four questions addressing cues to action and the one addressing susceptibility were assessed with dichotomous yes/no responses.

Survey Pilot

Several professionals provided consultation on content, form, and other aspects of the survey administration. Specifically, the questionnaire was given to Dr. Tim Dunnagan, Associate Professor of Health Promotion/Wellness at Montana State University, Dr. George Haynes, Associate Professor of Health and Human Development at Montana State University, Dr. Craig Stewart, Professor of Health and Human Development at Montana State University, and Bruce Colton, EWP Director for the Bozeman School District #7. All of these professionals had extensive knowledge in the area of survey development and administration.

A pilot study was conducted with a sample of 15 school district employees. Cognitive and retrospective interviewing protocols were used for this pretesting phase (Dillman, 2000). Specifically, cognitive or “think-aloud” interviewing involved the respondent answering each question out loud while taking the survey. However, retrospective interviewing involved the respondent taking the survey in their usual manner and then answering questions posed by the researcher addressing potential problems found in the survey (Dillman, 2000). The purpose of the pilot was: 1) to determine whether respondents understood the questions (i.e. terminology, directions, clarity, and meaning) and 2) to evaluate the questionnaire as a whole (i.e. length, time to complete, readability, and appearance). Survey revisions were made in response to comments made during the pilot test.

Survey Construction

The survey consisted of two 11 inch x 17 inch pieces of paper stapled together in a booklet style to create four 8 1/2 inch x 11 inch pages (Appendix A). The order of questions in the survey was, 1) cues to action and susceptibility, 2) BRFSS, 3) benefits, 4) barriers, and 5) demographics. The first page contained a cover letter, which was signed by Bruce Colton, the Wellness Director of the Bozeman School District #7. This cover letter was used to demonstrate the level of commitment to this research and to help increase the response rate of the questionnaire. In addition, the cover letter was used to: 1) explain the purpose of the study and identify the researcher involved, 2) explain to the

respondents that their participation in the study was voluntary, and 3) briefly explain the process by which respondent anonymity and confidentiality would be protected.

Survey Distribution

The surveys were distributed via in school mailings during the spring of 2002 according to techniques described by Dillman (2000). First, a prenotification letter was distributed one week prior to the survey mailing. The respondents were asked to return the survey via in school mail within five days. Second, five days after the surveys were distributed, an e-mail was sent out to remind respondents to return the survey if they had not already done so. Finally, ten days after distribution of the surveys, all respondents received a postcard thanking them if they returned the survey and asking those who had not to please do so as soon as possible.

Code Book

Answers to survey questions were translated into numerical codes for statistical analysis. A codebook was developed to serve as a key for all coded information.

Statistical Analysis

Descriptive statistics were generated to gain a general characterization of the data. Frequencies and percent distributions were calculated by age, marital status, education, income, job classification, job status, dependent status, ethnic background, mammogram screening behavior, and HBM components. Additionally, a comparison of

mammogram screening rates between the BSD sample and the state of Montana population were conducted.

The occurrences of missing data were minimal. That is, most of the missing data were limited to one or two cases per question. One question, addressing income, was missing ten cases. Missing data were imputed by using the mode or most frequent response for questions that utilized a binary response. For instance, each cues to action question was missing one or two cases and the most frequent response to these questions was "yes" therefore, the mode value of one (yes=1) was imputed for these questions. The mode was also used for missing data with questions that had a five-point likert scale. For example, in the barrier questions, the most frequent response was "No, I disagree" therefore, the mode value of "two" was imputed for the missing data (No, I disagree= 2). Additionally, other questions that had a five-point likert scale response also had a neutral response option. Therefore, "I don't know" responses and "I neither agree or disagree" were used when these responses were available. Finally, questions with continuous data were imputed by the mean or the average of the data. For example, question 36 asked the age of the respondent therefore, the mean age of 48 years was imputed for the missing data.

Linear Regression

Using the regression procedure in the SPSS Graduate Pack 10.0 for Macintosh system for personal computers (SPSS Inc., 2000), regression analysis was used to determine if the HBM components of perceived susceptibility, perceived benefits,

perceived barriers, and cues to action predicted the dependent variable, prior mammogram screening behavior. The prior mammogram screening behavior variable was a dichotomous question (yes/no).

Next, control variables were used in the multivariate regression analysis. The control variables included: age, marital status, level of education, level of income, job classification, job status, dependent status, and ethnic background. These models allowed the investigator to determine if the individual HBM components predicted the presence of mammogram screening behavior while controlling for these important variables.

Finally, the four HBM components along with the control variables were used in the multivariate regression analysis. Again, this model allowed the investigator to determine if the HBM components predicted mammography-screening behavior while controlling for these important variables.

Significance for all regressions was determined at the .05 level of confidence. The empirical models used in the multivariate analyses for this investigation are specified as follows:

Benefits Model

$$\text{Mammography screening} = \beta_0 + \beta_1 \text{sum of benefits} + \beta_2 \text{age} + \beta_3 \text{marital status} + \beta_4 \text{dependent(s)} + \beta_5 \text{job classification} + \beta_6 \text{job status} + \beta_7 \text{education} + \beta_8 \text{income} + \beta_9 \text{race} + \varepsilon$$

Barriers Model

Mammography screening = $\beta_0 + \beta_1$ sum of barriers + β_2 age + β_3 marital status + β_4 dependent(s) + β_5 job classification + β_6 job status + β_7 education + β_8 income + β_9 race + ε

Cues to Action Model

Mammography screening = $\beta_0 + \beta_1$ sum of cues to action + β_2 age + β_3 marital status + β_4 dependent(s) + β_5 job classification + β_6 job status + β_7 education + β_8 income + β_9 race + ε

Susceptibility Model

Mammography screening = $\beta_0 + \beta_1$ susceptibility + β_2 age + β_3 marital status + β_4 dependent(s) + β_5 job classification + β_6 job status + β_7 education + β_8 income + β_9 race + ε

Full Model

Mammography screening = $\beta_0 + \beta_1$ sum of benefits + β_2 sum of barriers + β_3 sum of cues to action + β_4 susceptibility + β_5 age + β_6 marital status + β_7 dependent(s) + β_8 job classification + β_9 job status + β_{10} education + β_{11} income + β_{12} race + ε

ε = Error term

Descriptive Statistics: Two by Two Tables

Based on the regression analysis and the premise of the HBM, two by two tables were constructed to describe three HBM components (cues to action, perceived benefits, and perceived barriers) and mammography screening behavior. Specifically, the HBM

components of perceived benefits and perceived barriers were divided into high and low categories and compared to mammogram screening behavior. The cues to action categories were defined as: respondents with zero to two cues to action were defined as having low cues to action whereas respondents having three or four cues to action were defined as having high cues to action. The four cues to action questions were dichotomous (yes/no) where a "yes" response would equal one point and a "no" response would equal zero or no point. The questionnaire is shown in Appendix A. This categorization was based on the logic that scores would range from zero to four. A midpoint in this range would be two, therefore in order to have a "high cues to action" score the respondent would need to have at least three cues to action in place. Conversely, a "low cues to action" classification would require the respondent to have two or fewer cues to action in place.

