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Predicting women's breast self-examination behaviour.

Arlene D. Cox
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PREDICTING WOMEN'S BREAST
SELF-EXAMINATION BEHAVIOUR

by

Arlene D. Cox

M.A. University of Windsor, 1989

A Dissertation
submitted to the Faculty of Graduate Studies and Research
through the Department of Psychology in Partial
Fulfilment of the Requirements for the
Degree of Doctor of Philosophy at
the University of Windsor

Windsor, Ontario, Canada

1994
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ABSTRACT

Breast self-examination (BSE) is an effective way to discover breast cancer early. Unfortunately only 14 to 40% of women perform BSE monthly. The Health Belief Model (HBM) presents seven factors considered to influence health behaviour. The Stage of change research focuses on the processes involved in changing a negative behaviour or acquiring a desired one. This study created an algorithm to classify each woman into one of five stages based on past performance and intent to perform BSE. The aim was to create a better method of predicting BSE behaviour, and current readiness to initiate monthly BSE, by combining health beliefs and Stage. Two hundred forty four women, aged 20 to 65, filled out a questionnaire assessing health beliefs, knowledge of breast cancer and BSE, and frequency of BSE. In general, the factor structure of the HBM was supported. The Stage of change gradient from disinterest in BSE to monthly performance was found along with the appropriate changes in health beliefs over the stages. The Stage variable was strongly related to both a general measure of BSE behaviour and intent to perform BSE next year. Support was also provided for the ability to accurately predict the amount of variation, and the point it occurs in the change process, in measures of the benefits and barriers to BSE. The results indicate that a combination of three HBM factors (representing perception of barriers to BSE, the benefits of BSE, and confidence in one’s ability to perform BSE accurately), and Stage, can provide the information necessary to predict a woman’s BSE performance and focus on what element(s) of her beliefs should be influenced in order to promote movement along the stages.
ACKNOWLEDGMENTS

This research project has been one of the most challenging experiences of my life. My interest and desire to work within health psychology has grown over the course of this project. However, my ability to create, produce, and finally finish, this research would not have been possible without the help of my partner in life, Douglas Dunscombe. It is Douglas, who supported me in the beginning and pushed me at the end, who deserves a major part of the credit. Also, the support of my parents, Marlene and Derrick, was invaluable. I did not want to let them down after all these years of believing I could do it. Great thanks also go to my brother, Trevor, and my sister-in-law, Shelley. Their expertise with the computer, and its far from simple parts, helped keep me on track.

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Last, but not least, thanks go to my friends in distress, Alison Crocker, Joanna Hamilton, and Rhonda Matters. I could not have made it without your support and encouragement (and the tips were good too).
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Chapter I
Introduction

The cancer rates in society today are enough to shock the most hardened person. Unfortunately, even though prevention and early treatment are possible, they are ignored by, literally, millions of people. Currently, health care professionals are studying ways to increase both the use of preventive health behaviours, like breast self-examination (BSE), and compliance to treatment. The study of compliance has become a prolific research area and has generated a number of models of behaviour.

One of the most useful models of health behaviour is the Health Belief Model (HBM) (Becker et al., 1979a). This model has been used to explain frequency of breast self-examination performance and has shown moderate success. Unfortunately, the predictive power of the HBM has not been as great as hoped and, thus, many of the important factors which are linked to increased BSE performance are as yet unclear.

Another, parallel, research area focuses on decreasing negative behaviour, like smoking or over-eating, in order to determine what factors are linked to changing the behaviour. Prochaska and DiClemente (1992) have developed a transtheoretical approach to behaviour change which uses a model based on Stages and processes of change. This model has been very successful in delineating which individuals will be using what change processes and what the likelihood of successful behaviour change will be. The model has been used in a very limited way with behaviour acquisition as well.

The explanatory power of the Stages of change prompted the idea to examine their possible use in determining changes in BSE performance, the basic aim of this research study. There are some similarities between the
HBM and the Stages of change approach that indicate a possible relationship between the concepts.

The aim of the current research project is to clarify the relationship between these two approaches which attempt to explain and predict behaviour. If their joint use can substantially increase our power to explain and predict BSE behaviour, then this information can be used to create more effective interventions. However, if the two approaches are explaining the same variance in a woman's BSE behaviour, then the approach which is most cost-effective, and least intrusive, can be chosen. Either situation will improve the preventive health care offered to women at this time.

In the following pages, literature pertinent to breast cancer, breast self-examination (BSE), the Health Belief Model (HBM), breast self-examination research using the Health Belief Model, and Stages of change will be presented. It will be made clear how these differing approaches may explain similar aspects of the BSE decision process. Then, a research project will be presented that is designed to clarify the best combination of models or factors with which to predict BSE behaviour. The intention is to provide information to both clients and health care providers which will promote greater use of BSE, or, demonstrate which type of information should be presented at each Stage in order to achieve this aim. The first section will discuss breast cancer and the need for women to perform BSE's.

**Breast Cancer**

Within the United States the risk of dying from breast cancer has not decreased in over thirty years. The death rate for breast cancer, in both the US and Canada, remains at approximately 27 women out of 100,000 (ACS, 1991; Statistics Canada, 1989). The number of estimated deaths for women in 1991 was 44,500 and the number of estimated new cases was 175,000 (ACS, 1991; Cooper, 1992). Dr. Susan Love states, in news reports in October, 1993, that the rate of breast cancer has likely increased to one
in eight women rather than the one in ten originally thought to be at risk.

The risk factors for developing breast cancer are: over age 50, personal or family history of breast cancer, never had children, and first childbirth after age 30 (ACS, 1991). Obviously, these are not variables that can be altered just to decrease cancer risk. However, early detection can considerably increase the likelihood of discovering cancer at a non-invasive stage. This stage of the disease requires minimal treatment only and has a survival rate that approaches 100% (ACS, 1991; Cooper, 1992). If the cancer is not discovered early, and has time to spread regionally, the survival rate drops to 69% (ACS, 1991; Cooper, 1992). Breast cancer is one of the greatest cancer killers for women, second only to lung cancer.

Preventing breast cancer is difficult since the cause of the disease is unknown. On the other hand, breast cancer is one of the few cancers that, if found early, can be almost eradicated. Thus, "the American Cancer Society recommends the monthly practice of breast self-examination (BSE) by women 20 years and older as a routine good health habit (ACS, 1991, p. 17)." The BSE is considered important since cancer symptoms can develop between clinical breast exams. Further, performing a BSE every month promotes familiarity with the breasts and, thus, a chance to notice changes quickly.

**Breast Self-Examination (BSE)**

Celentano (1983) stated that women who did monthly BSE's were more likely to detect lumps than if they relied solely on routine checks by their physician or accidental discovery. BSE is, arguably, the most effective technique considering convenience, cost, and risk (Eggertsen & Bergman, 1983).

There was some concern that promoting BSE behaviour would increase anxiety about cancer and promote a denial of risk rather than the desired recognition and wish to cope (Hobbs, Haran, Pendleton, Jones & Posner,
1984). However, Hobbs et al. (1984) reported that discussion and promotion of BSE did not heighten women's anxiety, worry or vulnerability about contracting breast cancer.

Although Hobbs et al. (1984) pointed out that any BSE is better than none, there is a lack of consistency in the research on BSE effectiveness. Celentano (1983) considered this lack of clear cut results likely due to the variability in BSE measures.

Measurement and Frequency of Breast Self-Examination

Most assessment of BSE performance is reliant on self-report. Researchers are realizing that self-reported frequency of BSE behaviour does not clarify skill or ability to perform BSE adequately. A number of studies have shown that women who report the appropriate frequency of BSE may not be performing the process accurately and, thus, are not gaining any benefit from the time spent (Assaf, Cummings & Walsh, 1983; Celentano, 1983; Howe, 1985; Pennypacker, Goldstein & Stein, 1983). Appropriate training is necessary (Assaf et al., 1983; Eggertsen & Pergman, 1983; Pennypacker et al., 1983).

It is important to investigate the relationship between self-reports and actual performance of BSE (Mamon & Zapka, 1983). Celentano and Holtzman (1983) found that women who performed monthly BSE's had higher knowledge of BSE technique scores and higher levels of confidence in their ability. These authors stated that self-report frequency can be validated by self-report technique descriptors; verbal reports of how BSE behaviour is performed can be a method of validating self-reported BSE practice.

Measures of BSE competence generally involve asking women what areas of the breast were examined and in what positions (Baker, 1989; Calnan, Chamberlain, & Moss, 1983; Celentano, 1983; Mamon & Zapka, 1983). Findings of competency using this self-report method have been consistent with demonstrations of competent BSE behaviour using smaller validation samples (Baker, 1989, Mamon & Zapka, 1983). These results support the relative accuracy of self-reports of BSE behaviour because observational
measurement techniques were used as well as self-report. These results also indicate the importance of using competency, as well as frequency, measures of BSE performance. Champion (1990) hypothesized that inadequate technique could explain why some studies show that BSE does not decrease cancer death rates.

Although there are uncertainties about the validity of self-report, obtaining more objective information is difficult and, in the circumstances, self-reporting may be the only acceptable method (Calnan et al., 1983). Assuming that the self-report data is accepted, the next step is to determine the current frequency of BSE behaviour.

Trotta (1980) reported that the majority of women are not practicing BSE. Researchers have found that while 96 to 99% of women have heard of BSE only 14 to 40% report performing it monthly (Champion, 1988; Lauver, 1987; Strauss, Solomon, Costanza, Worden & Foster, 1987). Worse, women who are at greatest risk, those age 35 and over, have been reported to practice BSE even less frequently (Champion, 1990).

When women were asked why they did not perform monthly BSE's a variety of reasons were provided: lack of knowledge, fear of findings, and lack of self-confidence. The attempt to discover why women are not performing preventive health behaviours is part of the more general issue of compliance behaviour. Thus, examination of the compliance literature, and its most useful model of health behaviour, is necessary in order to understand BSE behaviour.

Compliance

Haynes (1979a) defined compliance as: the extent to which a person's behaviour - in terms of keeping appointments, taking medications, and executing lifestyle changes - coincides with medical advice (pp. 1-2). There are two general views in the literature and research on compliance. The first is that some situations are linked to noncompliance such that everyone could potentially not comply in those situations. The focus, therefore, is on discovering how to change the situation. The second view
is that some people are noncompliers and we should determine what characteristics they possess. However, as Meichenbaum and Turk (1987) state, the 'search for stable factors that comprise the nonadherent, uncooperative, or chronic defaulter patient has met with little success' (p. 42). Although there does not appear to be a stereotypical 'noncomplier', particular individual factors do seem to be linked to complying in certain situations. Haynes (1979b) has identified over 200 factors which have been studied in relationship to compliance. This vast pool of variables prompted Feinberg (1988) to recommend we limit our focus to factors that are amenable to change.

The Health Belief Model (HBM)

Compliance research has generated a number of influential factors which in turn have prompted the creation of an assortment of models designed to better understand the individual's compliance behaviour. The most popular and useful model is the Health Belief Model (HBM). This formulation is

"...based on the decision-making concepts of valence (or attractiveness of the goal to the individual) and subjective probability (or personal estimate of likelihood of goal attainment). The theory argues that whether or not an individual will undertake a recommended health action is dependent upon that individual's perceptions of: (1) level of personal susceptibility to the particular illness or condition; (2) degree of severity of the consequences (organic and/or social) which might result from contracting the condition; (3) the health action's potential benefits or efficacy in preventing or reducing susceptibility and/or severity; (4) physical, psychological, financial, and other barriers or costs related to initiating or continuing the advocated behavior. The Health Belief Model also stipulates that a cue to action or stimulus must occur to trigger the appropriate behavior by making the individual consciously aware of his feelings about the health threat. Such cues can be either internal (for eg, perception of symptoms) or external (such as mass media campaigns, interpersonal interactions)" (Becker et al., 1979a, pp. 78-79, emphasis added).

An important characteristic of the HBM is that the perception and beliefs which comprise the model have been shown to be alterable (Youssef, 1983). Christensen-Szalanski and Northcraft (1985) agree that this type of model considers the perceived benefits and costs associated with a
treatment regimen to be the main causes of an individual's willingness to comply (p. 263).

Although the HBM has provided an initial framework for understanding preventive health behaviour there has been a growing push for the inclusion of additional variables in the model. Rosenstock (1985) emphasized a need for a motivational or incentive element, which indicates an individual's interest in their health. Also, the addition of a self-efficacy or confidence element was considered important, as people will only comply if they think they are able to follow the regimen (Kaplan & Simon, 1990; Rosenstock, 1985; Strecher, DeVellis, Becker & Rosenstock, 1986).

Research Support for the Health Belief Model

Janz and Becker (1984) examined a decade of studies which used the HBM in both prospective and retrospective research. All four dimensions of the HBM, Susceptibility, Seriousness, Benefits, and Barriers, were significantly related to compliance. Of the 29 studies published between 1974 and 1984, Barriers was the most powerful element, followed by Benefits, Susceptibility, and Seriousness.

Janz and Becker (1984) suggest that it may be difficult for people to conceptualize the Seriousness dimension because: (1) they are currently asymptomatic, (2) the health threat is thought to be long-term, and (3) they may have little or no experience with the medical condition. When Janz and Becker (1984) examined studies which focused on sick-role behaviour, the Seriousness dimension became the second highest in the order. This supports the idea that Seriousness is only meaningful to people who are ill and/or experiencing symptoms.

The HBM is useful because the existence of certain individual beliefs and attitudes which affect behaviour have been supported. The next section will describe the HBM elements as used to determine BSE behaviour and their effectiveness in describing and predicting that behaviour.
Health Belief Model Elements Related to BSE Behaviour

Of the four original elements of the HBM, most researchers assess Barriers, Benefits, and Susceptibility, while few examine Seriousness. This occurs because almost all women consider breast cancer to be a serious disease and this lack of variability makes the Seriousness element useless as a predictor of behaviour. The two additional variables that Rosenstock (1985) suggested, Health Motivation and self-efficacy or Confidence, are also used. Last, both knowledge about breast cancer or BSE and perceived Control (Champion, 1988) have been assessed because of their hypothesized association with BSE. Each of these elements will be discussed separately in the following sections.

Benefits. Baker (1989) assessed Benefits by asking women to rate their belief that BSE: is effective in providing an early detection of breast abnormalities, reduces cancer mortality, and provides monthly reassurance. This approach was typical. Hill, Gardner and Rassaby (1985) found that the most powerful Benefits were: detected cancer would be curable, provision of a sense of relief, and reassurance. Contrary to expectation, strength and type of perceived Benefits was unrelated to intent to perform BSE in the future. One of the possible reasons for this weak result may be that the particular benefits the individual perceives are not listed in the questionnaire or appropriately assessed. However, the addition of more Benefits categories did not add power to or alter the pattern of Hill et al.'s (1985) results.

Perceiving a high level of Benefits was significantly associated with greater frequency of BSE in both Rutledge's (1987) and Hallal's (1982) research. On the other hand, Benefits explained only a small amount of variance in frequency and technique of BSE before and after an educational program in England (Calnan & Rutter, 1986). This result supported Champion's (1990) work, which found Benefits to be correlated with, but not a strong predictor of, BSE frequency. In Champion's (1993) latest research on the HBM questionnaire Benefits showed limited
correlation with a general measure of BSE behaviour (combination of frequency and proficiency) although it did have enough predictive power to be useful in the regression equation. Lashley (1987) found no relationship between Benefits and frequency or technique of BSE.

The weak, or nonexistent, predictive power of the Benefits variable may be due to the lack of a direct relationship between BSE and reduction in Susceptibility to breast cancer (Champion, 1984). The variety of measurement techniques and instruments may also have had an impact on the variable's inconsistent results.

**Barriers.** Baker (1989) assessed the following list of Barriers to BSE behaviour: fear of discovery, embarrassment about touching one's breasts, stereotypes about those who practice BSE, doubts about self-efficacy or ability to perform BSE, lack of BSE skill, lack of BSE knowledge, doubts about the efficacy of BSE in detecting abnormalities and reducing risk, and forgetting. Hill et al. (1985) found the greatest perceived Barriers to BSE were: forgetting, laziness, fear of losing a breast, not knowing how, and believing "it couldn't happen to me" (which seems to be more a measure of Susceptibility). Each of these Barriers were significantly, negatively correlated with intention to do BSE in the future and past performance.

Trotta (1980) found that Barriers contributed the most to explaining the variance in BSE frequency, 12.2%, and explained 36.5% of the variance in BSE thoroughness. Barriers explained the most variance in BSE frequency for all groups in the Strauss et al. (1987) study, ranging from 37% to 58%. Champion (1990) found that Barriers was a strong predictor of BSE performance and had significant negative correlations with a combined measure of BSE frequency and proficiency (1993). Rutledge (1987) demonstrated a clear relationship between low Barrier scores and high frequency of BSE performance. Baker (1989) assessed the effect of an educational program on women's Barriers to BSE behaviour and found a
significant decrease after the program. Further, measures of BSE quality increased within this group also.

It is clear from these results that determining an individual's perceptions of Barriers to BSE performance provides valuable information about the likelihood of that performance. Further, Barriers can be altered, thus, performance can be increased. This HBM variable has been found to be a strong predictor in most studies using this model, regardless of behaviour or treatment approach (for example, Becker et al., 1979b; Champion, 1990; Janz & Becker, 1984).

Susceptibility. Calnan and Rutter (1986) assessed this variable by asking for the woman's perceived vulnerability to breast cancer. Stillman (1977) found that women who consciously labelled themselves as more susceptible to breast cancer tended to have higher frequencies of BSE behaviour. Massey (1986) assessed BSE practice over a one year period and found that women who practiced six or more times had significantly higher mean Susceptibility scores than those who practiced less. These scores seem based on actual exposure to the disease since more of the women in the six and greater group had a history of breast disease or friends or relatives with breast cancer. Champion (1993) found Susceptibility to be significantly correlated with a general measure of BSE behaviour. However, other researchers have found only a limited relationship between Susceptibility and frequency or technique of BSE behaviour (Calnan & Rutter, 1986).

Trotta (1980) did not find Susceptibility to be significantly correlated with BSE frequency or thoroughness and neither did Lashley (1987). A number of other researchers assessed frequency alone and supported this lack of relationship (Lauver, 1987; Rutledge, 1987). The inconsistent measurement techniques and item description may have played a part in the inconsistent findings for Susceptibility. Champion (1984) has suggested that the relationship between Susceptibility and behaviour may not be as presented in the HBM since there is no direct way to
decrease Susceptibility. Perhaps education is required here, to clearly present the increase in Susceptibility to advanced forms of cancer if breast cancer is not caught early.

**Seriousness.** Trotta (1980) was one of the few researchers to assess Seriousness; however, no significant relationship with frequency or thoroughness of BSE was found. Although Champion (1993) found Seriousness to be a reliable and valid factor in the HBM questionnaire, the bivariate correlation with a general measure of BSE behaviour was low. Other researchers have also failed to find a relationship between Seriousness and BSE frequency (Lauver, 1987; Rutledge, 1987).

Seriousness may not be a useful variable as it may be hard to imagine when one is in an asymptomatic state and, thus, has little experience with the disease (Rutledge, 1987). Champion (1984) considers Seriousness's lack of explanatory power to be related to the negative and hopeless connotation women have of breast cancer. There may be a curvilinear relationship, like fear or stress, with high levels inhibiting response to breast cancer. This would fit with Strauss et al.'s (1987) results, which indicate that women who have experience with successful treatment of breast cancer rate the disease as less serious than women who have no experience with the disease directly and, thus, may have less knowledge on which to base a rational perception.

The next sections will discuss two additional variables, Health Motivation and Confidence, which have been linked to later conceptions of the HBM. Both Rosenstock (1985) and Becker (1979a) consider these variables as appropriate additions to the model.

**Health Motivation.** Lauver (1987) reports that general Health Motivation, such as exercising or eating well, has a positive but inconsistent link with frequency of BSE. Champion (1984) found high scores on Health Motivation to be related to greater frequency of BSE performance. When Champion (1988) examined BSE proficiency, Health Motivation was the variable with the greatest correlation and accounted
for the most variance, with Barriers second. When intent to perform BSE in the future was assessed, the strongest variable was Barriers, with Health Motivation second (Champion, 1988). When Champion (1990) assessed frequency (now and in the past), intent, and total performance (frequency plus proficiency), Health Motivation was only related to the frequency variables. However, Champion's (1993) latest research shows that Health Motivation is both significantly and positively correlated with, and a significant predictor of, a general measure of BSE behaviour.

The power of Health Motivation as a predictor variable is not clear since there is some inconsistency in the results. This may be linked to the aim of this preventive health behaviour. Similar to the discussions of Susceptibility and Seriousness, performing monthly BSE's may not clearly relate to Health Motivation since BSE's do not increase current health or decrease cancer risk. However, future use of this variable is supported by the strength of some of the findings, particularly Champion's (1984, 1988, 1993), which rely on a statistically well-developed and supported instrument.

Confidence. Baker (1989) found that confidence in one's own ability to perform BSE was strongly related to frequency of BSE behaviour. According to Seydel, Taal, and Wiegman (1990), it is self-efficacy [confidence] that is related to BSE frequency rather than risk-appraisal variables such as Seriousness or Susceptibility (Seydel, Taal & Wiegman, 1990). Of note, is that women, who felt confident they were performing their BSE correctly, usually were (Celentano, 1983; Celentano & Holtzman, 1983). Thus, it would appear that measures of Confidence assess some aspect of skill level too.

Champion (1990) did not find a relationship between Confidence and BSE performance. However, Confidence was significantly negatively correlated with Barriers and positively correlated with Control. Although Champion (1990) found that the variable Confidence was unnecessary to the regression equation to predict BSE performance, it did provide significant
explanatory power in the equation to predict frequency. It may be that Confidence's strong correlations with Barriers and Control decrease the need for it in the equation to predict performance. In Champion's (1993) latest study, on the factor structure of the HBM questionnaire on BSE behaviour, Confidence was found to be a reliable and valid factor. Further, Confidence was an important part of the regression equation predicting BSE behaviour. A reason, for this new finding, may be the collapsing of the frequency and proficiency measures of BSE into a more general BSE behaviour measure. Internal consistency and reliability information led Champion (1993) to combine frequency and proficiency into one general variable and this may have allowed the impact of Confidence to show more clearly. Overall, the research seems to indicate that self-efficacy/Confidence is a valuable part of the assessment of health behaviour. The next sections will discuss the final two variables that have been linked with the HBM and BSE behaviour in particular.

Knowledge. Stillman (1977) found that most women knew, or overestimated, the risk of breast cancer and could report such risk factors as age and occurrence within immediate family. Newell, Price, Roberts and Baumann (1986) found that knowledge of cancer treatment predicted different behaviour than knowledge of the disease itself. Individuals who were willing to reject conventional cancer treatments, and only use unorthodox treatments (for example, shark cartilage), had more knowledge of the treatment rather than the disease. Results such as these indicate the importance of clarifying knowledge questions so that an individual's knowledge of cancer is not confused with their knowledge of cancer treatment. It is expected that women, who understand the difference between treatment for advanced versus early breast cancer, rate the Benefits of BSE much higher than women who are unaware of treatment differences.

Marteau et al. (1992) examined the level of Knowledge in women who did and did not take a prenatal screening test. Women who were tested
were more likely to state that they had heard of the AFP (alpha fetoprotein) test and were more likely to know to whom the AFP test is routinely offered, than women who were not tested. Level of Knowledge clearly differentiated the two groups of women, however, the variance explained was quite low.

The average woman knows two-thirds of the information on correct BSE technique (Champion, 1990). Champion (1990) found that, although Knowledge could weakly predict present BSE performance it was not a predictor of frequency. This highlights the importance of determining how well women who report appropriate frequency are actually performing the BSE technique.

The last variable to be discussed, Control, was suggested as a possible addition to the HBM in the early 1970's, however, its use in the literature was limited until Champion's work (1988, 1990).

**Perceived Control.** This variable was assessed by asking women questions about their belief whether they can Control the effects of breast cancer by discovering lumps at an early stage (Champion, 1988; 1990). Champion (1988) found that Control was the third most important variable to explain the variance in intent to perform BSE. However, the variable was not important when predicting current frequency or performance. In a later study, Control was significantly correlated with Confidence and did relate to current frequency (Champion, 1990). In Champion's (1993) latest assessment of the HBM questionnaire no Control items were included.

The importance of the Control variable is not clear since it has had limited research assessment. However, the HBM elements, which encompass all of the variables discussed above, do seem to provide some insight into what influences women's BSE performance. In contrast, the demographic variables that have been assessed, which often explain large amounts of variance, have not been found influential in this area of study.
Demographic Variables. In general, few demographic variables are relevant to BSE frequency or proficiency (Lauver, 1987). Champion (1990) supported many earlier researchers by demonstrating that SES, as measured by Green (1970), is not relevant to BSE performance. Neither level of social support nor social network properties were linked to BSE frequency (Champion, 1990; Rutledge, 1987). Celentano and Holtzman (1983) found older age to be associated with less frequent performance, while, marital status was unrelated. In contrast, Rutledge (1987) and Strauss et al. (1987) found no relationship between frequency of BSE and age.

The indication that demographic variables are not influential in women's decisions about performing BSE is promising from a health perspective. These variables are not alterable and if they did relate strongly to decisions about BSE then that behaviour would be difficult to change. It is possible to influence the factors in the HBM and, thus, their influence on a woman's decision to perform BSE. Unfortunately, the amount of variance in BSE performance explained by the HBM is not large. Of the three dependent variables assessed, the maximum amount of variance explained was 44% when intent was the focus; which is rare (Champion, 1988). In general, HBM variables explain approximately 15 to 25% of the variance in the BSE performance variables (for example, Champion, 1984; Becker et al., 1979b; Rutledge, 1987). Although explanation of this amount of variance is useful, it certainly does not outline the entire picture of what is occurring when women decide to perform, or not to perform, BSE. One possible reason for the limited explanatory power of the HBM is the methodology used in the research.

Flaws in Methodology

Many researchers attribute the inconsistent HBM and BSE findings to a number of elements: diversity in populations, lack of uniformity in operationally defining model variables and lack of information on reliability and validity of study instruments (Champion, 1984; Champion, 1988; Champion, 1993; Lashley, 1987). However, Champion (1984, 1988,
1993) has designed an instrument that is useful because of its demonstrable reliability and validity. Since the development of this instrument, the relationship between the HBM elements and BSE performance variables has been assessed and the 15 to 25% level of explanatory power was achieved (Champion, 1988; Champion, 1990).

It seems likely that, in this later research, difficulty assessing the HBM appropriately, in relation to BSE performance, is not the reason for the limited explanatory power achieved. A second possible reason is that other processes are occurring during the decision about BSE, that have not yet been addressed. Grady (1984) stated that personality/medical/idiosyncratic theories cannot clearly show how to increase compliance to BSE. However, it is possible that a focus on an individual's acceptance or readiness for changing health behaviour may be more relevant.

The next sections will introduce a new direction for research in preventive health behaviour; examination of the process of change. The basic issue in BSE research is to determine how to increase the current level of BSE performance. A number of researchers have been focusing on how to decrease negative behaviours like smoking and over-eating. Although this is a different aim it seems plausible that the theory and findings can be used to help explain behaviour acquisition as well. The following discussion will focus on the Stages of change, how these are assessed, and additional variables that clarify the process. Following this will come discussion of the predictive value of the Stages of change with regard to various target behaviours. The last section of the introduction will focus on meshing the two approaches (HBM and Stages) to explaining behaviour.

**Stages of Change**

Prochaska and DiClemente (1992) have focused predominantly on changing behavior. Through their research it became clear that the
process of change could be best understood when divided into segments or Stages.

Prochaska and DiClemente (1992) have formulated and isolated five Stages of change that are a fundamental part of their transtheoretical model of behaviour change. These Stages are: Precontemplation, Contemplation, Preparation, Action, and Maintenance. These "Stages of change represent specific constellations of attitudes, intentions, and/or behaviors that are relevant to an individual's status in the process of change (p. 185)." Further, the Stages are problem or behaviour specific. Although the majority of the research has been directed at how to decrease problem behaviours, the model can be adapted to behaviour acquisition.

Precontemplation. Individuals in this Stage are unaware, unwilling or discouraged when it comes to changing a particular problem behaviour. They are not convinced that the negative aspects of the behaviour change outweigh the positive ones. People in this Stage are not thinking of changing in the future and would be least responsive to interventions focused on change activities (Prochaska & DiClemente, 1992, pp. 185-186).

Contemplation. This Stage involves an active consideration of the prospects of change, i.e., the personal dimensions of the problem as well as the possibility and consequences of any change. However, they are not prepared to take action, only evaluate options (Prochaska & DiClemente, 1992, p. 186). If behaviour acquisition is desired then information will be gathered about the behaviour, i.e., when it should be performed, the skills required, the effectiveness of the behaviour with regard to the end desired. Using BSE as an example, the individual would need to learn about BSE technique; perhaps decide to attend a workshop or ask a doctor for information.

Preparation. It is at this Stage that a readiness to change, both in attitude and behaviour, is apparent. Individuals are intending to change in the near future and have learned valuable lessons from past change attempts and failures (Prochaska & DiClemente, 1992, p. 186). The
behaviour to be acquired is clear at this time and it is the overt performance of the behaviour that is being considered. Knowledge of how to do a BSE has been acquired and the individual makes a definite commitment to use the technique in the near future.

**Action.** This Stage involves the overt modification of the problem behaviour. The behavioural change processes are most critical at this time. Individuals must have the skills to use key processes and to adopt more productive patterns. Further, individuals must be both aware of the pitfalls that would undermine continued effective action and capable of effective strategies to prevent lapses from becoming complete returns to the problem behaviour. With regards to addictive behaviours, a time frame of six months for the Action Stage appears to have received the greatest support from both maintenance and relapse literature (Prochaska & DiClemente, 1992, pp. 186-187).

New behaviours are initiated during Action. It is during this Stage that problems with continuing the behaviour are discovered and relapse to a lack of preventive behaviour can occur. This is a good learning experience and prepares the individual for what is necessary for a successful change.

The time frame for the Action Stage, for BSE behaviour, is unknown because there is a lack of research using this model. A six month to one year range would be most probable. Although BSE is infrequent, it does occur in a set pattern and six months of consistent behaviour should indicate a commitment to the behaviour.

**Maintenance.** This is the final Stage in the process of behaviour change and involves continued or maintained behaviour change. The prior problematic behaviour is not completely extinguished nor is the new adaptive behaviour firmly established. This is especially true if the environment is filled with cues that can trigger the problem behaviour or if the new behaviour is one which occurs infrequently, like BSE.
Relapse is the norm in most behaviour change attempts. True Maintenance can only occur if the individual sustains the behavioural change process activity for periods of time from six months up to three or more years after the initial Action (Prochaska & DiClemente, 1992, p. 187).

As Prochaska and DiClemente (1992) state, once the concept of Stages of change is proposed an attempt to modify a problem behaviour can be conceptualized as part of a learning process. Obviously, in this type of process, "one trial learning is the exception rather than the rule (p. 187)." Research has clearly shown that successful change often requires repeated recycling through the Stages of change (DiClemente & Prochaska, 1985; Prochaska, 1991; Prochaska & DiClemente, 1992; Prochaska et al., 1992b; Prochaska et al., 1994). Thus, each fall back into problem behaviour or lack of preventive behaviour should be emphasized as a step toward the hoped for end. It is the spiral method of change which most adequately represents how the majority of people change over time. Decrease in chronic behaviour problems progresses from Precontemplation, through Contemplation and Preparation, to Action and the majority can relapse on any one cycle. Most learn from this relapse and do not go in circles (Prochaska, 1992).

Measuring the Stages of Change

There has been no one method of measurement used exclusively in this literature. Prochaska and DiClemente (1992) state that the critical elements for accurate assessment of change Stages include: attitudes, intentions, and behaviours specific to each Stage and target problem behaviour.

Categorical Classification. Most studies have used a four or five item algorithm in order to classify subjects into a particular Stage of change. Studies focused on smoking cessation invariably used a categorical classification based on questions about intention to quit, previous attempts to quit, and current smoking status. Subjects grouped
in this manner have demonstrated significant differences on processes of change, change activity, decisional balance (pros minus cons), and self-efficacy measures (DiClemente & Prochaska, 1985; DiClemente et al., 1991; Prochaska & DiClemente, 1992). This approach to classification has also been successfully used with quitting cocaine, weight control, high fat diets, adolescent delinquent behaviour, sun exposure, radon exposure, sedentary lifestyles, and psychic distress (Prochaska, 1991; Prochaska et al., 1992b; Prochaska et al., 1994).

Use of this approach with regard to the acquisition of preventive behaviours like mammography, safer sex, condom use, and exercise has also occurred (Marcus, Rakowski & Ross, 1992; Prochaska & DiClemente, 1992; Prochaska et al., 1994). Somewhat different time frames were used in order to classify subjects into the Stages with regard to their mammogram usage. A twelve month cut-off for Action versus Maintenance was used instead of the six month cut-off in the smoking cessation studies. Precontemplators were those individuals who had not had a mammogram and were not intending to obtain a mammogram in the next twelve months; contemplators had not had a mammogram in the past twelve months but were intending to have one within the next year; prepared subjects already had an appointment within the next six months; Action subjects had received a mammogram in the past twelve months and were intending to have one in the next year; finally, Maintenance subjects had repeated mammograms for the past twenty-four months and intended to continue in the next year (Prochaska & DiClemente, 1992; Rakowski et al., 1992).

Marcus et al. (1992) assessed exercise acquisition and used amount and frequency of exercise to classify into categories. Precontemplators did not exercise and did not intend to start in the next six months; contemplators did not exercise but intended to start in the next six months. Preparers exercised some but not regularly (regular exercise = 3 or more times per week for 20 minutes or longer). Actors exercised
regularly but had done so for less than six months and maintainers exercised regularly and had done so for six months or longer.

Use of these theoretically generated categories resulted in the expected profiles of behaviour change, decisional balance and process activity for both studies (Marcus et al., 1992; Rakowski et al., 1992). Exploration of those findings will occur in later sections.

Scale Scores and Profile Analysis. The University of Rhode Island Change Assessment Scale has been developed to assess the Stages of change in psychotherapy (McConnaughty, Prochaska & Velicer, 1983). Using this scale an individual receives scale scores on four different subscales: Precontemplation, Contemplation, Action, and Maintenance. These scores allow for a better assessment of degrees of intention and attitudes related to change. Unfortunately, classifying individuals into a single Stage is more difficult. Using the single subscale independently seems to lose some important information about the relationship among the subscale scores (Prochaska & DiClemente, 1992).

The preferred use of the subscale scores is cluster analysis designed to isolate groups of subjects with specific patterns of scores. Studies using this approach have found approximately five to eight profiles that best categorize subjects, with four or five profiles representing the majority (Prochaska & DiClemente, 1992). Further, the profiles have been found to be related to problem dimensions and other change constructs, like decision making, self-efficacy, and processes of change, in theoretically consistent ways (Prochaska & DiClemente, 1992; Prochaska et al., 1992b). Unfortunately the questionnaire is specifically aimed at psychotherapeutic change and is not easily transferred to any other problem area. On the other hand, the majority of studies have used the simpler four or five item algorithm with success and no apparent loss in predictive power.
Stages and Decision Making

The Stages construct has been supported by the concomitant occurrence of other constructs involved with decision-making. Many of the researchers assessing the Stages construct have used Janis and Mann’s (1977; cited in Velicer et al., 1985) conflict model of decision-making. The assumption, in this model, is that people scan their gains and losses before making a particular decision. The consequences were categorized into four general areas: (a) utilitarian gains and losses for self, (b) utilitarian gains and losses for others, (c) self-approval or self-disapproval, and (d) approval or disapproval from significant others. These categories were used to generate items that assess an individual’s perception of the pros and cons of the problem behaviour or changing that behaviour. Consistently, analysis of the decision-making questionnaires revealed two components, not four (Marcus et al., 1992; Prochaska & DiClemente, 1992; Prochaska et al., 1994; Rakowski et al., 1992; Velicer et al., 1985). Studies found that principal component analysis showed two factors that could be clearly interpreted as the general pros or cons of the problem behaviour or making the behaviour change. Overall, these components explained approximately 45 to 50% of the variance. Thus, creating items to assess the four areas hypothesized by Janis and Mann is unnecessary. Of note, is the independence of the two components, such that, ratings of negative aspects are unrelated to ratings of positive aspects (Velicer et al., 1985).

It was found that the pros and cons are clearly relevant to the Stages of change. However, there is some variance in the pattern of the pros and cons based on which behaviour is examined. With regard to smoking cessation, the initial Stage of Precontemplation involves high levels of pros of smoking and low cons. The pros remain high throughout the first three Stages, such that, it is not until the end of Preparation that the pros of smoking start to decrease in importance. However, the cons increase in importance during Contemplation until they equal the
pros. It is at this point that the decisional balance is equal and seems to become irrelevant to further movement on the problem behaviour. In Preparation the cons begin to outweigh the pros and during Action the cons remain higher as both recede in importance. During successful Maintenance the decisional balance considerations fade further with the cons remaining greater than the pros (DiClemente & Prochaska, 1985; Prochaska & DiClemente, 1992; Prochaska et al., 1991; Velicer et al., 1985).

Previous work, with the pros and cons of changing a behaviour, has shown that change occurs following a fixed process: an initial increase in the pros of changing is followed by a decrease in the cons of changing (Prochaska et al., 1994). Before behaviour change occurs (Precontemplation) the cons outweigh the pros. Movement from Precontemplation to Contemplation is achieved by increasing the pros of change. A decrease in the cons is necessary before movement from Contemplation, through Preparation, to Action, can occur. The increase in pros, and decrease in cons, concludes in a crossover, usually occurring in the Preparation stage, that results in the pros outweighing the cons and a consequent readiness for Action (Prochaska et al., 1994). Prochaska et al. (1994) suggest that movement through the stages can be facilitated by, first, focusing on increasing the pros of changing, and following this accomplishment, focusing on decreasing the cons of changing.

Prochaska (1994) went further and determined the usual amount of change in the pros and cons necessary to prompt movement through the stages. In general, a full 1 SD increase in the pros of changing (assessed using T scores) is required to move from Precontemplation to Action. This was considered a strong principle since it consistently occurred in all the studies used. Prochaska (1994) also found that a 0.5 SD decrease, in the cons of changing, is required to move from Precontemplation to Action. This was considered a weaker principle since some of the studies required a full 1 SD drop in the cons before Action occurred. The studies requiring the 1 SD drop involved the acquisition of
positive behaviours (mammography) rather than the cessation of negative
behaviours.

With regard to mammogram behaviour acquisition, Rakowski et al.
(1992) found relationships between Stage of change and scores on pros and
cons of mammography screening that followed the predicted pattern.
Precontemplators were high on the cons of screening and low on the pros.
Contemplators were about equal on the measures while women in Action and
Maintenance were higher on the pros rather than the cons. The cons
depended in the Action and Maintenance Stages while the pros increased,
which is different from the results of the smoking group (Prochaska &
DiClemente, 1992). With smoking both pros and cons decline in the later
Stages since attention to smoking in general was not as strong and
continued to decrease as successful Maintenance continued. However, it is
likely that continued Maintenance of preventive behaviours requires
continued focus on the pros, thus, their continued prominence is
necessary. As Prochaska and DiClemente (1992, p. 203) state, "to have a
newly acquired behavior become less important over time is likely to
increase the risks of relapse if that new behavior does not remain highly
valued." Acquisition of BSE behaviour will likely follow the same cycle
of pros and cons as mammography behaviour.

Decisonal-balance assessment is not the only construct that
supports the Stages of change construct. It was Bandura (1986) who stated
self-referent thought is an important mediator between knowledge and
action. As Prochaska and DiClemente (1992) state, Bandura's (1977) social
cognitive theory assumes that self-efficacy evaluations influence choice,
effort expenditure, thoughts, emotional reactions, and behavioural
performance.

Stages and Self-Efficacy

With regard to addictive behaviours, self-efficacy assessment
involves asking subjects to evaluate the strength of their confidence in
their ability to abstain from, avoid, reduce, or control the behaviour
across a variety of relevant stimulus cues (Prochaska & DiClemente, 1992, p. 194). According to Prochaska and DiClemente (1992) efficacy scores vary significantly across the Stages for smoking cessation. Precontemplators report the lowest levels of efficacy and maintainers the highest. Velicer, DiClemente, Rossi, and Prochaska (1990) also found that confidence was an important part of determining readiness for change. In a weight loss program self-efficacy increased as subjects moved into the Action Stage, but it only reached a moderate level. The hypothesis was that, since Maintenance had not been reached, the peak level of self-efficacy had also not been reached (Prochaska et al., 1992b).

In general, the Stages of change research has shown that self-efficacy evaluations are relevant predictors of movement into Action and Maintenance Stages, but do not emerge as relevant for earlier Stage movement (Prochaska & DiClemente, 1992). This result is consistent, considering the lack of experience with targeted behaviour change at the early Stages and, thus, the lack of capability to accurately judge how effective any change attempt will be.

Self-efficacy may not follow the same pattern for behaviour acquisition. A certain level of Confidence would seem to be necessary before contemplating the addition of a behaviour to one’s repertoire. Self-efficacy may be more important, to Stage development and movement, when acquisition is the aim. However, what is apparent, is that the assessment of both the pros/cons and self-efficacy should clearly indicate the process of change and tap all Stages of change.

Overall, the evidence supports the transtheoretical model, since there appears to be a cyclical pattern of movement through the specific Stages, and corresponding evidence of decision-making processes and self-efficacy beliefs. The power of this model to predict who is ready for what could greatly improve development of programs to increase preventive health behaviours, like BSE.
Health Belief Model and Stage Similarity

Research is revealing a common ground between the two approaches. Ben-Sira (1977) discovered an association between attitude and smoking cessation such that a sequential order of variables existed; starting with the arousal of a feeling of susceptibility. Also, West, Graham, Swanson and Wilkinson (1977) found that a person who viewed cigarette smoking as a personal threat (i.e., felt susceptible) was more likely to modify smoking behaviour. This points to Susceptibility occurring in the early Stages of change, like Contemplation. Perhaps the reason why Susceptibility has not been related strongly, if at all, to increased BSE performance is that it occurs before behaviour change occurs and becomes less important once that change starts.

In contrast, Massey (1986) found that higher Susceptibility scores were linked to a greater amount of BSE practice. This contrary finding may be explained by the length of time BSE has been practiced. Thus, women who have only just started performing BSE regularly are still in the Action Stage, and may be focusing on earlier HBM elements, which will gradually fade in importance as Maintenance is achieved. Further clarification of BSE technique, resulting in a better measure of overall BSE performance, may also indicate that Susceptibility is linked to beginners who have achieved the appropriate frequency, but not yet developed the technique.

Strecher et al. (1986) examined outcome and efficacy expectancies. Both Susceptibility and Benefits can be considered outcome expectancies as they involve beliefs about the likelihood of certain outcomes (Strecher et al., 1986). The authors suggested that it is these outcome expectations which may play the largest role in influencing initial motivation, and decision to change a health practice, which occur in the Contemplation and Preparation Stages. These authors hypothesized that health practices which are not particularly difficult to modify, but whose perceived consequences are uncertain (for example, hypertensive medication), may
largely depend on outcome expectancies. Health practices which are believed to lead to desired consequences, but where the change is difficult to make (smoking cessation), probably depend primarily on self-efficacy considerations. Finally, for more difficult to change practices, of uncertain consequences (BSE performance), both outcome and self-efficacy expectations may be required to explain the behaviour change process (Strecher et al., 1986, pp. 87-88). Thus, self-efficacy is considered an important additional variable, for both models. The expectation is that, depending on the type of behaviour, self-efficacy should be most important during the earlier Stages since action will not be prompted unless there is faith the action can be performed.

The hypothesis that outcome expectancies are important in the explanation of BSE acquisition implies that both Susceptibility and Benefits should occur early in the Stages of change, as they initiate and motivate behaviour. A second reason, for the importance of the Benefits variable in the early Stages, is that it is a measure of the individual’s perceptions of the pros of the behaviour change. Pros are expected to increase before action can occur so the assumption is that Benefits will play a role early in the process too. The similarity between Benefits and pros reveals the complementary paths the two theories have taken in explaining behaviour.

A similar relationship between the Barriers variable and cons of behaviour change can also be predicted. It is highly likely that HBM Benefits and Barriers assess the same areas as the pros and cons and clarification of this possibility is necessary. It is also possible that all the elements of the HBM could be collapsed onto a general scale that assesses the pros and cons of BSE behaviour.