The six questions addressing perceived benefits and the five questions addressing perceived barriers were based on a five-point likert scale where "strongly agreed" equaled a score of five and "strongly disagreed" equaled a score of one. A neutral response of "I neither agree or disagree" equaled a score of three. In the perceived benefits area, respondents having a summated benefit score of zero to 23 were placed in the low benefit category whereas a score of 24 to 30 placed the respondents in the high benefit category. This categorization was based on the work of Champion (1995) which was based on the premise that in order to have a "high benefits" score the respondent would have to indicate that they agreed or strongly agreed with all six of the perceived benefits questions. Conversely, a "low benefits" classification would require the

respondents to have responses that were neutral, disagreed or strongly disagreed with all six questions.

Finally, the perceived barriers low and high categories were defined by a summated score of zero to ten and 11 to 25, respectively. Again, this categorization was based on the work of Champion (1995) which was based on the premise that in order to have a “low barriers” score the respondent would have to indicate that they disagreed or strongly disagreed with all five of the perceived barriers questions. Conversely, a “high barriers” classification would require the respondents to have responses that were neutral, agreed or strongly agreed with all five questions.

Linear regressions were used on each table to determine statistical significance ($p \leq .05$). Specifically, the three highest means within each table were compared to the fourth mean (lowest). For instance, in the two by two comparison of perceived benefits and perceived barriers, the means of high benefits/high barriers, high benefits/low barriers, and low benefits/low barriers were entered into the regression model. Regression results were compared to the mean of low benefits/high barriers for statistical significance.

Hypothesized Relationships

This study used hypothesis testing to examine factors in the HBM. It was hypothesized that 1) women (35 years and older) with higher perceived cues to action would be more likely to receive a mammogram screening than women with lower perceived cues to action, 2) women (35 years and older) with higher perceived benefits

would be more likely to receive a mammogram screening than women with lower perceived benefits, 3) women (35 years and older) with lower perceived barriers would be more likely to receive a mammogram screening than women with higher perceived barriers, and 4) women (35 years and older) with higher perceived susceptibility would be more likely to receive a mammogram screening than women with lower perceived susceptibility.

CHAPTER 4

RESULTS

This chapter presents the results of the study. To this end a description of the survey respondents, a comparison of mammography screening behavior between the Bozeman School District #7 employees and that of the state of Montana population, linear regressions, and a series of descriptive tables of select HBM components are examined. Also, relevant trends and themes that were obtained through the focus group sessions will be incorporated into the narrative of the results.

Survey Respondent Information

A total of 491 surveys were distributed via in school mail to all Bozeman School District #7 female employees. Four hundred and eight employees were 35 years of age or older. Of the 408 employees who received the survey, 314 completed and returned the survey. Forty-five surveys were excluded from the study due to the age of the subjects (< 35 years). In total, 66% (n=269) of the employees 35 years of age and older completed and returned the survey.

Demographic and Socioeconomic Characteristics

Frequencies and percent distributions of respondents' demographic and socioeconomic characteristics are presented in Table 1. More than half of the respondents were certified employees (53.5%), such as teachers, librarians, and

counselors; 37.9% were classified employees, such as secretaries, custodians, and food servers. The remainder of the respondents (8.5%) were administrative and professional employees.

Table 1. Demographic and Socioeconomic Characteristics of Survey Respondents Compared to the BSD Population

VARIABLE	% Of Survey Sample N=269	% Of BSD Population N=408
AGE (mean 48 yrs) (SD 7.06)		
35-49 years	57.2	61.8
50-80 years	42.8	38.2
EDUCATION		
High School	6.7	-
Some College	19.3	-
College Graduate	74	-
MARITAL STATUS		
Married	82.9	-
Not Married	17.1	-
RACE		
White	97.8	-
Non-White	2.2	-
INCOME		
< 25,000	5.9	-
25,000-34,999	11.9	-
35,000-49,999	23.8	-
50,000-74,999	35.7	-
75,000-99,999	13.8	-
> 100,000	8.9	-
JOB STATUS		
Classified	37.9	41.9
Certified	53.5	54.2
Admin/Prof	8.5	3.9
DEPENDENTS		
None	33.5	-
At least one dependent	66.5	-

Note. - Data not available

Seventy-four percent of the respondents had obtained a college or advanced degree. Most (82.9%) of the respondents were married and 66.5% had at least one dependent. A majority of the respondents were full time (77%) and had an income of 25,000 or more (94.1%). The average age of the respondents was 48 years with the vast majority being classified as white (97.8%).

Mammography Screening Behavior

Table 2 illustrates the BSD respondents screening behaviors. A majority of the respondents had at least one mammogram (89.6%) in their life. Of those who had a mammogram, 79.9% had a mammogram within the past two years. More than two thirds of the respondents used the Bozeman School District EWP screening program (68%). However, results from the focus group sessions revealed that many of the subjects found that the summer time offering of mammography screenings was difficult to fit into their schedules. Most of the mammogram screens were for a routine check up (76.6%) with breast cancer being identified in approximately three percent of the sample.

Table 2. Percent and Number of Mammogram Screening Behavior.

VARIABLE	% Of Subjects	# Of Subjects (N=269)
Ever had a mammogram	89.6	241
Program used:		
BSD EWP screening	68	183
Other	22.3	60
Had a mammogram in the last 2 years	79.9	215
Reason for mammogram		
Routine check up	76.6	206
Breast problem other than cancer	8.2	22
Breast Cancer	3.3	9

Mammogram Screening Behavior Compared to the State of Montana Population

Table 3 illustrates the screening behavior of the survey respondents compared to that of the state of Montana population. These comparisons were only available for respondents 40 years of age or older. The BSD respondents and the state of Montana population were similar in mammography screening rates when compared by education, income, and race. That is, women in the BSD sample with a college degree were as likely to receive a mammogram screening as women in the state population with a college degree. Similarly, women in the BSD sample with an income of \$35,000 were as likely to receive a mammogram screening as women in the state population with an income of \$35,000. However, a significantly higher percentage of women in the BSD sample in the 50-64 year old group had a mammogram (99%) compared to the state of Montana population (87.5%).

Table 3. Mammography Screening Rates of Survey Respondents compared to the State of Montana Population with 95% confidence intervals (MT BRFSS, 2001).

VARIABLE	% Of BSD sample (n =243)	CI (+/-)	% Of MT POP (n =702)	CI (+/-)
AGE				
40-49	91	(5.0)	82.6	(5.7)
50-64	99	(2.0)	87.5	(4.6)*
65-74			89.2	(5.2)
EDUCATION				
High School	89	(16)	81	(5.1)
Some College	92	(8)	87.1	(5.2)
College Graduate	89	(4)	94.7	(3.6)
INCOME				
20,000-34,999	88	(9)	85.4	(5.7)
35,000-49,999	88	(9)	86.6	(7.5)
50,000 +	89	(5)	90.2	(7.3)
RACE				
White	90	(3.5)	86.4	(2.8)

* $p \leq .05$ level of significance

Health Belief Model Components

Cues to Action

Table 4 illustrates the percentage and number of respondents that received select cues to action related to breast cancer screenings. Cues about early detection of breast cancer and mammography from doctors occurred 94.1% and 91.1%, respectively, while cues from health professionals were lower (76.6% and 72.9%, respectively). The importance of physician and health care provider cues to action were expressed through the focus group sessions.