**Aim of Present Study**

This study is designed to increase the understanding of women’s health beliefs, knowledge and behaviour and their relationship to the performance or non-performance of BSE. The intention is to combine the
HBM, which has had some success explaining BSE behaviour, with the Stages of change model, which has had considerable success explaining smoking cessation. This combination model should increase the ability to predict a woman's readiness to learn about, attempt, or consistently practice BSE. Further, this information will allow us to choose the intervention most fitted to each individual's Stage of readiness and, thus, most effective at increasing BSE behaviour.

The study will determine the woman's frequency of BSE behaviour within the last year, her proficiency, the intent to perform BSE in the next year, and knowledge about BSE, breast cancer symptoms and breast cancer treatment. In addition, the woman's beliefs about the benefits of BSE, Barriers to BSE, her susceptibility to and the seriousness of breast cancer, will be assessed. Health Motivation, feeling of control over breast cancer, and confidence/self-efficacy will also be determined. Once this information has been collected it will be possible to assign each woman to a certain Stage of change dependent on her frequency and intent scores (Precontemplation, Contemplation, Preparation, Action, or Maintenance). This classification will be based on a formula created for this study and based on previous research on exercise (Marcus et al., 1992) and mammography (Rakowski et al., 1992). Precontemplators will not be performing BSE and will have no intent to do so. Contemplators will not be performing BSE but will have some intent to do so. Preparers will have a limited experience with BSE but will intend to increase this to monthly in the next year. Actors will be performing a moderate level of BSE and will have the intention of increasing to monthly in the next year. Maintainers will be performing BSE monthly and intend to keep doing so. It is predicted that these variables will appropriately classify women, with different levels of BSE frequency, proficiency, and future intent, into a BSE acquisition gradient.

The basic aim of the study is to create a better method of predicting a woman's BSE behaviour or current readiness to initiate BSE.
Predicting level of readiness will allow researchers and educators to: one, focus the already existing interventions on women who will most benefit from that approach, and two, provide parameters to create interventions specifically designed for certain stages in the process of adopting BSE. If, as predicted, the combination of stage of change and HBM variables provides greater explanatory power, than that previously reported for HBM variables alone, then a method will have been created to increase intervention efficiency and cost-effectiveness. It is also possible that classifying each woman into a particular stage of change may provide as much explanatory and predictive power as the full combination model. If this is found, then a simpler, quicker method of assessing BSE behaviour and readiness has been created.

A second aim of the study is to assess whether the HBM Benefits and Barriers variables are complementary to the pros and cons of change measures created by Stage researchers. Entire research projects have been devoted to the creation of pro/con measures for a variety of change processes, including exercise, mammography, and smoking cessation (Prochaska, 1994). Previous studies have found that the pros and cons vary consistently across the stages. If Benefits and Barriers are appropriate measures of the pros and cons of BSE then a pro/con measure for BSE already exists and can be used in the current research. Further, if the Benefit and Barrier scores consistently and appropriately vary across the stages created in this study they will provide support for the usefulness of the 'Stages of change for BSE' formula created here.

Goals and Hypotheses of Present Study

The eight predictor variables to be assessed in the present study consist of the Health Belief Model (HBM) elements. The HBM variables are "Barriers" to breast self-examination (BSE), "Benefits" of BSE, belief in "Susceptibility" to breast cancer, belief in the "Seriousness" of breast cancer, "Health Motivation", perceived "Control" over breast cancer, "Confidence" at BSE, and "Knowledge" of breast cancer, treatment, and BSE.
The three criterion variables to be assessed are "Frequency" of BSE, "Proficiency" at BSE, and "Intent" to conduct BSE in the future.

The first goal of the present study is to both replicate and clarify the factor structure of the questionnaire in order to support the contention that separate, mutually exclusive, elements are being measured. Previous research has shown separate factors that appear to represent, Barriers, Benefits, Susceptibility, Seriousness, Confidence, and Health Motivation.

Hypothesis One. As found before, items should load on mutually exclusive factors that represent: Barriers, Benefits, Seriousness, Susceptibility, Confidence and Health Motivation.

Hypothesis Two. Variables that have not been previously analyzed should be represented by separate components in the questionnaire. Control and Knowledge will be represented as mutually exclusive factors.

Hypothesis Three. All the factors found to represent the different elements of the HBM are expected to load on two, more general, factors: pros and cons.

The second goal of the study is to investigate the relationship among predictor variables. The expectation is that the results of previous studies will be replicated.

Hypothesis Four. A negative correlation will be found between Barriers and three other predictor variables: Benefits, Confidence, and Control.

Hypothesis Five. A positive correlation will be found between all three HBM predictor variables: Benefits, Confidence, and Control.

The third goal of the study is to assess the relative power of the predictor variables in predicting the three BSE criterion variables.

Hypothesis Six. The most powerful predictors of BSE Frequency will be Barriers and Health Motivation. Confidence, Benefits, and Susceptibility will be significant but less powerful predictors of BSE frequency.
Hypothesis Seven. The most powerful predictors of the future Intent to perform BSE will be Barriers, Health Motivation, and Control. Susceptibility, Seriousness, and Benefits will be significant but less powerful predictors of Intent.

Hypothesis Eight. The most powerful predictors of Proficiency in BSE will be Barriers and Health Motivation. Susceptibility, Seriousness, and Benefits will be significant but less powerful predictors of Proficiency.

The fourth goal of the study is to evaluate the model proposed by Prochaska and DiClemente (1992), Marcus et al. (1992), and Rakowski et al. (1992) that there are five Stages in acquiring a health behaviour (Precontemplation, Contemplation, Preparation, Action, and Maintenance).

Hypothesis Nine. It is hypothesized that there will be a gradient from not thinking about BSE, to thinking, to doing. It is expected, by using the algorithm based on three questionnaire items, that the five different Stage classifications can be meaningfully applied to the sample, in the sense that a sufficient number of women will be in each classification.

The fifth goal of this investigation is to determine whether scores, on the predictor variables, vary in a manner that is theoretically consistent, with the Stage of change into which the women are classified. Although it is firmly predicted that the gradient will be operant, the following hypotheses are tentative in that they suppose all five classifications will prove to be meaningful.

Hypothesis Ten. Precontemplators will have the highest Barriers scores and lowest scores on all other predictor variables.

Hypothesis Eleven. Actors and Maintainers will have the lowest Barriers scores and the highest scores on all other predictor variables.

Hypothesis Twelve. Contemplators and Preparers will score higher on Barriers than on Benefits.
Hypothesis Thirteen. Actors and Maintainers will score higher on Benefits than on Barriers.

The sixth goal of the study is to determine the relative power of the HBM variables (Barriers, Benefits, Susceptibility, Seriousness, Health Motivation, Confidence, Control, and Knowledge) and the BSE variable, Proficiency, to predict the Stage of change classification. As the other two BSE variables, Frequency and Intent, were used to create the Stage classifications their predictive power would be expected to be overwhelming. A second analysis including these two measures should clarify the structure of the Stage variable. This is a new analysis so there are no firm predictions, just tentative suppositions.

Hypothesis Fourteen. Barriers, Benefits, and Proficiency will be significant predictors of Stage of change.

Hypothesis Fifteen. Frequency and Intent will be the strongest significant predictors of Stage of change.

Figure 1 presents a more graphic illustration of the variables of importance in this study.
Predictors

<table>
<thead>
<tr>
<th>Health Belief Model</th>
<th>Demographics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barriers</td>
<td>Age</td>
</tr>
<tr>
<td>Benefits</td>
<td>SES</td>
</tr>
<tr>
<td>Seriousness</td>
<td>Marital Status</td>
</tr>
<tr>
<td>Susceptibility</td>
<td>Education</td>
</tr>
<tr>
<td>Confidence</td>
<td>Occupation</td>
</tr>
<tr>
<td>Control</td>
<td>Family History of</td>
</tr>
<tr>
<td>Health Motivation</td>
<td>Breast Cancer</td>
</tr>
</tbody>
</table>

Some combination of above is expected to accurately predict criterion levels.

Criterion

<table>
<thead>
<tr>
<th>Past Behaviour</th>
<th>Possible Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>Behaviour</td>
</tr>
<tr>
<td>Proficiency</td>
<td>Intent</td>
</tr>
</tbody>
</table>

New Variable: Stage

Created using 3 Frequency and Intent items. Places women in a specific "Stage" of readiness to perform BSE

Previous Research (Prochaska & DiClemente, 1992):

Stage linked to Pros/Cons of a Behaviour
Stage <--> Pros/Cons

Options for this Research:

Stage <--> Barriers/Benefits
(-analogous to Pros/Cons)

OR

Stage <--> All HBM Factors

OR

Stage <--> Pros/Cons of HBM
(2 general factors made up of all HBM factors)

Figure 1. Predictor, criterion, and "new" variables in study.
CHAPTER II

METHOD

Subjects

The convenience sample of women, used for this study, were approached through a variety of organizations (banks, oil company, volunteer groups) in a Western Canadian city of approximately 750,000. All subjects were encouraged to provide questionnaires to friends and family members in order to widen the sample distribution. Five hundred fifty-five questionnaires were distributed, 250 were returned and 244 were usable, with 135 providing their name and address for a follow-up study.

The population ranged from 20 to 65 years of age (M = 37.4, SD = 9.7). The age range was chosen because 20 is the age at which the American Cancer Society (1991) recommends women start practicing breast self-examination (BSE). Further, one of the advantages of monthly BSE is the increased knowledge of the breast and familiarity with texture and shape. Once a young woman is familiar with her breasts then any change is more likely to be noticed and checked. The higher risk for breast cancer at 35 can be better addressed if the woman is already familiar with her breasts. The second reason for widening the age range from that used by Champion (1984, 1988, 1993) was to assess women who are considered at less risk for breast cancer. These women were expected to demonstrate lower Knowledge and Susceptibility scores and thus help clarify the impact of age on the predictor variables.

Socioeconomic status (SES) was determined using Green’s (1970) formula and calculated using education and occupation. If the woman did not work for pay then the occupation of the spouse or mother or, last, the father was used. The occupation score ranged from 44 (maintenance) to 64 (bank branch manager) (M = 55.6, SD = 3.6) with the mean representing a clerical/sales level. The education level ranged from 46 (between grade
9 and 12) to 73 (graduate school) \((M = 57.8, SD = 8.3)\) with the mean falling in the one to two years of college/university range. These measures provided SES scores ranging from 52.2 to 76.7 \((M = 62.6, SD = 6.1)\) with a possible range of 32.9 to 84.3. The mean was very similar to Champion's usual score of 62.5 (1984, 1988). Green's (1970) measure is hierarchical, thus, the number provides a way to rank subjects, not classify them into one specific, high or low, SES group.

**Instruments**

Champion's (1988) scales were used to measure the Health Belief Model elements and additional variables of Control, Health Motivation, Knowledge and Confidence. A modified version of the Health Motivation and Knowledge scales were used, since some items were not relevant to BSE behaviour and knowledge of breast cancer treatment was not previously assessed.

The original scales were designed in an interview format so they could be modified for provision over the telephone, personal interview, or questionnaire response. The latter modification was performed so that written answers could be provided for this study (complete questionnaire package included in Appendix A). There are five sections, the first has 10 items assessing demographics. The second section has 13 items assessing exposure to breast cancer and BSE. The third section has 28 Knowledge items that tap knowledge of the breast (2), breast cancer symptoms (8), risk of breast cancer (7), breast cancer treatment (7), and BSE (4). The fourth section has 22 items which assess the dependent variables of Frequency (5), Proficiency (9), and Intent (7). The final section has 51 items which assess the Health Belief Model (HBM) variables of Susceptibility (5), Seriousness (8), Benefits (7), and Barriers (7), and the additional variables of Confidence (12), Control (4), and Health Motivation (8). The final page of the questionnaire asks for permission to contact the person in approximately one year for follow-up information. The answers to the questionnaire are presented in Appendix B.
The Stages of change were determined by using an algorithm based on three items from Section D of the questionnaire. These items assess past frequency of BSE and future intent to perform BSE in the next year. The breakdown of the Stages is as follows (item answers that define Stages presented in Appendix C):

**Precontemplator:**
- has never performed BSE and has little or no intent for future performance;
- has performed BSE in the past, but not within the last year and has little or no intent for the future;

**Contemplator:**
- has never performed a BSE but does intend to start this behaviour within the next year;
- has performed BSE before and may have done so infrequently within the last 6 months, however, intends to keep up at least a limited level of performance within the next year;

**Preparer:**
- has performed BSE in the past, and at a limited level within the past 6 months, but intends to increase to monthly or close within the next year;

**Actor:**
- has performed BSE in the past, and at a moderate level within the last 6 months, however, intends to increase to monthly or close within the next year; and

**Maintainer:**
- has performed monthly BSE during last 6 months and intends to maintain this level of performance.

**Procedure**

Bank employees were approached using a memorandum of introduction by the Chairperson for Workplace Equality, with the Vice-President’s authorization, or an Email message to all branch managers from the Senior Vice President’s Office Manager. The employees were informed of a
research study that focuses on health beliefs and behaviours with a particular focus on breast self-examination. The memorandum/Email introduced the researcher and stated that she was doing research with the full support/knowledge of the bank Vice President. The employees were informed that the researcher would be contacting them in the near future to determine a good time to drop off some information sheets and questionnaire packages for any interested female employees. The memorandum or Email clearly stated that participation was voluntary and entirely unrelated to bank business.

Following the introductory message each branch manager was contacted by the researcher and an introduction and information sheet was supplied to all interested subjects. It briefly explained the study, the questionnaire, and the procedure for participation. This sheet could be kept by the subject. A contact person at the Canadian Cancer Society was provided in case a participant wished further information on breast cancer or BSE. Further, the contact addresses of the researcher, supervisor, and Chair of the Ethics Committee for the University of Windsor were also supplied. Finally, the information sheet indicated when and how results of the study would be supplied.

Other groups were approached by the researcher directly and asked if it was possible to distribute information sheets and questionnaires to interested women. These organizations were generally involved with cancer in some way and used many volunteers.

The introduction sheet clearly stated participation was voluntary and entirely unrelated to any employer's or group's business. The researcher attempted to provide an in-house volunteer coordinator for each group so the packages could be kept in one, discrete place. Any person who wished to participate was directed to pick up a questionnaire package from their volunteer coordinator or a specified location. Packages contained a stamped, addressed envelope and were returned to the researcher using Canada Post.
Three weeks after the questionnaires had been distributed a memorandum was sent to the branches asking for the questionnaires to be returned. Approximately two weeks after this telephone calls were made to some of the contact people in order to determine if more questionnaires could be used or if there were extras to be picked up. Questionnaire return took approximately three months.

Following the completion of the statistical analyses a feedback form was written describing the basic results. This form contained a description of the aim of the study and the general conclusions. The percentage of women practicing BSE, and their percentage on other items focusing on exposure to BSE, were presented. Each correct response to the Knowledge items was clearly outlined along with the percent who answered correctly. Each Knowledge question and its accurate response was included in the feedback form. It was speculated that receiving clear answers to these items would help clarify any questions raised by the questionnaire. Last, the average response to each category of health belief was presented. The address for the principal researcher and contact at the Canadian Cancer Society were again provided. This form is presented in Appendix D.

The feedback form was sent to each of the bank branches, offices, and departments, that were ever contacted about the research.
CHAPTER III

RESULTS

This initial section covers a general analysis of individual items in the questionnaire. The focus is on the exposure to breast self-examination (BSE) and the knowledge of breast cancer and BSE.

Relationship with Frequency

One hundred percent of the women in this study had heard of BSE. Almost 90% had performed a BSE at sometime in the past. Of the 210 women who reported experience with BSE in the past year, 27.6% performed monthly BSE or better. When women over 34 were isolated, 34.4% were performing monthly BSE.

The performance of BSE was grouped into three categories, the low group held women who had not performed BSE or had done so less than once every two months. The middle group held women who had performed BSE from once every two months to almost monthly and the high group held women with BSE frequencies of monthly or better. This grouping variable was then used to assess the impact of individual items in the questionnaire.

The majority of women did not live alone (90%) and their Frequency of BSE was unrelated to this variable. Sixty three percent of the women were married, 10% lived common-law, 10% were divorced, 2% were widowed or separated, 14% had never been married, and 1% declined to answer. Marital status was also unrelated to the Frequency variable. The majority of women worked in the banking field (86%) and thus the 'group' variable was not differentiated enough to be useful.

Most of the women had heard of breast cancer within the last three months (79%). This variable was related to Frequency of BSE such that if the woman had not heard anything about breast cancer lately she was more likely to fall into the low group, $^2(2, N=210) = 7.5$, $P<.05$. Although 77% of the women had heard or seen something related to BSE within the
last three months this variable was not related to Frequency of BSE within the last year.

Seventy four percent had been taught BSE by a doctor and 25% had been taught by a nurse. However, only the latter variable was related to Frequency such that women who had not been taught by a nurse were more likely to be in the low group, $\chi^2(4, N=209) = 14.2, p<.01$.

Whether or not a woman's BSE procedure had been checked was clearly related to Frequency of BSE. Only 20% of the women had been checked by a professional and these women were much more likely to be in the high group. The women in the low group were more likely to have never been checked, $\chi^2(4, N=210) = 23.8, p<.01$.

The majority of women had been taught to perform BSE individually (71%) or not taught at all (18%). With regard to how one learnt BSE, 37% read a pamphlet or book, 9% looked at a film, 6% listened to radio or television, 9% learned by several methods, 6% listed a personal or unique method, and 20% did not learn by any of the methods listed (13% failed to respond to the question). Neither how one was taught nor the medium used to teach were significantly related to Frequency of BSE within the last year.

Thirty four percent of the women had a family history of breast cancer. Of this 34%, 25% knew of one relative and the remaining 9% knew of two or three. The existence of breast cancer in the family and the number involved were not related to Frequency of BSE.

When asked if they knew of someone outside of the family with breast cancer, 73% did have this exposure. Eighty six percent of those who had experience with non-family members with breast cancer knew from 1 to 5 people with the disease. The remaining 14% of the women knew from 6 to 20 individuals with breast cancer. Again, this variable was unrelated to BSE Frequency.
With regard to the 28 Knowledge questions, all were unrelated to Frequency of BSE. The correct responses, and the number of women who responded accurately to these items, are presented in Appendix E.

Goal One

Confirmatory Factor Analysis

The first goal of the research was to replicate and/or clarify the factor structure of the questionnaire. A confirmatory factor analysis, using LISREL, was performed in order to determine if the factor structure previously obtained by Champion (1984, 1993) was also apparent within this sample. Table 1 presents the factor loadings for the six Health Belief Model (HBM) factors that Champion (1993) reported, matched with the loadings found using the confirmatory factor program. Champion's (1993) order of presentation was used.

According to Champion's (1993) exploratory analysis, five of the six factors (Confidence, Barrier, Health Motivation, Seriousness, and Benefits) had only one item that did not load on the factor appropriately (less than a .45 loading score). All of the Susceptibility items loaded appropriately. However, the confirmatory analysis found two items of insufficient strength for Confidence and Health Motivation, three items for Benefits, and four items for Seriousness. Considering the number of items for the Benefits (7) and Seriousness (8) factors, the poor loadings found by the confirmatory program, and the <.90 Goodness of Fit Index for the entire model, these latter two factors could not be supported.

The confirmatory analysis was performed a second time with only those women aged 35 and older (n=140), in case the difference in the ages used between the two samples was of any influence. The second confirmatory analysis revealed lower loadings on all factors.

These results indicate partial support for Hypothesis One: items were found to load appropriately on Barriers, Susceptibility, Confidence and Health Motivation. However, the factor loadings for Seriousness and Benefits were not as clear as expected.
Table 1.

Factor Loadings for Confirmatory* and Exploratory+ (Champion, 1993)

<table>
<thead>
<tr>
<th>Confidence</th>
<th>Barriers</th>
<th>Susceptibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Con 2</td>
<td>.83*</td>
<td>.75+</td>
</tr>
<tr>
<td>Con 9</td>
<td>.90</td>
<td>.76</td>
</tr>
<tr>
<td>Con 12</td>
<td>.67</td>
<td>.67</td>
</tr>
<tr>
<td>Con 1</td>
<td>.85</td>
<td>.68</td>
</tr>
<tr>
<td>Con 7</td>
<td>.53</td>
<td>.71</td>
</tr>
<tr>
<td>Con 10</td>
<td>.63</td>
<td>.69</td>
</tr>
<tr>
<td>Con 8</td>
<td>.51</td>
<td>.59</td>
</tr>
<tr>
<td>Con 5</td>
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<td>.64</td>
</tr>
<tr>
<td>Con 6</td>
<td>.53</td>
<td>.56</td>
</tr>
<tr>
<td>Con 3</td>
<td>.44</td>
<td>.62</td>
</tr>
<tr>
<td>Con 11</td>
<td>.57</td>
<td>.52</td>
</tr>
<tr>
<td>Con 4</td>
<td>.07</td>
<td>&lt;.45</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Health Motivation</th>
<th>Seriousness</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HM 4 .70* .79+</td>
<td>Ser 5 .56*</td>
<td>Ben 3 .11* .72+</td>
</tr>
<tr>
<td>HM 3 .72 .77</td>
<td>Ser 7 .53</td>
<td>Ben 4 .79</td>
</tr>
<tr>
<td>HM 2 .69 .78</td>
<td>Ser 6 .41</td>
<td>Ben 5 .64</td>
</tr>
<tr>
<td>HM 1 .71 .71</td>
<td>Ser 3 .62</td>
<td>Ben 6 .50</td>
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<td>HM 5 .38 .67</td>
<td>Ser 2 .44</td>
<td>Ben 2 .28</td>
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<tr>
<td>HM 6 .45 .57</td>
<td>Ser 4 .72</td>
<td>Ben 1 .29</td>
</tr>
<tr>
<td>HM 7 .49 .54</td>
<td>Ser 8 .37</td>
<td>Ben 7 .49</td>
</tr>
<tr>
<td>HM 8 .41 &lt;.45</td>
<td>Ser 1 .17</td>
<td>&lt;.45</td>
</tr>
</tbody>
</table>

Underlined confirmatory loadings fell below the standard set by Champion (1993) of .45.

Exploratory Factor Analysis

An exploratory factor analysis was then performed in order to better understand how the Seriousness and Benefits items were loading in the current sample. Table 2 presents the loadings, eigenvalues and variance explained. This analysis clearly supports Hypothesis One, since all the six factors expected were clearly defined. Both Benefits and Seriousness showed that a reduction in items was necessary to delineate the factor clearly. Only six of the eight Seriousness items were necessary and only four of the seven Benefits items. The fourth Confidence item loaded on the Benefits factor which was unexpected, however, the loading was low.
Table 2.

Exploratory Factor Analysis Results for the Original Six HBM Factors:

Loadings, Eigenvalues and Variance

<table>
<thead>
<tr>
<th>Confidence</th>
<th>Barrier</th>
<th></th>
<th>Susceptibility</th>
<th></th>
<th>Health Motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Con 9</td>
<td>Bar 5</td>
<td>.78</td>
<td>Sus 2</td>
<td>.90</td>
<td>HM 4</td>
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<tr>
<td>Con 1</td>
<td>Bar 3</td>
<td>.76</td>
<td>Sus 4</td>
<td>.89</td>
<td>HM 2</td>
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<td>Bar 4</td>
<td>.74</td>
<td>Sus 1</td>
<td>.85</td>
<td>HM 3</td>
</tr>
<tr>
<td>Con 7</td>
<td>Bar 1</td>
<td>.71</td>
<td>Sus 3</td>
<td>.80</td>
<td>HM 1</td>
</tr>
<tr>
<td>Con 12</td>
<td>Bar 7</td>
<td>.61</td>
<td>Sus 5</td>
<td>.78</td>
<td>HM 6</td>
</tr>
<tr>
<td>Con 6</td>
<td>Bar 2</td>
<td>.57</td>
<td></td>
<td></td>
<td>HM 7</td>
</tr>
<tr>
<td>Con 8</td>
<td>Bar 6</td>
<td>.53</td>
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<td></td>
<td>HM 8</td>
</tr>
<tr>
<td>Con 10</td>
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<td></td>
<td></td>
<td></td>
<td>HM 5</td>
</tr>
<tr>
<td>Con 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Con 5</td>
<td></td>
<td>.57</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Con 3</td>
<td></td>
<td>.47</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Eigenvalue
4.86 3.22 3.58 2.93

Variance Explained
21% 14% 16% 13%

<table>
<thead>
<tr>
<th>Seriousness</th>
<th></th>
<th>Benefits</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ser 4</td>
<td>.73</td>
<td>Ben 4</td>
<td>.76</td>
</tr>
<tr>
<td>Ser 5</td>
<td>.68</td>
<td>Ben 5</td>
<td>.74</td>
</tr>
<tr>
<td>Ser 7</td>
<td>.66</td>
<td>Ben 7</td>
<td>.70</td>
</tr>
<tr>
<td>Ser 3</td>
<td>.65</td>
<td>Ben 6</td>
<td>.66</td>
</tr>
<tr>
<td>Ser 2</td>
<td>.52</td>
<td>Con 4</td>
<td>.47</td>
</tr>
<tr>
<td>Ser 6</td>
<td>.48</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Eigenvalue
2.36 2.27

Variance Explained
10% 10%
In order to test Hypothesis Two, a second exploratory factor analysis was performed including the Control and Knowledge items. Unfortunately, the limited response range for the Knowledge items (0 or 1), and the poor intercorrelations, made a factor analysis including the Knowledge scale difficult, as the assumptions for the analysis were not met. It had been predicted that the Knowledge items would load on five different areas of breast cancer or BSE Knowledge. These areas are presented in Appendix B.

The analysis was then attempted using only the Control items (4) with the original six HBM factors. Hypothesis Two was not supported with regard to Control because three of the four Control items loaded on the Benefits factor, thus Control is not a mutually exclusive factor. Table 3 presents the factor loadings for this new factor, now labeled, Bencon. Adding the Control items increased the explanatory power of Bencon, over Benefits, by 2.5%.

Table 3.
Factor Loadings for the New Variable, Bencon

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bencon</td>
<td></td>
</tr>
<tr>
<td>Ben 4</td>
<td>.68</td>
</tr>
<tr>
<td>Ben 5</td>
<td>.67</td>
</tr>
<tr>
<td>Cont 1</td>
<td>.66</td>
</tr>
<tr>
<td>Ben 6</td>
<td>.64</td>
</tr>
<tr>
<td>Ben 7</td>
<td>.60</td>
</tr>
<tr>
<td>Cont 2</td>
<td>.60</td>
</tr>
<tr>
<td>Cont 3</td>
<td>.58</td>
</tr>
<tr>
<td>Conf 4</td>
<td>.48</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Eigenvalue</td>
<td>3.02</td>
</tr>
<tr>
<td>Variance Explained</td>
<td>12.5%</td>
</tr>
</tbody>
</table>
Each of the Control items addresses the desire to control breast cancer by detecting lumps early, using a particular technique (BSE, mammogram, and professional breast examination). The Benefits items that loaded addressed the issues: BSE will allow me to find lumps early, BSE will decrease chances of dying from breast cancer, BSE will decrease chances of surgery, and BSE will help me find a lump before it is discovered by a doctor or nurse. Thus, all seven of the Bencon items describe the 'benefits' of controlling the discovery of breast cancer. Some items simply focus on the desire for control while others expand into the consequences of that control. Overall, the factor does appear to be addressing the 'benefits' of BSE and so support for the content validity of the Bencon factor was provided. What cannot be supported is that the Control items assess a new element of a woman's health beliefs.

The final step in the factor analysis was to determine if the factors found to be clear, and mutually exclusive, could be forced to load on two, more general, factors. These general factors were thought to likely represent the pros and cons of BSE. In order to test this concept, the factor scores of the six supported factors (Barriers, Benefits, Susceptibility, Seriousness, Confidence, and Health Motivation) were forced to load onto two factors. The first factor had an eigenvalue of 0.89, which is low, and was made up of positive loadings on the Benefits factor and negative loadings on the Susceptibility factor. The second factor had an eigenvalue of 0.82 and was made up of a positive loading on the Health Motivation factor.

A second general factor assessment was made using the HBM factors with the Bencon factor rather than the Benefits factor. Similarly, the first factor was made up of Bencon and Susceptibility. However, Barriers loaded positively with Health Motivation on the second factor. This grouping made interpretation of the second factor difficult.

The limited and unexpected loadings of the HBM factors, on the two general factors, clearly indicated there was no support for Hypothesis
Three. It would appear that the HBM factors cannot be collapsed into two
general factors, representing the pros and cons of BSE. However, it has
yet to be determined whether the individual factors, Benefits and
Barriers, are similar to the pros and cons.

**Internal Consistency**

The factor analyses supported the general factor structure of
Champion's instrument (1984, 1993). Further analyses were performed using
either the original breakdown of the questionnaire, such that Control and
Benefits were used as two separate factors, and repeated using the new
scale, Bencon, without the original scales. This was done in order to
promote clear replication of previous results, in addition to determining
if the new factor, Bencon, was more useful or understandable.

To assess the reliability of the factors found, an internal
consistency measure, Cronbach alpha, was determined for each predictor
variable. Table 4 presents the alphas for all nine possible predictor
variables (Barriers, Benefits, Susceptibility, Seriousness, Health
Motivation, Confidence, Control, Knowledge, and Bencon). The internal
consistency of the three criterion variables, Frequency, Proficiency, and
Intent, was also assessed.

A cutoff alpha score of 0.70 was assigned following Champion’s
(1984) example. All the criterion variables demonstrated good internal
consistency. A combination of the Frequency and Proficiency items was
also assessed, since there had been a move in the literature to combine
these scales (Champion, 1993). The combination of the two criterion
variables was consistent and the level matched that found by Champion
(1993). Considering previous research (Champion, 1990, 1993), and the
good internal reliability, a new criterion variable was created and named
"Bsebehav". This variable represented a general measure of BSE behaviour
since it assessed both frequency and proficiency. Following this, further
analyses were performed using the Bsebehav variable in place of the
Frequency and Proficiency variables.
Table 4.

Cronbach Alphas for Criterion and Predictor Variables

<table>
<thead>
<tr>
<th>Scale</th>
<th>N Items</th>
<th>Mean/N</th>
<th>SD/N</th>
<th>Cronbach Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>3</td>
<td>3.93</td>
<td>2.66</td>
<td>.97</td>
</tr>
<tr>
<td>Proficiency</td>
<td>8</td>
<td>2.47</td>
<td>0.59</td>
<td>.75</td>
</tr>
<tr>
<td>Intent</td>
<td>7</td>
<td>4.86</td>
<td>1.09</td>
<td>.82</td>
</tr>
<tr>
<td>Combination Scale</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bsebehav</td>
<td>11</td>
<td>2.87</td>
<td>1.01</td>
<td>.83</td>
</tr>
<tr>
<td>Susceptibility</td>
<td>5</td>
<td>2.51</td>
<td>0.77</td>
<td>.91</td>
</tr>
<tr>
<td>Seriousness</td>
<td>8</td>
<td>3.43</td>
<td>0.60</td>
<td>.70</td>
</tr>
<tr>
<td>Benefits</td>
<td>7</td>
<td>3.88</td>
<td>0.49</td>
<td>.68</td>
</tr>
<tr>
<td>Barriers</td>
<td>7</td>
<td>2.18</td>
<td>0.65</td>
<td>.84</td>
</tr>
<tr>
<td>Confidence</td>
<td>12</td>
<td>3.43</td>
<td>0.59</td>
<td>.86</td>
</tr>
<tr>
<td>Control</td>
<td>4</td>
<td>3.99</td>
<td>1.43</td>
<td>.75</td>
</tr>
<tr>
<td>Health Motivation</td>
<td>8</td>
<td>3.80</td>
<td>0.59</td>
<td>.80</td>
</tr>
<tr>
<td>Bencon</td>
<td>11</td>
<td>3.92</td>
<td>0.44</td>
<td>.76</td>
</tr>
<tr>
<td>Knowledge (Kn)</td>
<td>28</td>
<td>0.67</td>
<td>0.12</td>
<td>.62</td>
</tr>
<tr>
<td>Kn of Breast (B)</td>
<td>2</td>
<td>0.82</td>
<td>0.28</td>
<td>.19</td>
</tr>
<tr>
<td>Kn of B Cancer (BC)</td>
<td>8</td>
<td>0.71</td>
<td>0.17</td>
<td>.41</td>
</tr>
<tr>
<td>Kn of BSE</td>
<td>4</td>
<td>0.65</td>
<td>0.26</td>
<td>.45</td>
</tr>
<tr>
<td>Kn of BC Treatment</td>
<td>7</td>
<td>0.59</td>
<td>0.17</td>
<td>.19</td>
</tr>
<tr>
<td>Kn of BC Risk</td>
<td>7</td>
<td>0.64</td>
<td>0.18</td>
<td>.40</td>
</tr>
</tbody>
</table>

The predictor variables were generally consistent. The Susceptibility, Barriers, Confidence, and Health Motivation scales all showed good internal consistency. Seriousness, Control, and Bencon were adequate while the Benefits variable had a slightly lower alpha (0.68) than was desired. The finding that Bencon was more reliable than both Control and Benefits indicates that the new factor may be a better measure than the original two assessed separately. Overall, the predictor and criterion scales were shown to be reliable measures of each factor.

The Knowledge scale’s alpha of 0.62 was slightly lower than the cutoff and likely indicates that a variety of information has been grouped under one heading. The Knowledge items were then classified into five different groups that coincided with different areas of breast cancer or
BSE knowledge. These groups had been created a priori. Originally, a factor analysis was to be performed in order to support these five Knowledge categories. Unfortunately, the Knowledge items lacked the significant intercorrelations necessary for factor analysis. However, if the internal consistency of these smaller, more specific, groups was greater than the larger, more general, Knowledge scale it was expected that they would be more useful predictor variables.

Contrary to expectations, all five groups showed poor internal consistency, alphas <0.50. Thus, determination of the influence of knowledge of breast cancer, versus knowledge of breast cancer treatment, was not possible using these groups of items. While the separation of the Knowledge items, into the five groups, seemed appropriate the responses to the a priori grouped items were not consistent with responses to one area of knowledge. However, the questions seemed face valid with regard to knowledge of breast cancer and BSE so the larger Knowledge scale was left intact for further analyses.

Goal Two

Pearson Product Moment Correlations

Table 5 presents the Pearson Product Moment correlation matrix of the nine predictor, two criterion, five demographic variables assessed, and the newly created variable, Stage, all crossed with the five demographic variables. An alpha level of .001 was used to assess significance because of the large number of correlations performed. In general, the demographic variables had little influence on the predictor or criterion variables. Of note is Age, which was significantly positively correlated with both criterion variables and Stage. Because of the correlations with the criterion measures Age was included as a predictor variable in later analyses.

The second goal of this study was to replicate the correlations found between the predictor variables. Table 6 presents the Pearson Product Moment Correlation matrix of the predictor variables. Hypothesis
Table 5.

Correlations of All Variables with Demographic Variables

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>Family History of Breast Cancer</th>
<th>Occupation</th>
<th>Education</th>
<th>SES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family History of Breast Cancer</td>
<td>.0282</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td>.0477</td>
<td>.0610</td>
<td>.0821</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>-.2375*</td>
<td>.1262</td>
<td>.3132*</td>
<td>.9722*</td>
<td>1.000</td>
</tr>
<tr>
<td>SES</td>
<td>-.2245*</td>
<td>.1319</td>
<td>.0595</td>
<td>.0911</td>
<td>.0230</td>
</tr>
<tr>
<td>Bsebehav</td>
<td>.2510*</td>
<td>.0515</td>
<td>.0595</td>
<td>.0091</td>
<td>.0230</td>
</tr>
<tr>
<td>Intent</td>
<td>.2442*</td>
<td>.1362</td>
<td>.0500</td>
<td>-.0267</td>
<td>-.0189</td>
</tr>
<tr>
<td>Barriers</td>
<td>-.1327</td>
<td>-.0044</td>
<td>.0547</td>
<td>.0832</td>
<td>.0846</td>
</tr>
<tr>
<td>Benefits</td>
<td>-.0222</td>
<td>.0244</td>
<td>.0813</td>
<td>.0449</td>
<td>.0699</td>
</tr>
<tr>
<td>Susceptibility</td>
<td>-.0781</td>
<td>.2033</td>
<td>-.0447</td>
<td>.0150</td>
<td>-.0053</td>
</tr>
<tr>
<td>Seriousness</td>
<td>-.0270</td>
<td>-.1195</td>
<td>-.0889</td>
<td>-.0376</td>
<td>-.0604</td>
</tr>
<tr>
<td>Confidence</td>
<td>.1633</td>
<td>.1012</td>
<td>.1045</td>
<td>.0633</td>
<td>.0819</td>
</tr>
<tr>
<td>Control</td>
<td>.0261</td>
<td>-.0046</td>
<td>.0632</td>
<td>.1350</td>
<td>.1434</td>
</tr>
<tr>
<td>Health Motivation</td>
<td>.1258</td>
<td>-.0837</td>
<td>.0904</td>
<td>.0925</td>
<td>.1059</td>
</tr>
<tr>
<td>Knowledge</td>
<td>.1619</td>
<td>.0864</td>
<td>.0591</td>
<td>.0727</td>
<td>.0874</td>
</tr>
<tr>
<td>Bencon</td>
<td>-.0542</td>
<td>.0330</td>
<td>.1301</td>
<td>.0809</td>
<td>.1131</td>
</tr>
<tr>
<td>Stage</td>
<td>.2714*</td>
<td>.1069</td>
<td>.0529</td>
<td>.0252</td>
<td>.0360</td>
</tr>
</tbody>
</table>

* Significant correlation at the < .001 level
Table 6.

Correlations of Predictor Variables

<table>
<thead>
<tr>
<th></th>
<th>Barriers</th>
<th>Benefits</th>
<th>Susceptibility</th>
<th>Seriousness</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barriers</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benefits</td>
<td>-.2870*</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Susceptibility</td>
<td>.0970</td>
<td>-0.0264</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seriousness</td>
<td>.0953</td>
<td>.0147</td>
<td>.1110</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Confidence</td>
<td>-.3571*</td>
<td>.1886</td>
<td>.0301</td>
<td>-.1631</td>
<td>1.000</td>
</tr>
<tr>
<td>Control</td>
<td>-.1969</td>
<td>.4003*</td>
<td>.1263</td>
<td>-.0649</td>
<td>.2106*</td>
</tr>
<tr>
<td>Health Motivation</td>
<td>-.3159*</td>
<td>.2758*</td>
<td>-.0369</td>
<td>-.0237</td>
<td>.3016*</td>
</tr>
<tr>
<td>Knowledge</td>
<td>-.2243*</td>
<td>.1465</td>
<td>.0312</td>
<td>-.1100</td>
<td>.3167*</td>
</tr>
<tr>
<td>Bencon</td>
<td>-.2287*</td>
<td>.9011*</td>
<td>.0204</td>
<td>-.0181</td>
<td>.2161*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Health Motivation</th>
<th>Knowledge</th>
<th>Bencon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Motivation</td>
<td>.2839*</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td>.1415</td>
<td>.2442*</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Bencon</td>
<td>.6243*</td>
<td>.3156*</td>
<td>.1351</td>
<td>1.000</td>
</tr>
</tbody>
</table>

* Significant correlation at the <.001 level

Four predicted a negative correlation between Barriers and three other variables (Benefits, Confidence and Control). Both Benefits and Confidence were correlated as expected. However, Control did not quite reach the vigorous significance level required, although, the appropriate direction of relationship was apparent. The combination variable, Bencon, did display a significant negative correlation with Barriers, reinforcing the usefulness of the Bencon variable over the a priori created Control variable.
Hypothesis Five predicted a positive correlation between all three predictor variables Benefits, Confidence and Control. Again, the expected relationships were found, although, the Benefit/Confidence relationship did not reach the desired significance level. The new factor, Bencon, also presented a positive and significant relationship with Confidence.

Health Motivation revealed significant positive relationships with five of the predictor variables (Benefits, Confidence, Control, Bencon, and Knowledge) and a significant negative relationship with Barriers. On the other hand, neither Susceptibility nor Seriousness had significant correlations with any of the other predictor variables.

Table 7 presents the correlation matrix representing the criterion and predictor relationships. Again, neither Susceptibility nor Seriousness were correlated with the criterion variables or Stage. Benefits was not as related as expected while Bencon revealed slightly stronger relationships. The other predictor variables were appropriately linked with the criterion variables and Stage.

The new variable, Stage, was created for this study and classifies women into particular "stages" of BSE behaviour and intent to perform BSE. The variable Stage was significantly correlated with both criterion variables. Further, six of the seven predictors, that correlated with one or both of the criterion variables, also correlated significantly, and in the same direction, with Stage.

From the factor analyses, Cronbach alphas, and correlations, it is clear that the reliability and validity of the nine predictor and two criterion variables has been assessed and supported. Further clarification of the pattern of response to the factors can be found in Appendix F. This Appendix also presents the means, maximum scores, standard deviations, and total N's for each variable, in Table 9.

Goal Three

The third goal of the study was to assess the power of the nine predictor variables in predicting the two criterion variables. As stated
Table 7.
Correlations of Criterion, Stage and Predictor Variables with Criterion and Stage

<table>
<thead>
<tr>
<th></th>
<th>Bsebehav</th>
<th>Intent</th>
<th>Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bsebehav</td>
<td>1.000</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Intent</td>
<td>.6158*</td>
<td>.7967*</td>
<td>1.000</td>
</tr>
<tr>
<td>Stage</td>
<td>.8729*</td>
<td>.4054*</td>
<td>-.4513*</td>
</tr>
<tr>
<td>Barriers</td>
<td>-.4471*</td>
<td>-.2070*</td>
<td>-.1549</td>
</tr>
<tr>
<td>Benefits</td>
<td>.1811</td>
<td>.3308*</td>
<td></td>
</tr>
<tr>
<td>Susceptibility</td>
<td>.1762</td>
<td>.1802</td>
<td>.1549</td>
</tr>
<tr>
<td>Seriousness</td>
<td>-.1205</td>
<td>.0677</td>
<td>-.0400</td>
</tr>
<tr>
<td>Confidence</td>
<td>.5205*</td>
<td>.5124*</td>
<td>.5858*</td>
</tr>
<tr>
<td>Control</td>
<td>.2259*</td>
<td>.3144*</td>
<td>.2557*</td>
</tr>
<tr>
<td>Health Motivation</td>
<td>.3538*</td>
<td>.3046*</td>
<td>.3359*</td>
</tr>
<tr>
<td>Knowledge</td>
<td>.3142*</td>
<td>.2384*</td>
<td>.2279*</td>
</tr>
<tr>
<td>Bencon</td>
<td>.1861</td>
<td>.3586*</td>
<td>.2623*</td>
</tr>
</tbody>
</table>

* Significant correlation at the <.001 level

Before, Frequency and Proficiency were combined to create the Bsebehav criterion variable, therefore, Hypothesis Six (Frequency) and Hypothesis Eight (Proficiency) were combined. This new hypothesis stated that Barriers and Health Motivation would be the most powerful predictors of Bsebehav. Confidence, Benefits, and Susceptibility would also be significant, but less powerful, predictors. It was also expected that an analysis that used Bencon, in place of Benefits and Control, would find that the Bencon variable provided a significant level of predictive power.
Predicting BSE Behaviour (Bsebehav)

Multiple regression was used to determine the amount of variance in the criterion variables which could be attributed to the predictor variables. Multiple regression was chosen because it takes into account intercorrelations between both predictors, and criterion and predictors. The analyses were performed, such that, each of the predictor variables could be used in the equation at each step. No variable was forced to enter or leave the equation. An alpha level of .05 was used to determine entry into, or removal from, the regression equation.

The first multiple regression was performed with the seven original HBM elements and Age. Barriers, Confidence, Health Motivation, Susceptibility, and Age were significant predictors of Bsebehav. Contrary to the hypothesis, Confidence and Barriers were the strongest predictors explaining 34.3% of the variance. Susceptibility, Age, and Health Motivation explained a further 7.6% of the variance. The Benefits variable did not explain Bsebehav. Thus, Hypothesis Six/Eight was generally supported, as four of the five variables predicted to be useful were. Overall, the regression analysis explained 41.9% of the variance in Bsebehav \( F(5, 203) = 31.03, \ p<.0001 \). This explanatory power is in excess of Champion's findings (1984-25%, 1993-24%).