Table 4. Percent and Number of Cues to Action

HBM Component	% of subjects that answered yes (N=269)
Dr. talked about early detection of breast cancer	94.1 (253)
Health professional talked about early detection of breast cancer	76.6 (206)
Dr. talked about mammography	91.1 (245)
Health professional talked about mammography	72.9 (196)

Perceived Susceptibility

A low percentage of respondents indicated that a mother, sister, grandmother, or other blood relative had breast cancer. Specifically, 28.6% of the subjects reported that a blood relative had ever had breast cancer. No significant trends or themes related to perceived susceptibility were identified through the focus group sessions.

Perceived Benefits

A high percentage of the respondents agreed or strongly agreed with each of the six benefit questions, ranging from 69.2% to 84%. Specifically, the benefit question indicating, "Having a mammogram or x-ray of the breast will help me find lumps early" was found to be the most strongly supported statement (84%). Conversely, the benefit question indicating, "Having a mammogram or x-ray of the breast will decrease my chances of requiring radical or disfiguring surgery if breast cancer occurs" was found to

be the least strongly supported statement (69.2%). A reoccurring theme from the subjects involved in the focus group sessions included the perceived effectiveness for early cancer detection through mammography screenings.

Perceived Barriers

A high percentage of respondents disagreed or strongly disagreed with four of the five barrier questions 70.7% to 95.5%. Specifically, the barrier question "Having a mammogram or x-ray of the breast would take too much time" was found to have the highest disagreement response rate (95.5%). Conversely, one barrier question, "Having a mammogram or x-ray of the breast would be painful", had a very low disagreement response rate (44.2%). Similarly, a reoccurring theme expressed by the subjects in the focus group sessions was the fear of pain. Another prevalent theme in the focus group sessions was the cost factor. The barrier question addressing the financial costs of mammography screening was found to have the second lowest disagreement response rate (70.7%).

Linear Regression Results

A correlation matrix was performed as an examination for multicollinearity between the independent variables. Based on the suggestions of Tabachnick & Fidell (1989), it has been shown that if two variables are correlated at 0.9 or higher, one of the variables should be removed from the regression model. The highest correlation was 0.825, therefore all independent variables were retained in the regression models.

Separate simple and multiple linear regression models were performed using mammography screening as the dependent variable and the HBM components of perceived benefits, perceived barriers, susceptibility, and cues to action as the independent variables of interest. The HBM questions addressing cues to action, perceived benefits, and perceived barriers were summed together for each component. For example, the four cues to action questions were dichotomous (yes=1, no=0) so each respondent had a total score for cues to action ranging from 0 to 4. Five-point Likert scales with responses ranging from *strongly agree* to *strongly disagree* were used to measure perceived benefits and perceived barriers items. Summated scores for each scale were coded so that higher scores indicated increased magnitude of beliefs. For instance, a higher score on benefits meant increased perception of benefits associated with mammography screening. The middle point provided a neutral option. The one susceptibility question was dichotomous (yes/no). This question was coded so that a "yes" response equaled a one and a "no" response equaled a zero.

Results of the simple regressions are presented in Table 5. The HBM components of cues to action and perceived benefits were found to have a positive relationship in prior mammography screening behavior. That is, as the cues to action and perceived benefits increased mammography screening behavior increased. The HBM component, perceived barriers, was found to have a negative relationship in prior mammography screening behavior. Specifically, as perceived barriers increased mammography-screening behavior decreased. No relationship was found between susceptibility and prior mammogram screening behavior. Cues to action predicted 11.2% of variance in

prior mammogram screening behavior. Perceived benefits and perceived barriers were found to have lower predictability of prior screening behavior, 6% and 3.9%, respectively.

Table 5. Determinants of Mammography Screening

HBM Construct	B	Std. Error	Sig.	Adjusted R Squared
Cues to Action	.108	.018	.001*	.112
Benefits	1.907	.004	.001*	.060
Barriers	-1.974	.006	.001*	.039
Susceptibility	8.159	.041	.984	-.004

* $p \leq .05$

Next, the remaining control variables were added to the models. This was done to determine whether the HBM components were still significant predictors of mammogram screening behavior when respondents were equated by the control variables. Tables 6-10 present the results of these multiple linear regressions for cues to action, perceived benefits, perceived barriers, susceptibility, and a full model that included all HBM components.

Cues to Action Model

When cues to action and all control variables were added to the regression model, 14.8% of the variance in prior mammography screening behavior was predicted. Significance was found in the relationship between cues to action and mammography screening behavior ($p = .00$) (Table 6). Marital status was also significantly related to mammography screening ($p = .05$). That is, married respondents were less likely to be

screened than single respondents. Therefore, after controlling for important socioeconomic variables, cues to action were shown to play a key role in explaining prior mammography screening behavior.

Table 6. Multiple Linear Regression Cues to Action Model Analysis
Dependent Variable= Mammogram Screening

Model	Unstandardized Coefficients		Sig.
	B	Std. Error	
(Constant)	.654	.174	.001*
SMCUES	.104	.020	.001*
Married	-.106	.054	.050*
WHITE	5.732	.122	.638
INC49	-3.227	.056	.566
INC74	-4.366	.056	.437
INC100	8.711	.064	.176
SOME			
COLLEGE	-1.562	.078	.841
COLLEGE DEGREE	-7.144	.081	.381
FULLTIME	3.712	.044	.402
CERTIF	-4.161	.055	.449
ADMPRO	-.137	.077	.074
DEP	4.013	.042	.339
AGE49	-1.556	.001	.084

Note. $R^2 = .190$; Adjusted $R^2 = .148$; * $p \leq .05$

Missing dummy variables: Single, Non-white, Income <\$35,000, High School Diploma, Part-time, Classified, No Dependent(s), and Age 50-70

Perceived Benefits Model

When perceived benefits and all control variables were added to the regression model, ten percent of the variance in prior mammography screening behavior was explained. Significance was found in the relationship between perceived benefits and mammography screening behavior ($p = .00$) (Table 7). Other independent variables

were statistically significant and included Age 49 ($p = .03$) and job classification Administrator/Professional ($p = .03$). That is, mammography screening was less likely in respondents that were younger and had administrative and professional job classifications. Therefore, after controlling for important socioeconomic variables, perceived benefits were shown to play a strong role in explaining prior mammography screening behavior.

Table 7. Multiple Linear Regression Benefits Model Analysis
Dependent Variable = Mammogram Screening

Model	Unstandardized Coefficients		
	B	Std. Error	Sig.
(Constant)	.644	.193	.001*
BENEFITS	1.718	.005	.001*
Married	-9.360	.055	.092
WHITE	1.044	.125	.933
INC49	-3.948	.058	.495
INC74	-6.001	.058	.299
INC100	7.046	.066	.289
SOME COLLEGE	3.477	.080	.965
COLLEGE DEGREE	-1.202	.082	.884
FULLTIME	3.586	.045	.430
CERTIF	-6.225	.056	.270
ADMPRO	-.170	.078	.031*
DEP	-5.858	.042	.889
AGE49	-2.018	.001	.028*

Note. $R^2 = .147$; Adjusted $R^2 = .104$; * $p \leq .05$

Missing dummy variables: Single, Non-white, Income <\$35,000, High School Diploma, Part-time, Classified, No Dependent(s), and Age 50-70

Perceived Barriers Model

When perceived barriers and all control variables were added to the regression model, eight percent of the variance in prior mammography screening behavior was explained. Significance was found in the relationship between perceived barriers and mammography screening behavior ($p = .01$) (Table 8). Again, other independent variables were statistically significant and included Age 49 ($p = .01$) and job classification Administrator/Professional ($p = .04$). That is, mammography screening was less likely in respondents that were younger and had administrative and professional job classifications. Therefore, after controlling for important socioeconomic variables, perceived barriers were shown to play a moderate role in the explaining of prior mammography screening behavior.

Table 8. Multiple Linear Regression Barriers Model Analysis
Dependent Variable = Mammogram Screening

Model	Unstandardized Coefficients		
	B	Std. Error	Sig.
(Constant)	1.300	.189	.001*
BARRIERS	-1.668	.006	.006*
Married	-7.567	.056	.180
WHITE	-5.205	.128	.684
INC49	-4.001	.059	.496
INC74	-5.937	.059	.311
INC100	6.682	.068	.327
SOME			
COLLEGE	4.110	.081	.996
COLLEGE DEGREE	-2.335	.084	.781
FULLTIME	3.466	.046	.452
CERTIF	-5.353	.057	.349
ADMPRO	-.161	.079	.044*
DEP	-3.294	.042	.938
AGE49	-2.318	.001	.012*

Note. $R^2 = .126$; Adjusted $R^2 = .081$; * $p \leq .05$

Missing dummy variables: Single, Non-white, Income <\$35,000, High School Diploma, Part-time, Classified, No Dependent(s), and Age 50-70

Perceived Susceptibility Model

When perceived susceptibility and all control variables were added to the regression model, less than one percent of the variance in prior mammography screening behavior was explained. No significant relationship between perceived susceptibility and mammogram screening behavior was found (Table 9). Once again, other independent variables were statistically significant and included Age 49 ($p = .01$) and job classification Administrator/Professional ($p = .04$). That is, mammography screening was less likely in respondents that were younger and had administrative and professional job classifications. Therefore, after controlling for important socioeconomic variables, perceived susceptibility was shown to play a weak and nonsignificant role in explaining prior mammography screening behavior.

Table 9. Multiple Linear Regression Susceptibility Model Analysis
Dependent Variable = Mammogram Screening

Model	Unstandardized Coefficients		Sig.
	B	Std. Error	
(Constant)	1.040	.167	.001*
SUSCEPT.	-1.501	.041	.715
Married	-9.219	.057	.107
WHITE	9.736	.128	.940
INC49	-2.519	.059	.671
INC74	-4.332	.059	.464
INC100	.109	.068	.110
SOME			
COLLEGE	2.091	.082	.799
COLLEGE DEGREE	-5.401	.085	.946
FULLTIME	3.658	.047	.434
CERTIF	-5.001	.058	.389
ADMPRO	-.170	.081	.036*
DEP	-7.594	.043	.861
AGE49	-2.347	.001	.012*

Note. $R^2 = .099$; Adjusted $R^2 = .053$; * $p \leq .05$

Missing dummy variables: Single, Non-white, Income <\$35,000, High School Diploma, Part-time, Classified, No Dependent(s), and Age 50-70

Full Model

When the four HBM components and all control variables were added to the regression model, 17.6% of the variance in prior mammography screening behavior was explained. Significance was found in the relationship between the full model and mammography screening behavior ($p = .00$) (Table 10). Specifically, HBM components of perceived benefits ($p = .01$) and cues to action ($p = .00$) remained statistically significant. However, perceived barriers became nonsignificant and perceived susceptibility, again, was not a significant predictor of mammography screening behavior. Therefore, after controlling for important socioeconomic variables and HBM components, perceived benefits and cues to action were significant predictors of prior mammography screening behavior.

Regression Summary

Based on the results of the simple regressions, three of the HBM components were found to be significant in explaining prior mammography screening behavior. Specifically, cues to action explained the most variance (11.2%) followed by perceived benefits (6%) and perceived barriers (3.9%). However, perceived susceptibility was found to have no statistical significance in explaining prior mammography screening behavior. Additionally, after controlling for important socioeconomic variables, the three HBM components of cues to action, perceived benefits, and perceived barriers remained significant predictors of prior mammography screening behavior explaining 14.8%, 10%, and 8% of the variance respectively. The full model explained 17.6% of the variance in

prior mammography screening behavior. The two HBM constructs of cues to action and perceived benefits remained statistically significant in the full model. However, the constructs of perceived barriers and perceived susceptibility were nonsignificant.

Table 10. Multiple Linear Regression Full Model Analysis
Dependent Variable = Mammogram Screening

Model	Unstandardized Coefficients		
	B	Std. Error	Sig.
(Constant)	.596	.224	.008*
Married	-9.451	.053	.078
WHITE	1.773	.122	.884
INC49	-4.619	.055	.404
INC74	-6.517	.055	.241
INC100	4.043	.065	.534
SOME COLLEGE	-3.398	.077	.659
COLLEGE DEGREE	-6.982	.080	.381
FULLTIME	3.094	.043	.477
CERTIF	-5.866	.054	.276
ADMPRO	-.143	.075	.057
DEP	3.398	.041	.408
AGE49	-1.479	.001	.094
BENEFITS	1.243	.004	.006*
BARRIERS	-1.008	.006	.082
SMCUES	8.614	.020	.001*
SUSCEPT.	-6.239	.039	.987

Note. $R^2 = .225$; Adjusted $R^2 = .176$; * $p \leq .05$

Missing dummy variables: Single, Non-white, Income <\$35,000, High School Diploma, Part-time, Classified, No Dependent(s), and Age 50-70

Descriptive Statistics: Benefits, Barriers, and Cues to action

Based on the results of the regression analysis and the premise of the HBM, two by two tables were developed to describe the three significant HBM components (cues to action, perceived benefits, and perceived barriers) and mammography screening behavior in more detail. The significant HBM components were divided into high and low categories and compared to mammogram screening behavior. The categories were defined as follows: respondents with zero to two cues to action were defined as having low cues to action and respondents having three or four cues to action were defined as having high cues to action. In the perceived benefits area, respondents' having a summated benefit score of zero to 23 were placed in the low benefit category and a score of 24 to 30 placed the respondent in the high benefit category. Finally, the perceived barriers low and high categories were defined by a summated score of zero to ten and 11 to 25, respectively.

There was a significant difference between subjects classified as low benefits and high barriers and the other three classifications. Table 11 illustrates that respondents with low benefits and high barriers to mammogram screening were less likely to be screened (80%) than the respondents with high benefits and low barriers (95%). Additionally, respondents with high benefits and high barriers (93%) or low benefits and low barriers (92%) were more likely to be screened than respondents with low benefits and high barriers. Consequently, a combination of high barriers and low benefits had a significant and detrimental impact on prior mammography screening behaviors.

Table 11. Mammogram Screening Behavior with Benefits and Barriers

	HIGH BENEFITS % Of mammograms (N)	LOW BENEFITS % Of mammograms (N)
HIGH BARRIERS	93* (60)	80 (82)
LOW BARRIERS	95* (65)	92* (62)

Note. * $p \leq .05$ compared to High Barriers/Low Benefits

Similarly, there was a significant difference between subjects classified as low cues to action and low benefits and the other three classifications. In Table 12, respondents with low benefits and low cues to action were less likely to get a mammogram (68%) than respondents with high benefits and high cues to action (96%). Also, respondents with high benefits and low cues to action (92%), and low benefits and high cues to action (89%) were more likely to be screened than the respondents with low benefits and low cues to action. Therefore, a combination of low cues to action and low benefits had a significant and detrimental impact on prior mammography screening behaviors.