In order to determine if the different age range used in this study affected the regression equation a second regression was performed using women age 35 and over. The same five predictors were used in this equation as well. Confidence lost some of its predictive power and Susceptibility and Health Motivation increased in power. The Age variable was still useful when this smaller range of ages was used, although the variance explained was small (2.9%). The overall variance explained dropped to 38.6% \( F(5, 118) = 16.48, \ p<.0001 \), however, this was still greater than Champion's (1984, 1993) previous findings. Considering the lack of difference between the two age groups no further analyses were
performed using the smaller age range. Inclusion of the Age variable should clarify the effect of age on the criterion variables.

A third multiple regression was performed to determine the impact of the Bencon variable on the Bsebehav equation. The Bencon variable had no impact on the equation, thus, the five predictive variables and the variance explained remained the same.

When Stage was added to the regression it became the most powerful predictor of Bsebehav. Stage explained 76.2% of the variance in the criterion. Two other predictor variables were also part of the equation, Knowledge and Seriousness. However, their contribution was minimal, Knowledge added 1.4% and Seriousness added 0.5% to the explained variance (F(3, 195) = 232.36, p<.0001). The six remaining predictors, and Age, were not useful in this regression equation.

As before, when Bencon was added to the regression analysis, in place of Benefits and Control, no change occurred. All variance explained and variables used remained the same, (F(3, 195) = 232.36, p<.0001).

Predicting Intent to Perform BSE

The regression analysis, of the criterion variable Intent, indicated that Confidence and Benefits explained 31.4% of the variance. Barriers, Susceptibility, Age, Seriousness, and Control explained a further 11.1%, providing a total of 42.5% of explained variance (F(7, 234) = 26.5, p<.0001). Neither Health Motivation nor Knowledge were significant predictors. Hypothesis Seven is not supported by the data, as it predicted that Barriers, Health Motivation, and Control would be the most powerful predictors. The importance of Susceptibility, Seriousness, and Benefits was supported. Thus, five of the six variables expected to predict Intent did so and two unexpected variables, Confidence and Age, also demonstrated predictive power.

When Bencon was used in the equation the two most powerful predictors became Confidence and Bencon (32.1%). Barriers, Susceptibility, Age, and Seriousness explained a further 11.1% of the
variance, providing a total explained variance of 43.2%. There were no new variables added and no variables lost. The overall variance explained increased very slightly as did the ANOVA value, $F(6, 235) = 31.50$, $p<.0001$.

Similar to the Bsebehav analysis, when Stage was added to the regression it was selected as the most powerful predictor of Intent, with 63.4% of the variance explained. Benefits (2.9%) and Seriousness (0.9%) were also significant, but minimal, predictors of Intent and provided an additional variance explanation of 3.8%. Thus, the total variance explained was 67.2%, $F(3, 219) = 149.99$, $p<.0001$.

When Bencon was used with Stage the same variables were necessary to the equation. The variance explained was 67.6% with Stage explaining 63.3% of this, Bencon 3.3%, and Seriousness 1.0%, $F(3, 219) = 153.49$, $p<.0001$. Again, Bencon and Seriousness are used in the equation, but, the amount of variance explained was still minimal.

Goal Four

**Stage of Change Classification**

The fourth goal of the study was to establish a model involving five stages of change in BSE behaviour acquisition. Five Stages were expected: Precontemplation, Contemplation, Preparation, Action, and Maintenance. These stages represent a gradient of behaviour and intent from no BSE performance and no interest in BSE (Precontemplation) to consistent performance of BSE and the intent to continue (Maintenance). Appendix C reports the algorithm used to classify the sample.

The existence of a gradient in BSE behaviour and intent was supported by the data. Two hundred twenty four women were successfully classified into one of the five stages. Twelve women were Precontemplators (5%), 46 women were Contemplators (19.2%), 58 women were Preparers (24.2%), 44 women were Actors (18.3%), and 64 women were Maintainers (26.7). This left 20 women who could not be classified.
The 20 "missing" women were originally thought to be missing information, such that, the classification could not be performed. However, after examination of the data it became clear that 16 (6.7%) of the women did not fall into an appropriate category, although they had provided the necessary information. These 16 women had not performed BSE within the last 6 months and, thus, should be classified as Precontemplators or Contemplators. However, unlike either of those categories, this group of women intended to suddenly increase their behaviour to monthly BSE rather than starting out with a minimum level as expected, from 0 to 5 times per year.

Because this was a clearly defined group with consistent characteristics a sixth stage was created to fit the data. This stage was labeled "Idealistic Contemplation" and given a score of 2.5, between Contemplation and Preparation. However, these women present a level of intent that is not quite believable as the behavioural aspects of their responses do not correspond with the cognitive elements of their responses. Analyses with the Stage variable included this new category until it became clear that Idealistic Contemplators did not perform in a theoretically consistent or understandable manner. Appendix G presents the results of the analyses using this stage, for comparison purposes. However, all analyses presented in the Results section use the Stage variable with the original five stages only.

Goal Five

Analyses of Variance

In order for the Stage variable to be a useful measure of BSE acquisition and performance, differences across HBM variable scores related to Stage should be apparent. A series of One-way Analyses of Variance were performed in order to determine the distribution of these variables over the five Stages. Significant ANOVAs' would indicate that the variable scores varied across the stages. The Student-Newman-Keuls (SNK) multiple range test, for pairs of groups which are significantly
different, was also determined. The SNK test used an alpha level of .05 and clarified the extent of the difference between stages on each variable. The variable scores for the ten predictors and two criterion were changed to T scores with a mean of 50 and a standard deviation of 10. This conversion made comparison across variables and stages possible. Table 8 presents the order of each stage, with mean scores, for each Analysis of Variance. The number before each stage indicates pairs with significant differences, as measured by the SNK multiple range test.

The variation of the Barriers variable over Stage clearly supported the presumption of differences across stages ($F(4, 219) = 14.27, \ p<.0001$). Precontemplators scored the highest on this scale (57.0) while Actors and Maintainers scored the lowest, 47.8 and 44.0 respectively. The SNK test, for significant pair group differences, showed that Maintainers (44.0) were significantly different from all other stages and Actors (47.8) were significantly different from Preparers (52.2), Contemplators (55.4) and Precontemplators (57.0).

The Benefits variable also varied significantly across the stages ($F(4, 218) = 2.84, \ p<.03$). The gradient from lowest score (43.1) to highest score (52.2) was in the appropriate direction for the five stages. The SNK test indicated that Maintainers (52.2) had a significantly greater Benefits mean score than Precontemplators (43.1). The middle stages, Actors (50.6), Preparers (49.5), and Contemplators (48.4), were not significantly different from each other. Figure 2 displays the variation over Stage for Barriers and Benefits, separately.

The new variable, Bencon, mirrored the Benefits findings, with clear significant differences in the expected direction, over the five stages, $F(4, 218) = 4.64, \ p<.002$. The SNK test showed that Precontemplators (41.5) had significantly lower Bencon scores than Preparers (49.8), Actors (50.5), and Maintainers (53.0). Further, Contemplators (47.6) had significantly lower scores than Maintainers (53.0).
Table 8.

Order of Stage and Means, from Lowest to Highest, and Significant Pair Differences, for each ANOVA

<table>
<thead>
<tr>
<th>Pairs</th>
<th>Barriers M</th>
<th>Benefits M</th>
<th>Bencon M</th>
</tr>
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<td>4321 Maintainer 44.0</td>
<td>1 Precontemplator 43.1</td>
<td>4321 Precontemplator 41.5</td>
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<tr>
<td>7651</td>
<td>Actor 47.8</td>
<td>Contemplator 48.4</td>
<td>5 Contemplator 47.6</td>
</tr>
<tr>
<td>52</td>
<td>Prepar 52.2</td>
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<th>Susceptibility M</th>
<th>Confidence M</th>
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<tr>
<td>Actor</td>
<td>49.1</td>
<td>Prepar 49.8</td>
<td>852 Prepar 50.5</td>
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<tr>
<td>Contemplator</td>
<td>51.0</td>
<td>Actor 51.1</td>
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<tr>
<td>Prepar</td>
<td>51.2</td>
<td>Maintainer 51.3</td>
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<th>Knowledge M</th>
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<td>1 Precontemplator 45.7</td>
<td>321 Precontemplator 41.7</td>
</tr>
<tr>
<td>2 Contemplator</td>
<td>47.3</td>
<td>32 Contemplator 46.4</td>
<td>Contemplator 47.4</td>
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<tr>
<td>Actor</td>
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<td>4 Prepar 48.5</td>
<td>1 Prepar 50.5</td>
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<tr>
<td>Prepar</td>
<td>50.2</td>
<td>2 Actor 52.1</td>
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<tr>
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<th>Intent M</th>
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<td>Prepar</td>
<td>47.5</td>
<td>852 Prepar 43.5</td>
<td>963 Prepar 51.5</td>
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<tr>
<td>Actor</td>
<td>50.8</td>
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<td>*863 Actor 54.1</td>
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<tr>
<td>Maintainer</td>
<td>53.8</td>
<td>9863 Maintainer 61.4</td>
<td>*974 Maintainer 57.9</td>
</tr>
</tbody>
</table>

Pairs with similar numerals (1-9) or signs (*) differ from each other at the p<.05 significance level.
Figure 2. T Score gradient, over Stage, for Barriers and Benefits.
The Seriousness scale has been shown to have limited relationships with the other variables in the study. When the Seriousness variable was assessed over Stage there were no differences across groups \(F(4, 219) = 1.29, \ p > .05\). All the groups considered breast cancer to be a serious disease. The means ranged from Precontemplators (45.3) to Preparers (51.2). Figure 3 presents the T Score means, over Stage, for Bencon and Seriousness, separately.

The Susceptibility variable did not show a significant variation over Stage either \(F(4, 218) = 2.12, \ p > .05\). However, when the SNK analysis was performed Precontemplators (42.6) had significantly different scores from Actors (51.1) and Maintainers (51.9).

Confidence did vary over the Stage variable \(F(4, 219) = 34.31, \ p < .0001\). This predictor variable was clearly related to Stage since the SNK analysis showed that almost all of the stages were significantly different compared to the other stages. Maintainers (56.1) had significantly greater Confidence scores than Precontemplators (33.0), Contemplators (44.2), Preparers (50.5), and Actors (53.2). Both Actors and Preparers had significantly higher scores than Contemplators and Precontemplators. Finally, Contemplators had significantly higher scores than Precontemplators. It is clear that confidence in one's ability, to perform BSE accurately and usefully, is highly related to Stage classification. Figure 4 displays the T Score variation, over Stage, for Susceptibility and Confidence, separately.

The ANOVA of the predictor Control indicated significant variation across the Stage classifications \(F(4, 219) = 4.44, \ p < .002\). The SNK test showed that Precontemplators (42.4) and Contemplators (47.3) scored significantly lower than Maintainers (53.2). Health Motivation significantly varied across Stage also \(F(4, 219) = 7.20, \ p < .0001\). Maintainers (54.8) had significantly greater motivation scores than the three lower stages and Actors (52.1) were significantly different from Contemplators (46.4). Figure 5 presents the T Score means, over Stage,
Figure 3. T Score gradient, over Stage, for Bencon and Seriousness.
Figure 4. T Score gradient, over Stage, for Susceptibility and Confidence.
for both Control and Health Motivation, separately.

Knowledge varied significantly across Stage as well ($F(4, 219) = 3.91, p<.005$). The SNK test indicated that Precontemplators (41.7) had significantly lower knowledge scores than Preparers (50.5), Actors (51.8), and Maintainers (52.1). Age was also assessed over Stage and was found to vary significantly by group ($F(4, 218) = 4.85, p<.001$). However, the SNK test showed no significant pair differences at the .05 alpha level. Figure 6 displays the T Score means, over Stage, for Knowledge and Age, separately.

Although Stage was created using one of the eleven Bsebehav items, an Analysis of Variance across Stage using Bsebehav was considered important information. Further, to support the validity of the Stage measure, a more general measure of BSE behaviour must vary across the Stages, as predicted by Stage definition. The Bsebehav scores did vary significantly across Stage classification ($F(4, 194) = 174.46, p<.0001$). The SNK test indicated that Maintainers (61.4) scored higher than the other four stages. Actors (53.0) scored higher than the remaining three stages. Preparers (43.5) scored higher than the Contemplators (39.5) and Precontemplators (34.7). The variation across and between stages clearly supported the gradient of BSE behaviour expected.

Stage was also created using one of the seven Intent items. However, the variation across Stage on the Intent scale was, again, considered important as it would provide validity for the Stage concept. The Analysis of Variance clearly showed different Intent scores over the five stages ($F(4, 219) = 142.03, p<.0001$). Maintainers (57.9) scored significantly higher on Intent than the other four stages. Actors (54.1) scored higher than Preparers (51.5), Contemplators (38.0), and Precontemplators (29.1). Preparers scored higher than both Contemplators and Precontemplators, and Contemplators scored significantly higher than Precontemplators. Thus, all possible significant pair differences occurred. Figure 7 displays the T Score means, over Stage, for both
Figure 5. T Score gradient, over Stage, for Control and Health Motivation.
Figure 6. T Score gradient, over Stage, for Knowledge and Age.
Bsebehav and Intent, separately.

**Support for Stage Hypotheses**

With regard to the specific hypotheses generated for the fifth goal Hypothesis Ten was confirmed. Precontemplators had the highest scores on Barriers and the lowest scores on all other predictor variables.

Hypothesis Eleven was generally supported. Actors and Maintainers did score lowest on Barriers, and Maintainers were the highest scorers on the other predictor variables, except for Seriousness. The Seriousness variable showed little variation and there were no significant differences between the stages. Actors scored higher than the other three stages, as predicted, for nine of the variables, but not for Control. Actors and Preparers were very similar for the Control variable.

Hypothesis Twelve predicted that Contemplators and Preparers would score higher on Barriers than Benefits, and this prediction was supported. The means for Contemplators and Preparers on Barriers were 55.4 and 52.2, respectively. The means for Contemplators and Preparers on Benefits were 48.4 and 49.5, respectively. This hypothesis was also supported when Bencon was examined, as the Bencon means were 47.6 for Contemplators and 49.8 for Preparers.

Hypothesis Thirteen predicted that Actors and Maintainers would score higher on Benefits than Barriers. This hypothesis was also supported. Actors and Maintainers had mean Benefits scores of 50.6 and 52.2, respectively, and mean Barriers scores of 47.8 and 44.0, respectively. The Bencon scores were also greater than the Barriers scores, as the Bencon means were 50.5 for Actors and 53.0 for Maintainers.

Figure 8 demonstrates the variation in the Bencon and Barriers T Score means over the five stages. This comparison is provided in order to clarify the relationship between, the variation of measures of the pros/cons of a behaviour over Stage (for eg., Prochaska et al., 1994), and the, possibly analogous, Bencon and Barriers variation over Stage. The Confidence variable is also included in the Figure because it was the
Figure 7. T Score gradient, over Stage, for Bsebehav and Intent.
Figure 8. T Score gradient, over Stage, for Barriers, Bencon, and Confidence, combined.
predictor variable with the most significant differences over Stage.

As stated, the predictor variable scores differed significantly across the stages. However, these differences were not always significant between each and every pair of stages. It is possible, that the predictor variable's scores only change at certain points in the change process, such that, some stages are similar while others are different depending on the particular variable examined. For example, Barriers may remain high for Precontemplators, Contemplators, and Preparers, and only change when the woman moves into Action and Maintenance. If this is so, then one would not expect the first three stages to have significant differences in their Barriers scores.

Examination of Prochaska's (1994) strong (pros T score will increase 1 SD) and weak principles (cons T score will decrease 0.5 SD) is appropriate here. This study involves acquiring a positive behaviour, it is possible that a full 1 SD drop in the Barriers T score will be required for movement over the stages. If the current Barriers and Bencon T scores parallel those demonstrated in the pros/cons studies, the usefulness of the HBM factors, and their link with Stage, is supported.

Figure 8 clearly demonstrates that the appropriate variation of Barriers and Bencon is occurring. Further, this variation demonstrates the criterion validity of the Stage measure, in general and in this study. Support for Prochaska's (1994) strong and weak principles is also demonstrated. Bencon increased almost one full SD (9.0 T points) from Precontemplation to Action. Barriers decreased almost one full SD (9.2 T points) from Precontemplation to Action. The crossover between the two variables occurred between the Preparation and Action stages, as expected. Confidence demonstrated an even greater variation over the stages, with a full 2 SD (20.2 T points) increase from Precontemplation to Action.

The fluctuation of the HBM variables, over the different stages, also supports the contention that Stage is a discrete variable. The Stage variable is created by asking women about their past frequency of, and
their future intent to perform, BSE. The discrete stages are created by making artificial cutoffs between different amounts, and combinations, of past performance and future intent. On the other hand, the Stage variable could also be seen as a measure of the continuous increase in performance and intent, especially since it is considered an acquisition gradient. However, Prochaska's (1994) strong and weak principles, plus the clear crossover during Preparation, between the positive and the negative aspects of BSE, indicates that there is a discrete difference between stages. Barriers, Bencon, and Confidence do not change in a smooth fashion over the stages, which would be expected if Stage was a continuous variable. Each of the HBM variables changes in a fixed pattern, with definite sharp increases and plateaus.

Prochaska et al.'s (1994) premise that it is the pros that increase first was also supported. Bencon increased 6.1 T points, from Precontemplation to Contemplation, while Barriers decreased only 1.5 T points. The Bencon and Barriers change in T points was similar from Contemplation to Preparation. However, the decrease in Barriers from Preparation to Action was 4.4 T points compared to Bencon's increase of 0.7. Confidence paralleled the behavior of Bencon, and/or the pros, with an initial large increase from Precontemplation to Contemplation (11.2 T points), followed by a drop in the amount of increase between Contemplation to Preparation (6.3 T points), followed by an increase, of a relatively minimal amount, between Preparation and Action (2.7 T points).

**Goal Six**

**Predicting Stage**

The final goal of the study was to determine the predictive power of the nine predictor variables (Barriers, Benefits, Susceptibility, Seriousness, Confidence, Control, Health Motivation, Knowledge, and Bencon) and Age with regard to Stage of change. The power of the
criterion variable Proficiency was also assessed since it was not used to create the Stage variable.

A multiple regression analysis was performed using the zero order approach, i.e., all variables had an equal chance to be entered into, or withdrawn from, the equation at each step. The final equation explained 47.8% of the variance in Stage. Confidence provided 34.3% of the explained variance, Barriers provided 6.7%, and Proficiency, Susceptibility, and Age provided the additional 6.8%. Thus, Hypothesis Fourteen is given some support, since Barriers and Proficiency were useful predictors of Stage of change. However, Benefits was expected to be useful and was not. The regression analysis was performed a second time using Bencon, in place of Benefits and Control. All variance explained, and the variables used, were the same. Of note, is the variation of Confidence over the stages, and how it mirrors and exaggerates the Bencon variation. It may be that the variation of Confidence is similar enough to Bencon that only one is needed in a regression equation.

It was then decided to run the multiple regression analysis with the two criterion variables and without Proficiency. The decision to include these variables was based on the importance of providing support for the composition of the newly created Stage variable. Because of the significant correlations between Stage and Bsebehav and Intent a certain level of predictive power was expected. However, if the criterion variables are clearly represented by the Stage variable, then, the Stage variable is an appropriate measure of the criterion variables.

Bsebehav and Intent were included in the regression analysis along with the eight HBM predictors and Age. The equation explained 87.8% of the variance in Stage, F(4, 194) = 357.99, p<.0001. Bsebehav explained 76.1% of the variance and Intent explained 10.8%. Two additional variables were used, Confidence and Knowledge, but their contribution was minimal (0.9%). When the above analysis was run with Bencon the variance explained, and all the variables used, were the same.
CHAPTER IV
DISCUSSION

If one accepts the premise, that performing breast self-examination (BSE) is a useful and effective way to address breast cancer risk, then a focus on BSE performance is appropriate. This study was designed to increase our understanding of women's health beliefs, knowledge, and behaviour and their relationship to BSE performance. The aim was to create a model that would increase our ability to predict a woman's readiness to learn about, or consistently practice, BSE and what influences that readiness. This model would then allow one to choose the intervention most effective, at increasing BSE behaviour, for a particular individual or group.

In order to create this model it was necessary to support the usefulness of the HBM questionnaire, created by Champion (1984, 1993), and the existence of the factors it assesses. Initially, all six original HBM factors were found to be occurring appropriately: Barriers, Benefits, Susceptibility, Seriousness, Confidence, and Health Motivation. Therefore, both the factor structure of the HBM and the construct validity of the scales were supported by this study. However, the additional factor Control was shown to be linked to the factor Benefits and, thus, neither could be supported as mutually exclusive factors of the HBM. What could be supported was the existence of a combined Control and Benefits factor, labelled Bencon. Examination of the items indicated that Bencon was assessing the 'benefits' of performing BSE. The support for the five original HBM factors and Bencon was reinforced by the reliability results.

With regard to the criterion measures used, the general measure of BSE behaviour (Bsebehav: a combination of the Proficiency and Frequency measures), had good internal consistency. This level of reliability
supported the use of Bsebehav in place of the Proficiency and Frequency variables separately. The criterion measure Intent was also reliable. Overall, the study found that the HBM factor structure, and criterion measures, were as predicted.

Part of the intent of this study was to assess the overlap between the HBM and Stage of change approaches. It was proposed that the HBM factors may be elements of the pros and cons of behaviour change found in the Stage research. Modification of the HBM factor structure to represent the pros and cons of BSE was not supported. The factors could not be forced onto two general factors that could be interpreted to represent pros and cons. It is more likely that the pros and cons are not complex variables and can be addressed using the Bencon and Barriers scales only. Previous work that created items to measure the pros and cons, of a variety of behaviours, (Prochaska et al., 1994; Rakowski et al., 1992) used expert opinion and face validity. The items created for, and loading on, the Barriers and Bencon variables would provide a starting place for a measure of the pros and cons of BSE.