Table 12. Mammogram Screening Behavior with Benefits and Cues to Action

	HIGH BENEFITS % Of mammograms (N)	LOW BENEFITS % Of mammograms (N)
HIGH CUES TO ACTION	96* (98)	89* (27)
LOW CUES TO ACTION	92* (106)	68 (38)

Note. * $p \leq .05$ compared to Low Cues to Action/Low Benefits

Finally, there was a significant difference between subjects classified as low cues to action and high barriers and two of the other three classifications. Table 13 illustrates that a combination of low cues to action and high barriers resulted in a lower mammography-screening rate (74%) for respondents than those that had high cues to action and low barriers (96%). Significance was also found in the comparison of respondents with high cues to action and high barriers (91%) and those with low cues to action and high barriers. However, no significant difference was found in the low cues to action and low barriers combination. A combination of high barriers and low cues to action had a significant impact on mammography screening behaviors.

Table 13. Mammogram Screening Behavior with Barriers and Cues to Action

	HIGH BARRIERS % Of mammograms (N)	LOW BARRIERS % Of mammograms (N)
HIGH CUES TO ACTION	91* (99)	96* (105)
LOW CUES TO ACTION	74 (43)	82 (22)

Note. * $p \leq .05$ compared to Low Cues to Action/High Barriers

Summary of Two by Two Tables

Significant variables in the regression were combined and shown in a series of two by two tables. Significant and substantial differences were shown based on the classification schemes generated by the two by two tables. Specifically, the tables showed that a combination of low benefits/high barriers, low cues to action/low benefits and low cues to action/high barriers were the least likely subjects to be screened.

CHAPTER 5

DISCUSSION

The purpose of this study was to examine factors associated with the Health Belief Model that influence a woman's decision to receive mammogram screenings within the Bozeman School District #7. More specifically, this study examined the following research questions: 1) Are women (35 years and older) with higher cues to action more likely to receive a mammogram screening than women with lower cues to action? 2) Are women (35 years and older) with higher perceived benefits more likely to receive a mammogram screening than women with lower perceived benefits? 3) Are women (35 years and older) with lower perceived barriers more likely to receive a mammogram screening than women with higher perceived barriers? and, 4) Are women (35 years and older) with higher perceived susceptibility more likely to receive a mammogram screening than women with lower perceived susceptibility?

Three of the four HBM components selected in this investigation were found to be predictive of prior mammography screening behavior. Based on the results of the investigation the full model explained the greatest portion of variance in prior mammography screening behavior. Individually, cues to action appeared to have the strongest impact on prior mammography screening behavior followed by perceived benefits and perceived barriers, respectively. The discussion of the outcomes of this study will review mammography screening behavior within the BSD sample, each HBM component and its' impact on mammography screening behavior, the impact of all four

of the HBM components on mammography screening behavior, and limitations and implications of this research.

Mammography Screening Behavior

As the incidence of breast cancer increases in the United States (ACS, 2002), so must the rate of mammography screening. National surveys report that less than 50% of women have had mammograms as recommended (Lauver, Nabholz, Scott, & Tak, 1997).

The BSD survey results indicated that most of the respondents age 35 years or older (90%) had at least one mammogram in their lifetime. Of those respondents who had a mammogram, almost 80% had one within the last two years. A large portion of the respondents (76.6%) had a mammogram as part of a routine check up or screening. Sixty-eight percent of the respondents used the BSDEWP mammography screening offered during the summer months of June, July and August. However, the BSDEWP summer time offering of mammography screening was perceived as a strong barrier in the focus group sessions.

When compared to the state of Montana, a significantly higher percentage of the BSD sample in the age range of 50-64 years participated in mammography screening than the state population. However, the screening rates were similar between the two groups for women in the range of 40-49 years of age. Additionally, screening rates were similar between the two groups of women in the areas of education, income, and race. That is, women in the BSD sample with a college degree were as likely to receive a mammogram screening as women in the state population with a college degree.

Similarly, women in the BSD sample with an income of \$35,000 were as likely to receive a mammogram screening as women in the state population with an income of \$35,000. Collectively, these results indicate that the BSD is doing well but there is room for improvement. Nevertheless, interventions designed for women who are eligible for, but not using mammography screening could be implemented to enhance screening rates. These interventions should be based on the three HBM constructs of cues to action, perceived benefits, and perceived barriers.

Cues to Action

Cues to action predicted 11.2% of the variance in prior mammogram screening behavior. That is, respondents with a higher summated cues to action score were more likely to participate in mammography screening. After controlling for all control variables, it was found that cues to action predicted 14.8% of the variance in prior mammography screening behavior. The statistical significance of cues to action also remained significant in the full model. Cues to action (i.e. physician and health care provider) were also found to be a strong theme in the focus group sessions. This finding was compatible with previous work done by others (Stein et al., 1992; Aiken, West, Woodward, & Reno, 1994; Bernstein Hyman, Baker, Ephraim, Moadel, & Philip, 1994). The researchers found a strong relationship between cues to action and prior mammography screening behavior.

Additionally, in the two by two tables, it was found that respondents with high cues to action were more likely to be screened regardless of their benefits or barriers

classification. Even combined with high barriers, respondents with high cues to action were more likely to be screened. This illustrates that most respondents admitted to the barriers of mammography but used it nevertheless. This finding may imply that cues to action somehow outweighed the barriers even though they were aware of them.

However, additional research is needed to determine if this relationship actually exists.

With the cues to action model explaining 14.6% of the variance, the temptation to focus on only this variable is tremendous. However, Strecher and Rosenstock (1997) cautioned against this action since the relationship between the HBM components are more than "a collection of equally weighted variables operating simultaneously" (p. 55). This position was supported by other studies (Stein et al., 1992; Aiken, West, Woodward, & Reno, 1994). Nevertheless, given the results of this study, interventions addressing cues to action, specifically, physician and health care provider cues regarding mammography, should be developed and implemented. Therefore, a focus on increasing referral rates of physicians and health care providers may help to increase the rate of mammography screening in the BSD population.

To this end, the wellness program could encourage physicians or health care providers to send reminder cards to employees or the wellness program could develop a flyer/brochure that includes a message to "Take Action" that encourages women to ask their doctor or health care provider for a mammography screening referral. Additionally, the wellness program could develop posters with slogans or catch phrases that are designed to cue female employees to initiate or repeat mammography screenings (Stein et al., 1992).

Perceived Benefits

Perceived benefits predicted six percent of the variance in prior mammogram screening behavior. That is, respondents with a higher summated perceived benefits score were more likely to participate in mammography screening. After controlling for all control variables, it was found that perceived benefits predicted 10.4% of the variance in prior mammography screening behavior. The statistical significance of perceived benefits remained constant (.006) in the full model. Again, this finding was consistent with findings by a number of other researchers (Bernstein Hyman, Baker, Ephraim, Moadel, & Philip, 1994; Aiken, West, Woodward, & Reno, 1994; Champion, 1995; Holm, Frank, & Curtain, 1999).

In the two by two comparisons, respondents with high benefits had a higher rate of screening regardless of their cues to action or barriers classification. Even combined with high barriers, respondents with high benefits were more likely to be screened. This illustrates that the respondents admitted to the barriers of mammography, but used it nevertheless. Moreover, the focus group sessions revealed this similar theme. For example, women identified the barriers of mammography but indicated that the screening was worth the perceived risks. This finding may imply that the benefits somehow outweighed the barriers even though they were aware of them. However, additional research is needed to determine if this relationship actually exists.

Therefore, based on these findings, information and interventions regarding perceived benefits should be developed for female employees who are 35 years of age or

older. Specifically, this survey sample indicated a low agreement percentage with the benefit of mammography decreasing the chances of radical or disfiguring surgery. Therefore, a focus providing correct information regarding this perceived benefit should be developed. For instance, a flyer or brochure that includes information regarding the usefulness, safety, and effectiveness of mammography could be distributed. This could be accomplished by obtaining brochures from the local American Cancer Society office. Additionally, the wellness program could develop an educational workshop that teaches about the safety and efficacy of current mammography technology. Finally, organizing focus groups within the employee population to address these results could provide valuable feedback and possible solutions to increasing mammography-screening rates.

Perceived Barriers

Perceived barriers predicted four percent of the variance in prior mammogram screening behavior. That is, respondents with a lower summated perceived barriers score were more likely to participate in mammography screening. After controlling for all control variables, it was found that perceived barriers predicted eight percent of the variance in prior mammography screening behavior. That is, respondents with lower perceived barriers were more likely to have a mammogram screening. Respondents identified the barriers of pain and cost to be the strongest of the five. Similar findings were discovered in the focus group sessions. Women in the focus group sessions described pain in varying degrees (e. g. pressure and discomfort). The statistical significance of perceived barriers was not significant in the full model. A negative

association between mammography screening behavior and perceived barriers was consistent with the literature (Aiken, West, Woodward, & Reno, 1994; Bernstein Hyman, Baker, Ephraim, Moadel, & Philip, 1994; Champion, 1995; Holm, Frank, & Curtain, 1999). Even though perceived barriers were not as strong of a predictor as the cues to action and perceived benefits components, information addressing mammography barriers should be distributed to female employees who are 35 years of age or older. Specifically, the barriers of fear of pain (44.2%) and cost (70.6%) had low disagreement percentages with the survey sample. Therefore, a focus providing correct information regarding these two perceived barriers should be developed. For example, accurate information down playing the barriers of mammography (i.e. cost, time, embarrassment, and especially pain) could be incorporated as part of an informational flyer or an educational workshop.

Perceived Susceptibility

Perceived susceptibility to breast cancer was not significantly associated with receiving mammograms in this study. Although a few researchers have shown similar results (Bernstein Hyman, Baker, Ephraim, Moadel, & Philip, 1994; Fischera, & Frank, 1994), many have found perceived susceptibility associated with mammography screening (Champion, 1991; Stein et al., 1992; Aiken, West, Woodward, & Reno, 1994). One explanation for this finding may be that mammography screening is a measure of secondary prevention. That is, mammography screening will not prevent breast cancer. Therefore, the perceived susceptibility construct may be more applicable to disease or

illness prevention screenings (Holm, Frank, and Curtin, 1999). Nevertheless, perceived susceptibility will not be a part of the wellness program intervention.

Summary

A significant association was found between two of the four HBM components and prior mammography screening behavior. Specifically, cues to action (e.g. physician) and perceived benefits remained significant in all regression analyses. The perceived barriers component was shown to play a moderate role in explaining prior mammography screening behavior while the perceived susceptibility component was shown to be nonsignificant. Based on these results, a variety of interventions techniques should be utilized based on available resources to modify significant HBM constructs to increase screening rates in the Bozeman School District.

Limitations

In interpreting the present results, readers should consider the limitations to this study. First, the investigator depended on self-reports of mammography screening behavior and history along with other important variables (e.g., physician and health care provider input). However, self-reports of mammography screening have been shown to be highly accurate (Rimer & King, 1992).

Second, the results of this study are not generalizable outside the population of the Bozeman School District #7 female employees. The BSD population can be characterized as white, well educated, and middle class, with access to medical care.

Third, the entire Health Belief Model was not utilized. Two HBM components, perceived severity and self-efficacy were left out of the study. As indicated earlier, most individuals view cancer as a serious disease. However, perceived severity has been used in previous studies with mixed results (Aiken et al., 1994; Drossaert, Boer, & Seydel, 1996). Due to the strong interrelationship between the six HBM components, further research should examine the complete model as a combination of constructs.

Finally, although significant, most correlations in this study were low, indicating that other sources of variance not measured are important in predicting mammography-screening utilization. These results do suggest the need for considering a broad range of predisposing variables in attempts to increase mammography screening.

REFERENCES CITED

- Aiken, L. S., West, S. G., Woodward, C. K., & Reno, R. R. (1994). Health beliefs and compliance with mammography screening recommendations in asymptomatic women. *Health Psychology, 13*(2), 122-129.
- Aldana, S. (1998). Financial impact of worksite health promotion and methodological quality of the evidence. *The Art of Health Promotion, 2*(1), 1-8.
- American Cancer Society (2001) Cancer Facts and Figures - 2001. American Cancer Society, Atlanta.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavior change. *Psychological Review, 84*, 191-215.
- Bernstein Hyman, R., Baker, S., Ephraim, R., Moadel, A., & Philip, J. (1994). Health belief model variables as predictors of screening mammography utilization. *Journal of Behavioral Medicine, 17*(4), 391-406.
- Centers for Disease Control and Prevention (1998). Behavioral risk factor surveillance system user's guide. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.
- Champion V. (1991). Compliance with guidelines for mammography screening. *Cancer Detection Prevention, 16*, 253-258.
- Champion V. (1994). Relationship of age to mammography compliance. *Cancer Supplement, 74*, 329-335.
- Champion V. (1995). Development of a benefits and barriers scale for mammography utilization. *Cancer Nursing, 18*, 53-59.
- Champion V. and Menon U. (1997). Predicting mammography and breast self examination in African American women. *Cancer Nursing, 20*, 315-322.
- Champion V. and Miller A.M. (1996). Recent mammography in women aged 35 and older: predisposing variables. *Health Care for Women International, 17*, 233-245.
- Dillman, D. A. (2000). *Mail and Internet Surveys: The Tailored Design Method* (Second ed.). New York: John Wiley & Sons.

- Dolan N., Reifler D, McDermott M, & McGaghie W. (1995). Adherence to screening mammography recommendations in a university general medicine clinic. *Journal of General Internal Medicine*, 10, 299-306.
- Drossaert, C. C. H., Boer, H. & Seydel, E. R. (1996). Perceived risk, anxiety, mammogram uptake, and breast self-examination of women with a family history of breast cancer: the role of knowing to be at increased risk. *Cancer Detection and Prevention* 20, 76-85.
- Dunnagan, T., Duncan, S., & Paul, L. (2000). Doing effective evaluations: a case study of family empowerment due to welfare reform. *Evaluation and Program Planning: An International Journal*, 23, 125-136.
- Dunnagan, T., Peterson, M., & Wilson, J. (1997). Qualitative evaluation techniques and wellness programming. *American Journal of Health Studies*, 13(4), 205-214.
- Goetzel, R. & Ozminkowski, R. (2000). Health and productivity management: emerging opportunities for health promotion professionals for the 21st century. *American Journal of Health Promotion*, 14(4), 211-214.
- Goldbeck, W. Forward. In: O'Donnell MP, Ainsworth, TH, Eds. *Health Promotion in the Work Place*. New York: John Wiley and Sons; 1984, vi.
- Holm, C. J., Frank, D. I., & Curtin, J. (1999). Health beliefs, health locus of control, and women's mammography behavior. *Cancer Nursing*, 22, 149-156.
- Janz, N. K. & Becker, M. H. (1984). The health belief model: A decade later. *Health Education Quarterly*, 11(1), 1-47.
- Kirscht, J. P. (1974). The Health Belief Model and Illness Behavior. *Health Education Monographs*, 2(4), 387-408.
- Krueger, R. A. (1998). *Developing Questions for Focus Groups*. Thousand Oaks, CA: Sage Publications, Inc.
- Lauver, D., Nabholz, S., Scott, K., & Tak, Y. (1997). Testing theoretical explanations of mammography use. *Nursing Research*, 46, 32-39.
- Montana Department of Public Health and Human Services. (2001). *Assessing health risks in Montana: 1999 survey results from the Montana behavioral risk factor surveillance system*. Helena, MT: Montana DPHHS, Health Planning and Evaluation Section.