The Barriers and Bencon variables, found in this study, clearly demonstrated theoretically appropriate variation over the stages. Prochaska's (1994) strong principle, that pros will increase 1 SD, did occur for Bencon. The weak principle, that cons will decrease from 0.5 to 1 SD, occurred for Barriers, which decreased 1 full SD. The fact that the two HBM variables fit the pattern predicted for the pros and cons of BSE supports both hypotheses; that Bencon and Barriers are good measures of the pros and cons of BSE, and that the Stage definitions/cutoffs created by this study match the acquisition gradient expected.

Another goal of the study was to determine the existence and possible usefulness of the Stage of change model related to BSE. The existence of the five original Stages of change (Precontemplation, Contemplation, Preparation, Action, Maintenance), within this sample, was supported as was the algorithm used to create them. The range of women in
the five stages, subsequent correlations with predictor and criterion variables, and predictive power of Stage, supported the achievement of the fourth goal. Further support for the Stage variable occurred with the appropriate variation of the HBM predictor and criterion variables over the stages.

Of note is the occurrence of a sixth group labelled, "Idealistic Contemplation". Categorization into this group was determined by a level of Intent which seemed highly improbable, because, instead of progressing gradually from zero, to limited, to monthly BSE performance, these women stated they would jump straight from no BSE in the past six months to monthly BSE. Overall, the combination of responses provided by these women, to all of the variables, indicated that although they were cognitively enthusiastic about preventive health behaviour their behavioural expression was virtually nonexistent. This inconsistency prompted a distrust in the self-report's provided. As well, the Stage of change theory does not recognize the existence of women who state they will jump from zero to monthly BSE behaviour. The model is based on the premise that behaviour change is gradual and directly linked to intent. Considering these points, the Idealistic Contemplators were excluded from the study (analyses including this sixth group are presented in Appendix G). It is clear that a testing mechanism is needed to determine if this type of behaviour does actually occur and, thus, should be included in both the model and future analyses. At present, Intent scores that represent drastic changes in behaviour may be markers that indicate the Stage of change model will not be helpful and that another approach is needed for women who provide inconsistent or questionable data.

A further goal of the study was to replicate the relationships between the variables and identify any new contributions. First, replication would provide support for the HBM factors and relationships. Second, if certain variables were, again, found to have limited relationships then their removal from the model would be supported. Even
though some of the HBM factors are reliable and valid measures their usefulness, with regard to predicting BSE behaviour, is in question.

The variables which demonstrated strong, appropriate relationships were: Barriers, Benefits/Bencon, and Confidence. Health Motivation was related to both criterion and most HBM variables, which implied that Health Motivation may have a limited amount of unique variance. As Health Motivation did not play an important role in predicting Bsebehav and Intent, likely indicating that the amount of unique variance was not significant, assessment of this variable is not considered important or useful. The relationship of Susceptibility with the other HBM variables was limited. Seriousness revealed no correlations with the criterion and predictor variables. Neither of these factors demonstrated a useful level of relationship, or predictive power, in the study.

The lack of influence by SES on the criterion variables, Bsebehav and Intent, was also replicated and is heartening considering the difficulty in altering this variable. However, the range of SES scores was limited and may have influenced the results. The impact of Age, on the criterion and some predictor variables, was not surprising as Age has a clear link with both risk of, and exposure to, breast cancer. However, the influence of Age on the criterion variables did not reduce the impact of the other predictors indicating that Age is not the underlying influence behind these relationships.

The strong relationship between Stage and the two criterion variables supported the concept that the new approach to assessing BSE behaviour acquisition (Stage of change) and the more traditional measures of BSE behaviour (general behaviour and Intent) are examining similar elements. Further, the correlations between the predictor variables and Stage, in the appropriate directions, reinforced the belief that Stage was assessing elements of BSE behaviour and concurrent health beliefs, i.e., criterion validity.
Another goal of the study was to determine the predictive power of the HBM variables in relation to the two criterion variables, Intent and Bsebehav. Barriers and Confidence were the most powerful predictors of Bsebehav, the general measure of BSE behaviour. The importance of Confidence in this equation was greater than expected. The performance of BSE seems linked to beliefs about ability to perform the task, and barriers to the behaviour, rather than any positive consequences that may result from the behaviour. The variables that were involved in the prediction of Intent revealed a fascinating mirror-image of those involved with Bsebehav. Confidence and Bencon explained the majority of explained variance. Thus, Intent is linked to Bencon, Bsebehav is linked to Barriers, and both Intent and Bsebehav are linked to Confidence.

Stage is considered to be closely tied to both Bsebehav and Intent. As one item from each of the criterion measures was used to help create the Stage algorithm, Stage was expected to demonstrate some ability to predict the criterion measures. However, the overwhelming amount of variance explained in both Bsebehav and Intent was surprising. This predictive power reinforces the belief that Stage is an appropriate measure of BSE behaviour and could replace Bsebehav. Further, Stage appears to be an appropriate measure of a woman's intent with regard to BSE behaviour.

Overall, there appears to be considerable overlap between the HBM predictor and criterion variables and Stage. Without Stage, Confidence was consistently linked to both Bsebehav and Intent. With or without Stage, Barriers consistently linked with Bsebehav and Bencon consistently linked with Intent. Stage clearly replaced many of the HBM variables, providing an extremely large amount of explanatory power. Of the HBM variables needed Barriers, Bencon, and Confidence seem the most useful.

Of note, is the appearance of Age as a useful, but minimal, variable in the regression equations of both Bsebehav and Intent. This appearance, plus the significant correlations between Age and the three variables,
Bsebehav, Intent and Stage, indicates that a woman's age should be recognized as influencing decisions about BSE performance. While age cannot be modified, it is possible to use different approaches to creating awareness of the threat of breast cancer depending on the age of the audience. For example, interventions with younger women may be aimed at describing the advantages of familiarity with the breast, how this can increase the chance of finding cancer at an early stage, and how this familiarity takes time to learn. Interventions with older women could focus on the greater risk of cancer at their age and the need to determine if cancer is present now rather than in some amorphous future.

It is also possible that age is an artifact of BSE acquisition. Clearly, acquiring a preventive health behaviour will take time. Thus, age will increase over the course of behaviour acquisition although it may not have any impact on health decisions at all. Whether age has an impact is not clear. What is clear, is that considering the correlations, and regressions, age's impact is not large.

Overall, it would appear that Stage is a useful variable, as are Barriers, Bencon, and Confidence. The basic aim of this study was to create a model to predict BSE and direct interventions. The combination of Stage, Barriers, Bencon, and Confidence represents this model. Support for this combination model was demonstrated by the relationships between the HBM elements and Stage. Confidence and Barriers were the important HBM elements when predicting Stage of change. While Bencon did not provide predictive power related to Stage it did vary appropriately over the stages. This variation, combined with Bencon's relationship with Intent and balance with Barriers, supports the continued inclusion of Bencon in the model.

Using Stage to replace the criterion measures seems feasible when the strong relationship between the variables is considered. Further, using Stage instead of Bsebehav and Intent reduces the demand on the respondent, as intended. Assessment of the three HBM elements would also
be important as Barriers, Bencon, and Confidence provide valuable information about the different beliefs and attitudes women have at each stage of BSE acquisition. Further, Bencon and Barriers do seem to parallel the pro/ con variables assessed by other researchers (for example, Prochaska, 1994; Prochaska et al., 1994). This parallel highlights the validity of this study's measure of the Stages of change in BSE acquisition, and demonstrates how the integration of the two approaches, HBM and Stage of change, results in a useful model.

**Practical Implications**

The Stage classification can occur after three questions, on past performance and future intent, have been answered. The speed and brevity of this measure is distinctly different from that of the criterion variables (22 items). Further, the Stage and criterion measures are best described by only three HBM factors (Barriers - 7 items, Bencon - 11 items, and Confidence - 12 items). The other variables (Susceptibility (5 items), Seriousness (8), Health Motivation (8), Knowledge (28), and Benefits (7) and Control (4) separately) do not provide enough useful information to warrant their time and energy costs. While Champion (1984, 1993) does not state that the HBM questionnaire is designed for the real world, the implication is that the questions need to be answered in order for the health care practitioner to know, and thus influence, a woman's beliefs and behaviours. The criterion and predictor variables involve 101 questions, not including desired demographics. If the three Stage items are used, plus the items for the three HBM variables, the item total is 30. This is a clear decrease in the burden on the respondent and will likely increase compliance to this type of information gathering.

Appendix H presents the BSE Readiness Questionnaire: an amalgamation of the items considered necessary in the combination model.

Real world application of the BSE Readiness Questionnaire is appropriate. Stage will indicate a woman's current level of BSE acquisition. The three HBM factors will clarify what is different about
the women in the different Stages (over and above the obvious differences in performance and intent). The use of the HBM factors, Barriers, Bencon, and Confidence, will provide an indication of what needs to be modified within the woman’s skill and belief repertoire.

The strong and weak principles demonstrated by Prochaska (1994), and verified here, indicate how the HBM variables can be used in a focused way. The suggestion is that health care practitioners would first determine a woman’s Stage of change for BSE by asking three questions, and once a stage has been assigned, the practitioner chooses to go in one of two directions. If a woman is in the Precontemplation stage then an increase in her perception of the benefits of BSE is required for movement to the next stage. Therefore, the Bencon items are given as they provide the necessary information. The Stage of change information would help the practitioner decide which education or skills/coping strategies he/she could provide. If the woman was in the Contemplation or Preparation stage then a decrease in the perception of barriers to BSE is desired. The Barriers items would be used to determine what stops this woman from performing BSE. This information would greatly enhance a practitioner’s ability to focus on what is hindering a specific person’s movement to monthly BSE. The Confidence items would always be assessed because confidence has been linked to actual skill, and stage movement would be hindered if the woman thought she could not perform BSE appropriately. Thus, the actual number of questions a woman would need to answer would vary from a minimum of 22 to a maximum of 26. Of course, if a practitioner wished for information on both benefits and barriers then the item total would be 33 and the burden on the respondent still reasonable.

**Future Research**

This study has prompted many ideas about where future work is needed. The Stage variable appears very useful. However, clarification of the Idealistic Contemplation Stage is necessary. Until this group of women can be clearly addressed how, or if, they fit the theoretical
gradient of acquisition is unclear. One hundred thirty five of the subjects in this study volunteered their name and address so they could be contacted, in one year, for a follow-up study. The objective is to assess actual BSE performance during the past year and compare it to the intent stated during the original study. This should provide information about the veracity of the future intent reports women provide.

Another direction for research is the modification of the HBM variables: Barriers, Bencon, and Confidence. The confirmatory factor analysis identified items within the variables that do not provide consistent information. Dropping the items that do not load may increase the effectiveness of the variables. The Barriers variable would stay the same. However, Bencon would drop 3 items, and Confidence would drop one. Analysis of the reliability of the two new variables and their consequent predictive power, and relationship to Stage, may provide important information. This study could not take this step as the number of analyses would have been inappropriate, considering sample size. The BSE Readiness Questionnaire includes these modified variables. Further, this questionnaire will be used in the follow-up study so both the modified scales, and the questionnaire as a whole, can be assessed for usefulness.

On a larger scale, research directed at assessing the impact of modifying the pros/cons or benefits/barriers of BSE performance would be important. Prochaska's (1994) premise that first one increases the pros and then decreases the cons needs to be assessed. A study that provides information, relevant to increasing perception of the benefits, during Precontemplation (Group 1), or Contemplation (Group 2), or Preparation (Group 3) would be very helpful. This study should also provide information relevant to decreasing perception of the barriers to BSE during each of these stages as well (Groups 4-6). Last, "treatment" groups, that are provided information about increasing benefits and decreasing barriers simultaneously, should be created (Groups 7-9, plus control groups). Comparison of these groups, which have been provided
with education/coping skills relevant to increasing the perception of/belief in positive or negative aspects of BSE (or both), at different stages, would clarify the process of behaviour change. For example, Group 1 may demonstrate greater stage movement compared to Groups 2 and 3. If so, interventions designed to increase the pros can be limited to women in the Precontemplation stage. Limiting interventions to those women in a certain stage of the change process should decrease the chance that women will be exposed to approaches that do not fit their state of mind and, thus, may at best waste their time and at worst interfere with behaviour change. Therefore, assessing the impact of real world interventions would greatly enhance our knowledge of the process of change and whether our beliefs about what is happening at each stage are accurate.

Last, the need for an assessment of knowledge was presented in this study. This study expanded the item pool to include questions that addressed a wide range of knowledge about breast cancer and BSE. Unfortunately, the Knowledge items did not appropriately reflect the areas of knowledge hoped for. Therefore, it was not possible to address the question of whether knowledge of different elements of breast cancer or BSE had different impacts on BSE performance. In general, the Knowledge variable was not useful and the time needed to answer and score these questions was not warranted. However, a scale focused on identifying knowledge of breast cancer versus knowledge of breast cancer treatment may provide useful information. If the influence of certain types of knowledge is important in the decision to start BSE, then, exactly what that knowledge entails is vital to educational programs. Increased information about types of treatment and how BSE reduces the need for certain invasive treatments, over others less so, may have much greater impact than simply presenting the growing risk for breast cancer itself.

**Methodological Issues**

Two main difficulties occurred within this research. The first was the type of sample used. A convenience sample, of women who
work/volunteer in a Western Canadian City, was used. This sample provided a limited SES range and other artifacts of the sampling procedure may have interfered as well. However, previous work using random digit dialling (Champion, 1984, 1988, 1993) has found no impact by SES. Replicating this research with a larger, more random, sample would strengthen the results found by this study.

The second difficulty was also related to the sample. The number of women, assigned to some of the Stage classifications, was limited. The Precontemplation stage had fewer members than was hoped for. This may have been an artifact of the volunteer process, however, other studies have managed to find equivalent numbers within their stages (Rakowski et al., 1992). The limited numbers may have influenced the results, however, it is likely that this influence would have been negative. In other words, greater numbers within the stages should allow for clarification of the results, and possibly, greater effect sizes.

In conclusion, this study considers the combination of Stage and Barriers, Bencon, and Confidence, to be the most effective approach to predicting, and influencing, the acquisition of BSE behaviour.
APPENDIX A

SAMPLE QUESTIONNAIRE PACKAGE
HEALTH BELIEFS AND BEHAVIOURS STUDY

First, let me say thank you for taking the time to find out more about this study. If you decide to fill out the questionnaire it should take no more than 25 minutes. If at any point you decide you are not comfortable with the questions and do not wish to continue then stop. You are not obligated to continue once you have started. Although this research study is completely voluntary and is entirely unrelated to any employer's or contact group's business it does have the support of your employer or group. The questionnaire is anonymous and your participation will be kept strictly confidential.

The Health Beliefs and Behaviours study is designed to learn more about how women view breast cancer and the preventive health behaviour of breast self-examination. You will be asked questions about your beliefs, attitudes, knowledge, and behaviour. A questionnaire package is available for anyone who is interested in volunteering for the study. The packages contain a questionnaire plus a stamped, addressed envelope for the confidential return of your information to the researcher.

Your consent to participate in the study is based on the return of the questionnaire package. Thus, if you are willing to allow the researcher to use the results of your questionnaire for research purposes, then the return of the questionnaire will be considered your full and complete authorization and consent. It is understood that this consent is provided on the understanding that the answers will be kept anonymous and strictly confidential.

The questionnaire contains a number of sections, each with different instructions. Most questions do not have right or wrong answers since they are designed to discover how you feel and think about certain issues. The most important thing is that you are honest, about both your behaviour and beliefs. Your answers will be kept entirely confidential and each questionnaire will be marked with an identifying number only, no name.

At the end of the questionnaire is a form for those who are willing to be contacted at a future date. This form will be separated from the questionnaire, to ensure the anonymity of the responses, and only used to assign the appropriate identifying number to the second questionnaire.

The study is open to all women who are 20 years old or older. The information gained will be most useful if a wide range of women volunteer. Therefore, I am asking any woman who is interested in filling out the questionnaire to ask female friends and relatives if they wish to volunteer also. The only caution is the need for confidentiality of your responses. Please do not share the information contained in the questionnaire, or the questions themselves, with others. The sharing of this information, or your
thoughts and feelings about the questionnaire, could influence how someone else will respond. Needless to say, it is important to fill out the questionnaire alone and only with your own beliefs and behaviours.

After approximately two to three months, the questionnaires will have been examined and each participating employer, branch or group will be provided with a summary sheet of the results. This summary will present the findings of the study and any conclusions or interpretations that arise.

If after reading this information sheet you are willing to fill out the questionnaire there should be one available where you work or with a volunteer coordinator you have been informed about.

If you have any questions or concerns about the study or the questionnaire please feel free to contact either the principal researcher:

Arlene D. Cox, M.A.
#1104, 505 - 4th Ave. S.W.
Calgary, AB, T2P 0J8
Home: (403) 234-0056    Bus: (403) 234-2871
Fax: (403) 266-5847

or the research supervisor:

G. Ron Frisch, Ph.D.
Department of Psychology
University of Windsor
Windsor, ON, N9B 3P4
Bus: (519) 253-4232    Fax: (519) 973-7021

In case you would like more information about breast cancer and breast self-examination I have arranged for a contact person at the Canadian Cancer Society, Calgary District Unit. Please feel free to contact:

Nancy Jacques
Unit Public Education Coordinator
Suite 408, 1305 - 11th Avenue S.W.
Calgary, AB, T3C 3P6
Bus: (403) 244-2791    Fax: (403) 229-2540

Last, if you have any concerns about the ethical nature of this research or how the information was obtained, or will be used, please contact the Acting Chair of the Ethics Committee for the University of Windsor, Dr. M. Kral, (519) 253-4232.

Thank you very much for your time and cooperation.
HEALTH BELIEFS
and
BEHAVIOURS
QUESTIONNAIRE

Distributed by:

Arlene D. Cox, M.A.
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University of Windsor
Windsor, ON
(519) 253-4232
SECTION A

We would first like to ask you some general questions. The questions will either provide a space for your written answer or provide answers from which you must choose. When choosing one of the provided answers please circle the one response that most represents you.

1. What is your current age? __________

2. What is the highest grade of school you have completed? Please circle the appropriate grade or level of school you have completed.
   00 01 02 03 04 05 06 07 08 09 10 11 12
   a) Completed high school degree
   b) 1 - 3 years college/university/technical school
   c) Completed college/university/technical school degree
   d) 1 - 3 years graduate school
   e) Completed graduate degree

3. Do you live alone? Yes No

4. Do you work for pay? Yes No

5. What is your occupation? (If retired, before retirement) ____________________________

6. What is your current marital status? Are you...
   a) Married --> go to question 7
   b) Married, but separated (Categories b to f go to question 8)
   c) Widowed
   d) Divorced
   e) Never Married
   f) Live Together/Common Law

7. What is the occupation of your spouse? (If retired, before retirement) ____________________________
8. What is the occupation of your father? (If retired, before retirement)

9. What is the occupation of your mother? (If retired, before retirement)

10. The women who are participating in this study have been solicited through a number of different groups. Please circle the group through which you were contacted to fill out this questionnaire.

a) Employer
b) Canadian Cancer Society
c) Recreational Group
d) Friend
e) Relative
f) Other, please specify:________________________________________

SECTION B

We would now like to ask you some questions about your experience with breast cancer and breast self-examination. Breast self-examination is when you examine your breasts for the purpose of finding an unusual lump. Each question provides a number of different answers, please circle the answer that most applies to you.

1. Before we contacted you about this study, had you seen or heard anything recently (within last 3 months) about breast cancer?
   Yes --> go to question 2   No --> go to question 3

2. Where did you see or hear something most recently about breast cancer? Did you see or hear from a...
   a) magazine   b) newspaper   c) television
d) doctor or nurse   e) health clinic or hospital
   f) friends or family   g) other - please specify:___________________

3. Before we contacted you about this study, had you heard or seen anything recently (within last 3 months) about breast self-examination?
   Yes --> go to question 4   No --> go to question 5
4. Where did you see or hear something most recently about breast self-examination? Did you see or hear from a...

   a) magazine       b) newspaper       c) television
   d) doctor or nurse e) health clinic or hospital
   f) friends or family g) other - please specify:____________________

5. Has a doctor or a nurse ever suggested that you should perform breast self-examination on a regular basis?
   Yes No I don’t remember

6. Before we contacted you, had you ever been taught by a doctor to examine your breasts?
   Yes No I don’t remember

7. Have you ever been taught by a nurse to examine your breasts?
   Yes No I don’t remember

8. If you have been taught breast self-examination, has anyone ever checked your procedure?
   Yes No Not Applicable

9. If you were taught to do breast self-examination, how was the teaching done? Was the teaching done...

   a) individually       b) in a group
   c) both individually and in a group
   d) other - please specify:____________________
   e) was not taught

10. If you know how to examine your breasts, have you learned to examine your breasts by a method other than personal teaching? Did you learn by...

    a) reading a pamphlet or book       b) listening to radio or TV
    c) looking at a film              d) other - please specify:____________
    e) learned by several methods - please specify:____________
    f) did not learn by any of these methods
11. Has anyone in your family had breast cancer? By family we mean someone related to you by blood or marriage.

Yes --> go to question 12
No --> go to question 13

12. How many persons in your family do you know who have had breast cancer? ________

13. How many persons outside your family do you know who have had breast cancer? ________

SECTION C

The next group of questions is about knowledge of breast cancer and breast self-examination. Most people will not know all the answers. Each question will have a number of different options, please circle the one, and only one, answer that you think is correct.

1. Which of the following can change a woman's breasts?
   a) monthly cycle  b) menopause  c) touching the breasts
   d) both a and b  e) don't know

2. When is the best time during the menstrual cycle (your period) to examine the breasts?
   a) about one week before your period starts
   b) during your period
   c) about one week after your period starts
   d) don't know

3. Should a woman examine her breasts when she is in the shower?
   a) no, she might miss lumps
   b) yes, lumps may be easier to find in the shower
   c) don't know

4. Are a woman's right and left breast the same size?
   a) yes, if the woman is fully developed
   b) no, variation in size is normal
   c) don't know
5. Should a woman see her doctor if there is a firm ridge in the lower curve of her breasts?
   Yes  No  Don’t know

6. Should a nonpregnant woman see her physician if she has discharge from her nipple(s)?
   Yes  No  Don’t know

7. Should a woman see her physician if she has puckering of her breast(s)?
   Yes  No  Don’t know

8. Should a woman see a physician if she has stretch marks on her breast(s)?
   Yes  No  Don’t know

9. Should a woman see a physician if she has an unidentified lump in her breast(s)?
   Yes  No  Don’t know

10. Should a woman see a physician if she has a dimple in her breast(s)?
    Yes  No  Don’t know

11. Should a woman see a physician if she has swelling of her breast(s) which is not related to her monthly cycle?
    Yes  No  Don’t know

12. Should a woman see a physician if she has a skin irritation on her breasts which lasts over one week?
    Yes  No  Don’t know

13. Should each breast be examined in a systematic manner?
    Yes  No  Don’t know
14. Should a woman look at her breasts in a mirror with her hands above her head?