- Montaño, D. E. & Taplin, S. H. (1991). A test of an expanded theory of reasoned action to predict mammography participation. *Social Science and Medicine*, 32, 733-741.
- National Cancer Institute. (2001). *Cancer Information*, [Web Site]. National Cancer Institute. Available: <http://cancer.gov> [2002, February 21].
- Office of Disease Prevention and Health Promotion. (1992). Washington, DC: US Public Health Service.
- Patton, M. (1990). *Qualitative Evaluation and Research Methods*. London: Sage Publications.
- Reardon, J. (1998). The history and impact of worksite wellness. *Nursing Economics*, 16(3), 117-121.
- Rimer, B. K., & King, E. S. (1992). Why aren't older women getting mammograms and clinical breast exams? *Women's Health Issues*, 2, 94-101.
- Silverstein, M. J. (1994). Noninvasive breast cancer. *Obstet Gynecol Clin North Am*, 21, 539-658.
- SPSS. (2000). SPSS Graduate Pack 10.0 for Macintosh: SPSS, Inc.
- Stokols, D. (1996). Translating social ecological theory into guidelines for community health promotion. *American Journal of Health Promotion*, 10(4), 282-298.
- Strecher V.J. and Rosenstock I.M. (1997). The health belief model. In K. Glanz, F. M. Lewis, & B. K. Rimer (Eds.), *Health Behavior and Health Education: Theory, Research and Practice* (pp. 41-59). San Francisco, CA: Jossey-Bass Publishers.
- Tabachnick, B. G. and Fidell, L. S. (1989). *Using Multivariate Statistics* (Second ed.). New York: Harper & Row.
- U.S. Department of Health and Human Services. (1995). *Healthy people 2000 midcourse review and 1995 revisions*. Washington, DC: U.S. Government Printing Office.
- Yarbrough S.S. and Braden C.J. (2001). Utility of health belief model as a guide for explaining or predicting breast cancer screening behaviours. *Journal of Advanced Nursing*, 33(5), 677-688.

APPENDICES

0

APPENDIX A

QUESTIONNAIRE

April 15, 2002

Dear School District Employee:

I am writing to request your participation in a school district wide research effort, and with the hope that you will participate.

The research concerns our Employee Wellness Program (EWP). The study is intended to evaluate the impact of the EWP on the employee population as well as provide guidance in future programming. The study is being conducted by Kim Hartman, graduate student at Montana State University. This project has the full support of the Bozeman Wellness Committee.

Your participation is of course, voluntary but I hope you will choose to take part. The investigator has gone through an extensive process, approved by the MSU-Bozeman Human Subjects Committee, to protect respondent anonymity. Only summarized information from all the respondents will be used or published.

Please take some time right now to complete and return the enclosed questionnaire. By responding within the next five days, you can help us save resources and time that would otherwise go to follow-ups with those who have not responded. If you have any questions about the study, please feel free to call Kim Hartman at Chief Joseph Middle School (522-6349).

Again, thank you for your support and assistance in this research project.

Sincerely,

Bruce Colton
Wellness Director

We urge you to respond, to give us the benefit of your candid judgments and experiences, regardless of the extent of any involvement in Employee Wellness Program activities. Your participation is, of course, voluntary. Confidentiality will be strictly maintained. **Please complete and return this questionnaire within the next five days.** An in-house address, on the back page of this questionnaire is provided for your convenience. Please feel free to call Kim Hartman at 522-6349 if you have any questions or concerns.

INSTRUCTIONS

Who should complete this survey?

We are asking all of the Bozeman School District female employees to complete this survey.

What is this survey about?

We are interested in your thoughts, feelings, and attitudes and experiences as they relate to breast cancer screening. There are no right or wrong answers.

What do I do?

Please mark one box (X) or write in the most appropriate response for each question.

START HERE

1. Has your physician ever talked to you about early detection of breast cancer?

- ☐ Yes
- ☐ No

2. Has a health professional, other than your physician, talked to you about early detection of breast cancer?

- ☐ Yes
- ☐ No

3. Has your physician discussed mammography with you?

- ☐ Yes
- ☐ No

4. Has a health professional, other than your physician, discussed mammography with you?

- ☐ Yes
- ☐ No

5. Has your mother, sister, grandmother, or any other blood relative had breast cancer?

- ☐ Yes
- ☐ No

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

- ☐ Yes
- ☐ No (Go to question #11)

7. How many mammogram(s) have you experienced in your life?

_____ (Number)

8. What is your primary choice for mammogram screening? (Please mark an "X" in all that apply)

- ☐ Employee Wellness Screening Program (Summer)
- ☐ Other (i.e. spouse's insurance, clinic, etc)

9. How long has it been since you had your last mammogram? (Please mark an "X" in the most appropriate box)

- ☐ Within the past year (1 to 12 months)
- ☐ Within the past 2 years
- ☐ Within the past 3 years
- ☐ Within the past 5 years
- ☐ 5 or more years ago

10. Was your last mammogram done as part of a routine checkup, because of a breast problem other than cancer, or because you've already had breast cancer?

- ☐ Routine checkup
- ☐ Breast problem other than cancer
- ☐ Had breast cancer

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

- ☐ Yes
- ☐ No (Go to question #13)

12. How long has it been since your last clinical breast exam?

- ☐ Within the past year (1 to 12 months)
- ☐ Within the past 2 years
- ☐ Within the past 3 years
- ☐ Within the past 5 years
- ☐ 5 or more years ago

13. A Pap smear is a test for cancer of the cervix. Have you ever had a Pap smear?

- ☐ Yes
- ☐ No (Go to question #15)

14. How long has it been since you had your last Pap smear?

- ☐ Within the past year (1 to 12 months)
- ☐ Within the past 2 years
- ☐ Within the past 3 years
- ☐ Within the past 5 years
- ☐ 5 or more years ago

15. When I get a recommended mammogram I feel good about myself.

- ☐ Yes, I strongly agree
- ☐ Yes, I agree
- ☐ No, I disagree
- ☐ No, I strongly disagree
- ☐ I neither agree or disagree
- ☐ I did not get a mammogram

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

- ☐ Yes, I strongly agree
- ☐ Yes, I agree
- ☐ No, I disagree
- ☐ No, I strongly disagree
- ☐ I neither agree or disagree
- ☐ I did not get a mammogram

17. Having a mammogram or x-ray of the breast will help me find lumps early. (Please mark an "X" in the most appropriate box)

- ☐ Yes, I strongly agree
- ☐ Yes, I agree
- ☐ No, I disagree
- ☐ No, I strongly disagree
- ☐ I neither agree or disagree
- ☐ I don't know

18. Having a mammogram or x-ray of the breast will decrease my chances of dying from breast cancer.

- ☐ Yes, I strongly agree
- ☐ Yes, I agree
- ☐ No, I disagree
- ☐ No, I strongly disagree
- ☐ I neither agree or disagree
- ☐ I don't know

19. Having a mammogram or x-ray of the breast will decrease my chances of requiring radical or disfiguring surgery if breast cancer occurs.