   Yes  No  Don’t know

15. Does early detection of breast cancer improve the chance for recovery?

   Yes  No  Don’t know

16. What percentage of breast lumps are cancerous?

   a) 10%  b) 20%  c) 50%  d) 80%

17. On the average how many women will get breast cancer sometime during their life?

   a) 1 woman out of 5  b) 1 woman out of 10
   c) 1 woman out of 25  d) don’t know

18. Who do you think is more likely to get breast cancer?

   a) women under 35  b) women over 35
   c) no difference  d) don’t know

19. Who do you think is more likely to get breast cancer?

   a) women who have had their first child before age 30
   b) women who have had their first child after age 30
   c) no difference  d) don’t know

20. Who do you think is more likely to get breast cancer?

   a) women whose mothers and sisters have had breast cancer
   b) women whose mothers and sisters have not had breast cancer
   c) no difference  d) don’t know

21. Bumping or bruising the breasts can cause breast cancer.

   Yes  No  Don’t know
22. Fondling or caressing the breasts can cause breast cancer.
   Yes   No   Don't know

23. Can plastic surgery ever be done to replace or reconstruct a breast that has been surgically removed?
   Yes, sometimes   No, never   Don't know

24. What is a biopsy?
   a) a test   b) a treatment   c) don't know

25. Who is more likely to find lumps in the breast(s)?
   a) the woman herself   b) a nurse
   c) a physician   d) husband (partner)

26. Surgery is the most common and most effective treatment for localized breast cancer.
   Yes   No   Don't know

27. Radiation therapy is only used when the entire breast is removed (radical mastectomy).
   Yes   No   Don't know

28. Chemotherapy is never used for the treatment of breast cancer.
   Yes   No   Don't know
SECTION D

The next group of questions is about things you currently do which will help you in examining your breasts for changes that might be breast cancer. Many women may not do any of the following activities or they may do them infrequently. It is very important that you answer the questions honestly. Again, each question is followed by a number of different answers, please circle the answer that best reflects what you do, or know, right now.

1. Have you ever heard of breast self-examination?
   Yes    No

2. Have you ever examined your breasts for lumps?
   Yes    No --> go to question 16

3. During the past year, did you examine your breasts monthly for breast lumps?
   Yes    No

4. During the past year, how many times did you examine your breasts?
   a) did not examine
   b) examined 1 time
   c) examined 2 times
   d) examined 3 times
   e) examined 4 times
   f) examined 5 times
   g) examined 6 times
   h) examined 7 times
   i) examined 8 times
   j) examined 9 times
   k) examined 10 times
   l) examined 11 times
   m) examined 12 times
   n) examined more than 12 times

5. During the past six months, how many times did you examine your breasts for lumps? Did you...
   a) not examine
   b) examined 1 time
   c) examined 2 times
   d) examined 3 times
   e) examined 4 times
   f) examined 5 times
   g) examined 6 times
   h) examined more than 6 times

6. During the past three months, how many times did you examine your breasts for lumps? Did you...
   a) not examine
   b) examined 1 time
   c) examined 2 times
   d) examined 3 times
   e) examined 4 times or more
7. On the average, how many minutes does it take you to examine your breasts? Does it take...
   a) 1 to 5 minutes    b) 6 to 10 minutes
   c) 11 to 15 minutes   d) over 15 minutes

8. When doing breast self-examination, how do you feel your breasts? Do you feel with the...
   a) palm of your hands  b) tips of your fingers
   c) flat part of your fingers

9. When you examine your breasts, how often do you look at your breasts in the mirror with your hands on your hips? Do you...
   a) never look    b) rarely look
   c) frequently look   d) always look

10. How often do you examine your breasts in the mirror by raising your hands over your head and looking at your breasts? Do you...
    a) never look    b) rarely look
    c) frequently look   d) always look

11. When you examine your breasts in the mirror, how often do you look for puckering, colour changes, and dimpling of the skin? Do you...
    a) never look    b) rarely look
    c) frequently look   d) always look

12. When you examine your breasts, how often do you feel your breasts by examining in a circular motion or a pattern which allows you to cover the entire breasts? Do you...
    a) never use a pattern    b) rarely use a pattern
    c) frequently use a pattern   d) always use a pattern

13. When you examine your breasts, how often do you feel the area under your arms to the edge of your breasts? Do you...
    a) never feel    b) rarely feel
    c) frequently feel   d) always feel
14. When examining your breasts, how often do you examine your breasts while standing? Do you...

a) never examine  b) rarely examine
   c) frequently examine d) always examine

15. When examining your breasts, how often do you examine each breast while lying down with a pillow under the shoulder of the breast being examined? Do you...

a) never examine lying down  b) rarely examine lying down
   c) frequently examine lying down d) always examine lying down

The following questions are about what you intend to do in the future. Please answer all questions honestly. Read the statements and indicate whether you strongly disagree, disagree, are neutral, or whether you agree or strongly agree by circling the response that best fits your intentions for the future.

16. During the next year, you intend to complete monthly breast self-examination. Do you...

a) strongly disagree  b) disagree  c) neutral
   d) agree  e) strongly agree

17. During the next year, you are determined to complete monthly breast self-examination. Do you...

a) strongly disagree  b) disagree  c) neutral
   d) agree  e) strongly agree

The next group of questions continues with asking about your intent towards breast cancer detection. Each group of answers is worded slightly differently. Please read each question and circle the answer that best fits your future intention.

18. During the next year how often will you examine your breasts? Will you...

a) not examine  b) examine 1 time
   c) examine 2 times  d) examine 3 times
   e) examine 4 times  f) examine 5 times
   g) examine 6 times  h) examine 7 times
   i) examine 8 times  j) examine 9 times
   k) examine 10 times  l) examine 11 times
   m) examine 12 times  n) examine more than 12 times
19. How useful or useless do you think it would be for you to perform breast self-examination on a monthly basis? Do you feel it would be...
   a) extremely useless  b) moderately useless  
   c) neutral  d) moderately useful  e) extremely useful

20. How good or bad do you think it would be for you to perform breast self-examination on a monthly basis during the next year? Do you feel it would be...
   a) extremely bad  b) moderately bad  c) neutral  
   d) moderately good  e) extremely good

21. How comfortable or uncomfortable do you think it would be for you to perform breast self-examination on a monthly basis during the next year? Do you feel it would be...
   a) extremely uncomfortable  b) moderately uncomfortable  
   c) neutral  d) moderately comfortable  e) extremely comfortable

22. How foolish or wise do you think it would be for you to complete breast self-examination during the next year? Do you think it would be...
   a) extremely foolish  b) moderately foolish  
   c) neutral  d) moderately wise  e) extremely wise
SECTION E

The following group of questions concerns your beliefs about breast cancer. There are no right answers. Everyone has different experiences which will influence their answers. Please answer as honestly as possible. We need the answer which best explains how you feel. Please answer the questions by circling one of the five options: strongly disagree, disagree, neutral, agree, or strongly agree.

1. It is extremely likely that I will get breast cancer.
   a) strongly disagree   b) disagree   c) neutral
d) agree       e) strongly agree

2. I feel I will get breast cancer in the future.
   a) strongly disagree   b) disagree   c) neutral
d) agree       e) strongly agree

3. There is a good possibility that I will get breast cancer in the next ten years.
   a) strongly disagree   b) disagree   c) neutral
d) agree       e) strongly agree

4. My chances of getting breast cancer are great.
   a) strongly disagree   b) disagree   c) neutral
d) agree       e) strongly agree

5. I am more likely that the average woman to get breast cancer.
   a) strongly disagree   b) disagree   c) neutral
d) agree       e) strongly agree

The next group of questions concerns what you believe about the seriousness of breast cancer. In answering the questions, you should assume you do not do breast self-examination and the discovery of cancer occurs by chance and therefore is not treated early. You will answer each question by circling one of the five options, the one that most fits you.

6. Breast cancer is an extremely serious disease.
   a) strongly disagree   b) disagree   c) neutral
d) agree       e) strongly agree
7. The thought of breast cancer scares me.
   a) strongly disagree  b) disagree  c) neutral
   d) agree  e) strongly agree

8. When I think about breast cancer my heart beats faster.
   a) strongly disagree  b) disagree  c) neutral
   d) agree  e) strongly agree

9. I am afraid to think about breast cancer.
   a) strongly disagree  b) disagree  c) neutral
   d) agree  e) strongly agree

10. Problems I would experience from breast cancer would last a long time.
   a) strongly disagree  b) disagree  c) neutral
    d) agree  e) strongly agree

11. Breast cancer would threaten the relationship with my boyfriend, husband, or partner.
    a) strongly disagree  b) disagree  c) neutral
     d) agree  e) strongly agree

12. If I had breast cancer, my whole life would change.
    a) strongly disagree  b) disagree  c) neutral
     d) agree  e) strongly agree

13. If I developed breast cancer, I would not live longer than 5 years.
    a) strongly disagree  b) disagree  c) neutral
     d) agree  e) strongly agree
The next group of questions concerns what you believe are the benefits to breast self-examination. When answering these questions, you are to pretend that you perform breast self-examination monthly.

14. When I do breast self-examination, I feel good about myself.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

15. When I complete monthly breast self-examination, I don’t worry as much about cancer.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

16. My doctor or nurse will praise me if I do monthly breast self-examination.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

The next group of questions concerns what you believe are the results of breast self-examination. In answering these questions, assume that you perform breast self-examination on a monthly basis.

17. Completing breast self-examination each month will allow me to find lumps early.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

18. If I complete breast self-examination monthly during the next year, I will decrease my chances of dying from breast cancer.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

19. If I complete breast self-examination monthly I will decrease my chances of requiring radical or disfiguring surgery if breast cancer occurs.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree
20. If I complete monthly breast self-examinations, it will help me find a lump, which might be cancer, before it is discovered by a doctor or nurse.

a) strongly disagree   b) disagree   c) neutral
d) agree               e) strongly agree

The next group of questions concerns what you believe are the problems with performing breast self-examination. In answering these questions you should assume that you will perform breast self-examination monthly. Please answer each question by circling the response that best fits how you believe.


a) strongly disagree   b) disagree   c) neutral
d) agree               e) strongly agree

22. Doing breast self-examination during the next year will make me worry about breast cancer.

a) strongly disagree   b) disagree   c) neutral
d) agree               e) strongly agree

23. Breast self-examination would be embarrassing to me.

a) strongly disagree   b) disagree   c) neutral
d) agree               e) strongly agree

24. Doing monthly breast self-examination would take too much time.

a) strongly disagree   b) disagree   c) neutral
d) agree               e) strongly agree

25. Doing breast self-examination would be unpleasant.

a) strongly disagree   b) disagree   c) neutral
d) agree               e) strongly agree

26. It is hard to remember to do breast self-examination.

a) strongly disagree   b) disagree   c) neutral
d) agree               e) strongly agree
27. I don't have enough privacy to do monthly breast self-examination.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

   The following group of questions concerns your confidence in completing breast self-examination and in controlling breast cancer. As before, there are no right answers. Please answer by circling the response that best fits you.

28. I know how to perform breast self-examination.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

29. I am confident I can perform breast self-examination correctly.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

*If you earlier reported that you have never completed a breast self-examination please go straight to question 40. If you have performed at least one breast self-examination continue with question 30.

30. If I were to develop breast cancer, I would be able to find a lump by performing breast self-examination.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

31. I am able to find a breast lump if I practice breast self-examination with a health professional.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

32. I am able to find a breast lump if I practice breast self-examination alone (without a health professional).
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree
33. I am able to find a breast lump which is the size of a quarter.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

34. I am able to find a breast lump which is the size of a dime.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

35. I am able to find a breast lump which is the size of a pea.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

36. I am sure of the steps to follow in doing breast self-examination.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

37. I am able to identify normal and abnormal breast tissue when I do
    breast self-examination.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

38. When looking in the mirror, I can recognize abnormal changes in my
    breasts.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

39. I can use the correct part of my fingers when I examine my breasts.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree
The following questions ask about the amount of control you feel over breast cancer. There are no right answers. Please choose the answer which best fits your feelings.

40. I can control the effects of breast cancer by discovering lumps at an early stage with monthly breast self-examination.
   a) strongly disagree  b) disagree  c) neutral
d) agree  e) strongly agree

41. I can control the effects of breast cancer by discovering lumps at an early stage through mammography.
   a) strongly disagree  b) disagree  c) neutral
d) agree  e) strongly agree

42. I can control the effects of breast cancer by discovering lumps at an early stage through professional breast examination.
   a) strongly disagree  b) disagree  c) neutral
d) agree  e) strongly agree

43. I want to control breast cancer by discovering lumps early.
   a) strongly disagree  b) disagree  c) neutral
d) agree  e) strongly agree

The next group of questions ask about your health activities. There are no right answers. Please answer each question honestly.

44. I try to discover health problems early.
   a) strongly disagree  b) disagree  c) neutral
d) agree  e) strongly agree

45. Maintaining good health is extremely important to me.
   a) strongly disagree  b) disagree  c) neutral
d) agree  e) strongly agree

46. I search for new information to improve my health.
   a) strongly disagree  b) disagree  c) neutral
d) agree  e) strongly agree
47. It is important to carry out activities that will improve my health.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

48. I eat a well balanced diet.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

49. I exercise at least three times a week.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

50. I have a regular health checkup even when I am not sick.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree

51. I have yearly pap smears.
   a) strongly disagree   b) disagree   c) neutral
   d) agree   e) strongly agree
RECONTACT INFORMATION

We would like to contact you again in about a year for a follow-up questionnaire. If you would be willing to participate in this second questionnaire please fill out the information form below. The connection between your questionnaire responses and name will be by code number only and your responses will be kept strictly confidential.

First Name ___________________ Last Name ___________________

Address ________________________________________________

_____________________________________________________

Postal Code ____________

Phone Number ____________  ____________

Home  Work

Is your phone listed in your name:  Yes _____ No _____

If no, in whose name is it listed? __________________________

Just in case you move before we contact you again, we would like the names of two people, such as a close friend or relative, who would know where we could get in touch with you.

Name ___________________ Relationship ____________

Address ________________________________________________

_____________________________________________________

Phone Number ____________

Phone in whose name ________________________________

Name ___________________ Relationship ____________

Address ________________________________________________

_____________________________________________________

Phone Number ____________

Phone in whose name ________________________________
Section A:

Questions 1 through 10 have no right answers.

Section B:

Questions 1 through 13 have no right answers.

Section C:


These items are scored either 0 for incorrect or 1 for correct. The number of correct answers are added to provide a total Knowledge score out of a possible 28. The specific items for each area of knowledge are:

Knowledge of breast: 1, 4.
Breast cancer symptoms: 5 to 12.
Breast self-examination: 2, 3, 13, 14.
Breast cancer treatment: 15, 23 to 28.
Risk of breast cancer: 16 to 22.

Section D:

Questions 1 through 6 have no right answers.

Question 4 is used to assess the frequency of BSE within the last year and is scored 0 to 13. Questions 5 and 6 assess the frequency of BSE use within the last six months (scored 0 to 7) and last three months (0 to 4). All three questions are added to gain the overall frequency variable.

Question 7 has one right answer, c, and 1 point is gained for answering correctly.
Question 8 has one right answer, c, and 1 point is gained for answering correctly.

Questions 9 through 15 are scored from 1 to 4 and added with 7 and 8 to provide an overall score for proficiency. The higher the score the more proficient with the maximum score being 30.
Questions 16 through 17 and 19 through 22 are scored on a Likert type scale with scores from 1 (negative end) to 5 (positive end). Question 18 is scored from 0 to 13. The scores are added to provide a total intent score with a maximum score of 43.

Section E:

There are no right answers to this section. Questions 1 through 51 are scored on a 5-point Likert type scale from strongly disagree to strongly agree.

Questions 1 through 5 assess the Susceptibility variable and are all scored such that strongly disagree is scored with a 1 and strongly agree a 5; the higher the score the greater the feeling of susceptibility, maximum is 25.

Questions 6 through 13 assess the Seriousness variable and strongly disagree is assigned a score of 1. High scores indicate a belief that breast cancer is very serious, maximum is 40.

Questions 14 through 20 assess the Benefits variable. All questions have strongly disagree scored as a 1. High scores indicate a belief in great benefit from performing BSE, maximum score is 35.

Questions 21 through 27 assess the Barriers variable. Strongly disagree is scored 1 and high scores mean low barriers, maximum is 35.

Questions 28 through 39 assess Confidence/self-efficacy. Strongly disagree is scored 1 and high scores indicate great confidence in ability to perform BSE appropriately, maximum is 60.

Questions 40 through 43 assess the Control variable. Strongly disagree is scored 1 and high scores indicate a feeling of control over breast cancer in general, maximum is 20.

Questions 44 through 51 assess general Health Motivation. Strongly disagree is scored 1 and high scores indicate high motivation, maximum score is 40.
APPENDIX C

STAGE DEFINITIONS
DEFINITION OF STAGES OF ACQUISITION
OF MONTHLY BREAST SELF-EXAMINATION

Questions used: Section D - 2, 5, and 18.

2. Have you ever examined your breasts for lumps?
   Yes = 1       No = 0

5. During the past six months, how many times did you
   examine your breasts for lumps? Did you...
   not examined = 0
   examined 1 or 2 times = 1
   examined 3, 4 or 5 times = 2
   examined 6 or more times = 3

18. During the next year how often will you examine your
   breasts? Will you...
   not examined = 0
   examined 1 to 5 times = 1
   examined 6 to 11 times = 2
   examined 12 or more times = 3

Precontemplator:
- has never performed BSE and has little or no intent for future
  performance;

\[ D2 = N \quad D18 = 0 \text{ or } 1 \]

- has performed BSE in the past, but not within the last year and
  has little or no intent for the future;

\[ D2 = Y \quad D5 = 0 \text{ or } 9 \quad D18 = 0 \]

Contemplator:
- has never performed a BSE but does intend to start this
  behaviour within the next year;

\[ D2 = N \quad D18 = 1 \text{ or } 2 \]

- has performed BSE before and may have done so infrequently
  within the last 6 months, however, intends to keep up at least a limited
  level of performance within the next year;

\[ D2 = Y \quad D5 = 0 \text{ or } 1 \quad D18 = 1 \]
Preparer:
- has performed BSE in the past, and at a limited level within the past 6 months, but intends to increase to monthly or close within the next year;
  \[ D_2 = Y \; D_5 = 1 \; D_{18} = 2 \; \text{or} \; 3 \]

Actor:
- has performed BSE in the past, and at a moderate level within the last 6 months, however, intends to increase to monthly or close within the next year;
  \[ D_2 = Y \; D_5 = 2 \; D_{18} = 2 \; \text{or} \; 3 \]

Maintainer:
- has performed monthly BSE during last 6 months and intends to maintain this level of performance;
  \[ D_2 = Y \; D_5 = 3 \; D_{18} = 2 \; \text{or} \; 3 \]

*Idealistic Contemplator:
- this group was created because of a large number of undefined women in the sample. These women may or may not have performed BSE in the past, but they have not done so during the past six months. However, unlike Contemplators they intend to jump right into a monthly BSE schedule rather than starting out slowly.
  \[ D_5 = 0 \; \quad D_{18} = 3 \]
APPENDIX D

FEEDBACK FORM
RESULTS OF HEALTH BELIEFS AND BEHAVIOURS QUESTIONNAIRE

This study was designed to increase our understanding of women's health beliefs, knowledge and behaviour and their relationship to the performance or non-performance of breast self-examination (BSE).

The basic aim of the study was to create a better, shorter, method of predicting a woman's BSE behaviour or current readiness to initiate BSE. Two ways of understanding a woman's choice were assessed, the old way which involved questions about health beliefs and frequency of BSE and a new way which used a few questions about frequency and intent to perform BSE to assign a woman a category of readiness for monthly BSE. The new approach was found to provide almost as much information as the old, with far fewer questions.

It is now expected that this new approach, combined with some of the questions on health beliefs, can be used to increase our ability to predict a woman's readiness to learn about, attempt, or consistently practice BSE. Predicting level of readiness will allow researchers and educators to: one, focus the already existing interventions on women who will most benefit from that approach, and two, prompt creation of interventions specifically designed for certain levels of readiness.

Results of Questions About BSE Exposure

100% of the women had heard of BSE. Almost 90% had performed a BSE sometime in the past. Of the 210 women who reported a BSE within the last year, 28% performed monthly BSE or better, 24% performed BSE about once every two months, and 48% rarely did BSE.

79% had heard of breast cancer within the last 3 months and 77% had heard of BSE. 34% had a family history of breast cancer and 73% knew of women outside the family with breast cancer. 74% had been taught BSE by a doctor and 25% by a nurse. Those women who had not been taught were more likely to report a low frequency of BSE. Only 20% of the women had had their procedure checked by a professional and these women were much more likely to report greater frequencies of BSE.