- ☐ Yes, I strongly agree
- ☐ Yes, I agree
- ☐ No, I disagree
- ☐ No, I strongly disagree
- ☐ I neither agree or disagree
- ☐ I don't know

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

- ☐ Yes, I strongly agree
- ☐ Yes, I agree
- ☐ No, I disagree
- ☐ No, I strongly disagree
- ☐ I neither agree or disagree
- ☐ I don't know

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

- ☐ Yes, I strongly agree
- ☐ Yes, I agree
- ☐ No, I disagree
- ☐ No, I strongly disagree
- ☐ I neither agree or disagree
- ☐ I don't know

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

- ☐ Yes, I strongly agree
- ☐ Yes, I agree
- ☐ No, I disagree
- ☐ No, I strongly disagree
- ☐ I neither agree or disagree
- ☐ I don't know

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

- ☐ Yes, I strongly agree
- ☐ Yes, I agree
- ☐ No, I disagree
- ☐ No, I strongly disagree
- ☐ I neither agree or disagree
- ☐ I don't know

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

- ☐ Yes, I strongly agree
- ☐ Yes, I agree
- ☐ No, I disagree
- ☐ No, I strongly disagree
- ☐ I neither agree or disagree
- ☐ I don't know

25. Having a mammogram or x-ray of the breast would cost too much money. (Please mark an "X" in the most appropriate box)

- ☐ Yes, I strongly agree
- ☐ Yes, I agree
- ☐ No, I disagree
- ☐ No, I strongly disagree
- ☐ I neither agree or disagree
- ☐ I don't know

26. The Employee Wellness summer time mammogram screening is difficult to fit into my schedule.

- ☐ Yes, I strongly agree
- ☐ Yes, I agree
- ☐ No, I disagree
- ☐ No, I strongly disagree
- ☐ I neither agree or disagree
- ☐ I don't know

27. What is your primary health insurance source? (Please mark an "X" in all boxes that apply)

- ☐ None
- ☐ Bozeman School District #7
- ☐ Medicaid/Medicare
- ☐ Other insurance source

28. What is your highest grade or year of school you completed?

- ☐ Grades 1 through 8 (Elementary)
- ☐ Grades 9 through 11 (Some high school)
- ☐ Grade 12 or GED (High school grad)
- ☐ College 1 to 3 years (Some college or technical school)
- ☐ College 4 years or more (College grad, BA, MA, EdD, JD, MD, PhD)

29. Are you:

- ☐ Married
- ☐ Divorced
- ☐ Widowed
- ☐ Separated
- ☐ Never been married
- ☐ A member of an unmarried couple

30. What is your race?

- ☐ White
- ☐ Black
- ☐ Asian, Pacific Islander
- ☐ American Indian, Alaska Native
- ☐ Spanish or Hispanic
- ☐ Other: _____

31. Which of the following categories best describes your *total household* income from *all* sources in the last calendar year before taxes and other deductions?

- ☐ Less than \$10,000
- ☐ \$10,000-\$14,999
- ☐ \$15,000-\$19,999
- ☐ \$20,000-\$24,999
- ☐ \$25,000-\$34,000
- ☐ \$35,000-\$49,999
- ☐ \$50,000-\$74,999
- ☐ \$75,000-\$99,999
- ☐ Over \$100,000

32. What is your status in the Bozeman School District?

- ☐ Full Time
- ☐ Part Time

33. What is your primary job classification in the Bozeman School District? . (Please mark an "X" in the most appropriate box)

- ☐ Classified (i.e. secretary, support service, custodian, etc)
- ☐ Certified (i.e. teacher, librarian, counselor, etc)
- ☐ Administrative (i.e. principal, etc)
- ☐ Professional (i.e. nurse, audiologist, etc)

34. How many dependents do you have, other than a spouse, in each age category? (Include children and any others.) Place an (X) next to "none" if you have no dependents.

- _____ None
- _____ Under 6 years
- _____ 6-12 years
- _____ 13-17 years
- _____ 18-65 years
- _____ Over 65 years

35. Who would you listen to about getting a mammogram? Please rank the following people or groups in order of importance with 1 being the most important and 8 being the least important.

- _____ Breast cancer survivor
- _____ Family
- _____ Friend
- _____ Physician
- _____ Health Professional, other than a Physician
- _____ Media
- _____ Co-worker
- _____ Spouse/Significant other

36. What is your age as of your last birthday?

_____ Age (years)

37. Please indicate your primary building assignment:

- ☐ High School
- ☐ Bridger Alternative
- ☐ Chief Joseph Middle
- ☐ Sacajawea Middle
- ☐ Emily Dickinson
- ☐ Hawthorne
- ☐ Irving
- ☐ Longfellow
- ☐ Morning Star
- ☐ Whittier
- ☐ Wilson
- ☐ Support Services

The appropriate data will be combined and provided in summarized form to the research investigator; **no identification will be included.** This process of ensuring anonymity has been carefully reviewed and approved by the MSU-Bozeman Human Subjects Committee, which oversees research like this with human subjects. However, if you choose not to provide us with your building assignment, **we urge you to still return your completed questionnaire.** Thank you!

Please tri-fold your survey and staple so that "Kim Hartman CJMS" shows on the back of this booklet and send via in-house mail.



WWAMI Medical Program
 308 Leon Johnson Hall
 P.O. Box 173080
 Montana State University
 Bozeman, MT 59717-3080
 Telephone: 406-994-4411
 FAX: 406-994-4398
 E-mail: wwami@montana.edu



MEMORANDUM

TO: Kimberly Ann Hartman

FROM: Stephen Guggenheim, M.D. *Stephen Guggenheim M.D.*
 Human Subjects Administrator

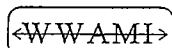
DATE: February 8, 2002

SUBJECT: Health Belief Model and its Application of Mammography in a K-12 School District Employee Wellness Program

The above research, described in your submission of February 5, 2002 is exempt from the requirement of review by the human subjects committee in accordance with the Code of Federal Regulations, Part 46, section 101. The specific paragraph which applies to your research is

- ☐ (b)(1) Research conducted in established or commonly accepted educational settings, involving normal educational practices.
- ☒ (b)(2) Research involving the use of educational tests, survey procedures, interview procedures or observation of public behavior.
- ☐ (b)(4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these specimens are publicly available, or if the information is recorded by the investigator in such a manner that the subjects cannot be identified.
- ☐ Other

Although review by the Human Subjects Committee is not required for the above research, the Committee will be glad to review it. If you wish a review and committee approval, please submit 3 copies of the usual application form and it will be processed by expedited review.



MONTANA STATE UNIVERSITY - BOZEMAN



3 1762 10359984 9