The questions about technique revealed that on average women knew 2/3's of the information presented. Most women agreed that BSE was something that they should be doing and the majority intended to increase their current level of behaviour.
Results of Questions About Knowledge of BSE and Breast Cancer

<table>
<thead>
<tr>
<th>Questions and Answers</th>
<th>% Accurate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Which of the following can change a woman's breasts: both monthly cycle and menopause.</td>
<td>72.7</td>
</tr>
<tr>
<td>2. When is the best time during the menstrual cycle to examine the breasts: about one week after your period starts.</td>
<td>43.5</td>
</tr>
<tr>
<td>3. Should a woman examine her breasts when she is in the shower: yes, lumps may be easier to find in the shower.</td>
<td>42.0</td>
</tr>
<tr>
<td>4. Are a woman's right and left breast the same size: no, variation in size is normal.</td>
<td>91.4</td>
</tr>
<tr>
<td>5. Should a woman see her doctor if there is a firm ridge in lower curve of her breasts: no.</td>
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<td>12. Should a woman see a physician if she has a skin irritation on her breast(s) which lasts over one week: yes.</td>
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</tr>
<tr>
<td>13. Should each breast be examined in a systematic manner: yes.</td>
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</tr>
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<td>16. What percentage of breast lumps are cancerous: 20%.</td>
<td>41.2</td>
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<td>17. On the average how many women will get breast cancer sometime during their life: 1 out of 10.</td>
<td>34.0</td>
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<td>18. Who do you think is more likely to get breast cancer: women over 35.</td>
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*both radiation and chemotherapy are often used.
Results of Questions About Health Beliefs

Health beliefs were separated into seven different categories. The first category, barriers, focused on what stopped women from performing monthly BSE. The average response was a disagree indicating that women did not find that many barriers to BSE. Benefits focused on the positive aspects of performing BSE and the average response was an agree. Susceptibility asked women if they felt vulnerable to getting breast cancer. The average response was neutral, thus, women felt neither exceptionally vulnerable nor exceptionally protected. seriousness focused on the severity of getting breast cancer and the impact the disease would have. The response was generally neutral to agree indicating women felt the disease’s impact would be strong, but not overwhelming. The confidence category focused on belief in the ability to perform BSE correctly. The average was neutral to agree showing that women were somewhat more confident, than not confident, about their skills. Control assessed desire for control over breast cancer and the average response was agree. Last, health motivation assessed general interest in good health and the average response was agree.

This completes the presentation of the general results for the Health Beliefs and Behaviours Study. I would like to say thank you to all the participants with special notice to Judy Fried and Deb Leinweber. If you have any questions or concerns please do not hesitate to call or write to me:

Arlene D. Cox, M.A.
#1104, 505 - 4th Ave. S.W.
Calgary, AB, T2P 0J8
Home: (403) 234-0056
Fax: (403) 266-5847

If you would like more information about breast cancer and breast self-examination I have arranged for a contact person at the Canadian Cancer Society, Calgary District Unit. Please feel free to contact:

Nancy Jacques
Unit Public Education Coordinator
Suite 408, 1305 - 11th Avenue S.W.
Calgary, AB, T3C 3P6
Bus: (403) 244-2791 Fax: (403) 229-2540

Thank you, your participation was greatly appreciated.
Sincerely
APPENDIX E
CORRECT KNOWLEDGE RESPONSES
<table>
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<tr>
<th>Section C/Knowledge Items and Answers</th>
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APPENDIX F

PATTERN OF RESPONSE

AND TABLE 9
Susceptibility's average response to an item (presented in numbers in Table 4, Chapter III) was between disagree and neutral. The average Seriousness response was between neutral and agree. Benefits had an average response close to an agree. Barriers had an average response close to a disagree. The Confidence scale had an average response between neutral and agree. Control's average response was close to an agree. Health Motivation had an average response close to an agree. Bencon's average response was close to an agree.

Table 9.
Means, Maximum Scores, Standard Deviations, and Total N, for each Variable

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean Score</th>
<th>Maximum Score</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>11.73</td>
<td>24</td>
<td>8.00</td>
<td>210</td>
</tr>
<tr>
<td>Proficiency</td>
<td>20.41</td>
<td>30</td>
<td>4.84</td>
<td>210</td>
</tr>
<tr>
<td>Intent</td>
<td>33.92</td>
<td>43</td>
<td>7.62</td>
<td>244</td>
</tr>
<tr>
<td>Bsebehav</td>
<td>32.14</td>
<td>54</td>
<td>11.23</td>
<td>210</td>
</tr>
<tr>
<td>Susceptibility</td>
<td>12.51</td>
<td>25</td>
<td>3.85</td>
<td>243</td>
</tr>
<tr>
<td>Seriousness</td>
<td>27.34</td>
<td>40</td>
<td>4.78</td>
<td>244</td>
</tr>
<tr>
<td>Benefits</td>
<td>27.01</td>
<td>35</td>
<td>3.63</td>
<td>243</td>
</tr>
<tr>
<td>Barriers</td>
<td>15.18</td>
<td>35</td>
<td>4.65</td>
<td>244</td>
</tr>
<tr>
<td>Confidence</td>
<td>37.54</td>
<td>60</td>
<td>12.52</td>
<td>244</td>
</tr>
<tr>
<td>Control</td>
<td>15.93</td>
<td>20</td>
<td>2.42</td>
<td>244</td>
</tr>
<tr>
<td>Health Motiv.</td>
<td>30.36</td>
<td>40</td>
<td>4.71</td>
<td>244</td>
</tr>
<tr>
<td>Knowledge</td>
<td>18.30</td>
<td>28</td>
<td>3.36</td>
<td>244</td>
</tr>
<tr>
<td>Stage</td>
<td>3.39</td>
<td>5</td>
<td>1.23</td>
<td>240</td>
</tr>
<tr>
<td>Bencon</td>
<td>42.83</td>
<td>55</td>
<td>5.30</td>
<td>244</td>
</tr>
</tbody>
</table>
APPENDIX G

RESULTS INCLUDING IDEALISTIC CONTEMPLATORS
Idealistic Contemplators

The Idealistic Contemplators did not provide consistent or theoretically understandable responses. Correlations, regression analyses, and ANOVA's using the six stage version were less interpretable than the five stage version. In a sense, the existence of these women is questionable since they differentiate themselves from Precontemplators and Contemplators by their intent to perform in the future, not their actual behaviour. These women have strong cognitive beliefs in their vulnerability and commitment to health, however, their behavioural commitment is lacking. The existence of this group needs to be verified in future work that clarifies the relationship between stated intent to perform BSE and actual performance in the future.

Correlations

Correlations with Stage, including Idealistic Contemplators:

Age = .2503* (p<.001),
family history of breast cancer = .0757 (p>.05),
occupation = .0527 (p>.05), education = .0408 (p>.05),
SES = .0504 (p>.05), Barriers = -.4360* (p<.001),
Benefits = .1735 (p<.006), Susceptibility = 1448 (p<.03),
Seriousness = -.0594 (p>.05), Confidence = .5585* (p<.001),
Control = .2393* (p<.001), Health Motivation = .3422* (p<.001),
Knowledge = .2235* (p<.001), Bencon = .1997 (p<.003),
Bsebehav = .8763* (p<.001), Intent = .7504* (p<.001).

Multiple Regressions

When Stage was added to the multiple regression analysis of Bsebehav it was the most powerful predictor. Stage explained 76.7% of the variance in the criterion (F(4, 204) = 367.17, p<.0001). Only one other predictor variable was necessary to the equation, Knowledge. However, Knowledge only added a minimal level of explained variance (1.4%). The seven remaining predictors, and Age, were no longer useful to the equation.
Contrary to expectations following the result of the above regression analysis, when Stage was added with Bencon in the equation, the equation changed quite drastically. Stage explained 70.1% of the variance. Following Stage came Knowledge (1.5%), then Barriers (0.7%), and finally Susceptibility (0.5%). The overall combination of variables explained 72.5% of the variance, $F(4, 202) = 136.55, \ p < .0001$. The Bencon combination decreased the predictive power of Stage and increased the power of Barriers and Susceptibility to useful range. This equation is more similar to the equation without Stage since Barriers and Susceptibility are once more helpful predictors.

Similar to the Bsebehav analysis, when Stage was added to the regression analysis for Intent it was selected as the most powerful predictor, with 56.1% of the variance explained. Unlike the Bsebehav variable, Benefits (4.1%), Seriousness (1%), and Confidence (1%) were also significant predictors of Intent and provided an additional variance explanation of 6.1%, $(F(4, 234) = 98.74, \ p < .0001)$. The total variance explained was 62.2%. Again, the unexpected variable, Confidence, is important to the equation.

When Bencon was used with Stage, to explain Intent, the same variables were necessary to the equation. Stage explained 61.5%, Bencon 4.2%, Seriousness 1.2%, and Confidence 0.6% of the variance. However, the overall variance explained increased from 62.2% to 67.5%, $F(4, 234) = 122.37, \ p < .0001$. The Bencon variable acted similarly to the Benefits variable but helped create a more useful equation.

**Analysis of Variance**

These analyses were designed to determine if the predictor and criterion variables appropriately varied over the different Stages. $T$ scores were used to represent the different variable scores in order to promote easy comparison between stages and variables. Table 10 presents the order of scoring, from lowest to highest score, means, and significant pair differences, for each Analysis of Variance.
Table 10.

Order of Stage and Means, from Lowest to Highest, and Significant Pair Differences, for each ANOVA

<table>
<thead>
<tr>
<th>Pairs</th>
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<td>Contemplator 48.8</td>
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<td>Preparer 50.0</td>
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<td>Actor 50.6</td>
<td>Actor 50.6</td>
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<td>85</td>
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</tr>
<tr>
<td>Actor 49.1</td>
<td>Preparier 49.8</td>
<td>Preparer 50.5</td>
<td>-963 Preparer 50.5</td>
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<td>*74 Actor 53.2</td>
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<tr>
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<td>Actor 51.1</td>
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<td>--85 Maintainer 56.1</td>
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<th>Pairs</th>
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<th>Knowledge M</th>
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<tr>
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<tr>
<td>Actor 49.1</td>
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</tr>
<tr>
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<td>3 Actor 52.1</td>
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<tr>
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<td>Precontemplator 42.9</td>
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<td>54321 Precontemplator 29.1</td>
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<td>654 Idealistic 39.0</td>
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<td>Preparer 47.5</td>
<td>987 Contemplator 39.5</td>
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<tr>
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<td></td>
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<tr>
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<td>#6 Idealistic 54.6</td>
<td></td>
</tr>
<tr>
<td>Maintainer 53.8</td>
<td>-763 Maintainer 61.4</td>
<td>++95 Maintainer 57.9</td>
<td></td>
</tr>
</tbody>
</table>

Idealistic* = Idealistic Contemplators.
Pairs with similar numerals (1-9) or signs (*) differ from each other at the p<.05 significance level.
The comparison of Stage with Barriers clearly supported the presumption of differences between the stages \( F(5, 234) = 11.39, p < .0001 \). Further, Precontemplators (57.0) scored the highest on this scale while Actors (47.8) and Maintainers (44.0) scored the lowest. The SNK test for significant pair group differences showed that Maintainers were significantly different from all other stages and Actors were significantly different from Preparers (52.2), Contemplators (55.4) and Precontemplators.

The Benefits variable also varied significantly between the stages \( F(3, 233) = 2.48, p < .04 \). The gradient from lowest score (43.1) to highest score (52.2) was in the appropriate direction for the five original stages. The stage Idealistic Contemplation (53.2) revealed the greatest Benefits mean score, which was unexpected. There were no significant pair differences across the stages. Figure 9 displays the \( T \) Score means, over Stage, for Barriers and Benefits, separately.

The new variable, Bencon, mirrored the Benefits findings, with clear significant differences in the appropriate direction over the five original Stage classifications, \( F(5, 234) = 3.05, p < .02 \). Again, the Idealistic Contemplators (52.7) had the highest Bencon score, rather than the Maintainers (52.3), as expected. Similarly, the SNK test showed no significant pair differences.

The Seriousness scale has been shown to have limited relationships with the other variables in the study. When the Seriousness variable was assessed over Stage there were no differences between the groups \( F(5, 234) = 1.64, p > .05 \). The means ranged from 45.3 to 54.1 indicating an average perception of breast cancer as a serious disease. Figure 10 presents the \( T \) Score means, over Stage, for Bencon and Seriousness, separately.

The Susceptibility variable did not show any variation over Stage either \( F(5, 233) = 1.71, p > .05 \). The means ranged from 42.6 to 51.9 indicating a slightly lower perception of Susceptibility compared to
Figure 9. T Score gradient, over Stage, for Barriers and Benefits.
Figure 10. T Score gradient, over Stage, for Bencon and Seriousness.
Seriousness.

Confidence did vary over the Stage variable (F(5, 234) = 25.28, p<.0001). This predictor variable was clearly related to Stage since the SNK analysis showed that almost all of the stages were significantly different compared to the other stages. Maintainers (56.1) had significantly greater Confidence scores than Precontemplators (33.0), Idealistic Contemplators (43.7), Contemplators (44.2), Preparers (50.5), and Actors (53.2). Both Actors and Preparers had significantly higher scores than Precontemplators and Idealistic Contemplators. It is clear that confidence in one's ability, to perform BSE accurately and usefully, is highly related to Stage classification. Of note, is the poor position of Idealistic Contemplators on this measure of ability rather than belief. Figure 11 displays the T Score means, over Stage, for Susceptibility and Confidence, separately.

The predictor Control also varied across the Stage classifications (F(5, 234) = 3.52, p<.005). The SNK test indicated that both Precontemplators (42.4) and Contemplators (47.3) scored significantly lower than Maintainers (53.2).

Health Motivation varied across Stage (F(5, 234) = 6.75, p<.0001). Maintainers (54.8) had significantly greater motivation scores than the four lowest stages and Actors (52.1) were significantly different from Contemplators (46.4). Of note, are the poor scores for Idealistic Contemplators (44.7) who scored lower, but not significantly so, than Precontemplators (45.7). This variable measures actual health behaviours performed. Figure 12 presents the T Score means, over Stage, for Control and Health Motivation.

Knowledge varied significantly over Stage as well (F(5, 234) = 3.24, p<.008). The SNK test indicated that Precontemplators (41.7) had significantly lower Knowledge scores compared to Preparers (50.5), Actors (51.8), and Maintainers (52.1). Age was also assessed over Stage and was found to vary significantly by group (F(5, 233) = 4.06, p<.002). However,
Figure 11. T Score gradient, over Stage, for Susceptibility and Confidence.
Figure 12. T Score gradient, over Stage, for Control and Health Motivation.
no significant pair differences were found. Figure 13 displays the T Score means, over Stage, for Knowledge and Age, separately.

Although Stage was created using one of the eleven Bsebehav items, an Analysis of Variance across Stage using Bsebehav was considered important information. To support the validity of the Stage measure a more general measure of BSE behaviour must vary across the stages, as predicted by Stage definition. The Bsebehav scores did vary significantly across Stage classification \( F(5, 201) = 150.85, p < .0001 \). Precontemplators (34.7) were found to have significantly lower scores than Preparers (43.5), Actors (53.0), and Maintainers (61.4). In fact, Maintainers scored significantly higher than all the other stages. Actors scored higher than the remaining four stages. Preparers scored higher than the first three stages. The variation across Stage clearly supported the gradient of BSE behaviour expected.

Stage was also created using one of the seven Intent items. However, the variation across the Stages on the Intent scale was, again, considered important as it would provide validity for the Stage concept. The Analysis of Variance clearly showed different Intent scores over the six stages \( F(5, 234) = 121.13, p < .0001 \). Precontemplators (29.1) were significantly lower and Maintainers (57.9) significantly higher than all other stages. Actors (54.1) scored higher than Precontemplators, Contemplators (38.0), and Preparers (51.5). Both Preparers and Realistic Contemplators (54.6) scored higher than Precontemplators and Contemplators. The Idealistic Contemplators appeared to be more similar to the Preparers and Actors in this analysis rather than the Contemplators. Figure 14 presents the T Score means, over Stage, for Bsebehav and Intent, separately.

**Support for Stage Hypotheses**

With regard to the specific hypotheses generated for the fifth goal, Hypothesis Ten was generally confirmed. Precontemplators had the highest scores on Barriers and the lowest scores on all other predictor variables,
Figure 13. T Score gradient, over Stage, for Knowledge and Age.
Figure 14. T Score gradient, over Stage, for Bsebehav and Intent.
except for Health Motivation. Idealistic Contemplators scored lowest on Health Motivation with Precontemplators (44.7 vs. 45.7).

Hypothesis Eleven was supported in a limited way, such that, Actors and Maintainers did score lowest on Barriers, however, they were not always the highest scorers on the other predictors. The Idealistic Contemplator stage interfered with support since these women scored highest on Benefits, Bencon, and Seriousness, and higher than Actors and Preparers on Control. Of note, is that the Seriousness variable showed little variation over the Stages, and no significant differences.

Figure 15 demonstrates the variation in the Bencon and Barriers means over the six stages. This comparison is provided in order to clarify the relationship between the previously found pro/con variation over Stage (Prochaska and DiClemente, 1992) and the, possibly analogous, Bencon and Barriers variation over Stage. The Confidence variable was also included in the Figure because it was the predictor variable with the most significant differences over Stage.

Predicting Stage

The final goal of the study was to determine the predictive power of the nine predictor variables (Barriers, Benefits, Susceptibility, Seriousness, Confidence, Control, Health Motivation, Knowledge, and Bencon) and Age with regard to Stage of change. The power of the criterion variable Proficiency was also assessed since it was not used to create the Stage variable.

A multiple regression analysis was performed using the zero order approach, i.e.; all variables had an equal chance to be entered into, or withdrawn from, the equation at each step. The final equation explained 43.5% of the variance in Stage. Confidence provided 32.1%, Barriers provided 6.0%, and Proficiency, Susceptibility, and Age provided the additional 5.4%. Thus, Hypothesis Fourteen is given some support, since Barriers and Proficiency were useful predictors of Stage of change. However, Benefits was expected to be useful and was not. The regression
Figure 15. T Score gradient, over Stage, for Barriers, Bencon, and Confidence, combined.
analysis was performed a second time using Bencon, in place of Benefits and Control. All variance explained, and the variables used, were the same.

It was then decided to run the multiple regression analysis with the two criterion variables and without Proficiency. Bsebehav and Intent were included in the regression analysis along with the eight HBM predictors and Age. The equation explained 82.9% of the variance in Stage, $F(5, 201) = 200.47, \ p < .0001$. Bsebehav explained 70.3% of the variance and Intent explained 11.7%. Two additional variables were used, Confidence and Knowledge, but their contribution was minimal (0.9%).

When the above analysis was run with Bencon the variance explained changed slightly, dropping to 82.7% ($F(5, 201) = 197.85, \ p < .0001$). Bsebehav and Intent were still the major contributors (81.8%) and Bencon was not used in the equation.
APPENDIX H

BSE READINESS QUESTIONNAIRE
We would like to ask you some questions about your experience with breast cancer and breast self-examination. Breast self-examination is when you examine your breasts for the purpose of finding an unusual lump. Each question provides a number of different answers, please circle the answer that best reflects what you have done in the past or your intentions for the future.

1. Have you ever examined your breasts for lumps?
   Yes --> go to question 2
   No --> go to question 3

2. During the past six months, how many times did you examine your breasts for lumps? Did you...
   a) not examine    b) examined 1 time
   c) examined 2 times  d) examined 3 times
   e) examined 4 times  f) examined 5 times
   g) examined 6 times  h) examined more than 6 times

3. During the next year how often will you examine your breasts? Will you...
   a) not examine    b) examine 1 time
   c) examine 2 times  d) examine 3 times
   e) examine 4 times  f) examine 5 times
   g) examine 6 times  h) examine 7 times
   i) examine 8 times  j) examine 9 times
   k) examine 10 times  l) examine 11 times
   m) examine 12 times  n) examine more than 12 times

*All of the remaining questions will be scored:
   a) strongly disagree    b) disagree    c) neutral
   d) agree    e) strongly agree

The next group of questions concerns what you believe are the results of breast self-examination. In answering these questions, assume that you perform breast self-examination on a monthly basis.

4. Completing breast self-examination each month will allow me to find lumps early.

5. If I complete breast self-examination monthly during the next year, I will decrease my chances of dying from breast cancer.

6. If I complete breast self-examination monthly I will decrease my chances of requiring radical or disfiguring surgery if breast cancer occurs.

7. If I complete monthly breast self-examinations, it will help me find a lump, which might be cancer, before it is discovered by a doctor or nurse.

The following questions ask about the amount of control you feel over breast cancer. There are no right answers. Please choose the answer which best fits your feelings.

8. I can control the effects of breast cancer by discovering lumps at an early stage with monthly breast self-examination.
9. I can control the effects of breast cancer by discovering lumps at an early stage through mammography.

10. I can control the effects of breast cancer by discovering lumps at an early stage through professional breast examination.

The next group of questions concerns what you believe are the problems with performing breast self-examination. In answering these questions you should assume that you will perform breast self-examination monthly. Please answer each question by circling the response that best fits how you believe.

11. I feel funny doing breast self-examination.

12. Doing breast self-examination during the next year will make me worry about breast cancer.

13. Breast self-examination would be embarrassing to me.


15. Doing breast self-examination would be unpleasant.

16. It is hard to remember to do breast self-examination.

17. I don't have enough privacy to do monthly breast self-examination.

The following group of questions concerns your confidence in completing breast self-examination and in controlling breast cancer. As before, there are no right answers. Please answer by circling the response that best fits you.

18. I know how to perform breast self-examination.

19. I am confident I can perform breast self-examination correctly.

*If you have performed at least one breast self-examination continue with question 20. However, if your answer to Question 1 was No, you have never performed a breast self-examination, then you do not need to answer any of the remaining questions and have finished the questionnaire.

20. If I were to develop breast cancer, I would be able to find a lump by performing breast self-examination.

21. I am able to find a breast lump if I practice breast self-examination alone (without a health professional).

22. I am able to find a breast lump which is the size of a quarter.

23. I am able to find a breast lump which is the size of a dime.

24. I am able to find a breast lump which is the size of a pea.

25. I am sure of the steps to follow in doing breast self-examination.

26. I am able to identify normal and abnormal breast tissue when I do breast self-examination.

27. When looking in the mirror, I can recognize abnormal changes in my breasts.

28. I can use the correct part of my fingers when I examine my breasts.
REFERENCES


VITA AUCTORIS

Arlene D. Cox was born on May 26, 1964 in Wellingborough, England. On September 10, 1974 the Cox family immigrated to Calgary, Alberta where they promptly fell in love with the sun and Stampede. Five years later the Cox's became official Canadian citizens. Arlene graduated, in June 1982, from Crescent Heights High School with full matriculation. She then enrolled at the University of Calgary and spent four years obtaining a Bachelor of Science degree, with honours, in Psychology. Following this achievement, Arlene moved to Windsor, Ontario, in September 1986, to enter the Adult Clinical Psychology program at the University of Windsor. She achieved her Masters Degree in Clinical Psychology in January 1989. The pre-doctoral internship was completed at the Calgary General Hospital during the 1989-1990 term. Following completion of all specialty requirements, June 1992, Arlene began her quest for a dissertation topic. The dissertation proposal was accepted April 1993 and the progress report was approved January 1994. The final defense, on June 3, 1994, went very smoothly.